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Sessional papers.

SESSIONAL PAPERS.

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OF THE

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OF THE

PROVINCE OF ONTARIO.

SESSION 1912.

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LIST OF SESSIONAL PAPERS

ARRANGED ALPHABETICALLY.

TITLE.	NO.	REMARKS.
Accounts, Public	1	*Printed.*
Agricultural College, Report	29	"
Agricultural and Experimental Union, Report	31	"
Agricultural Societies, Report	43	"
Agriculture, Department of, Report	28	"
Apples, Barrels of, at Demonstration Orchards	75	*Not Printed.*
Archivist, Report	50	*Printed.*
Auditor, Provincial, Statement of	53	"
Bee-keepers' Association, Report	37	*Printed.*
Bi-lingual Schools, Merchant's Report	62	*Printed for Distribution.*
Births, Marriages and Deaths, Report	19	*Printed.*
Boundary, Ontario and Manitoba, Correspondence	54	*Printed for Distribution.*
Boundary, Ontario and Manitoba, Order-in-Council	59	*Not Printed.*
Canadian Hospital Association	81	*Printed for Distribution.*
Charities and Correction Conference	80	*Printed for Distribution.*
Children, Neglected, Report	26	*Printed.*
Combines, Prosecution of Alleged	82	*Not Printed.*
Compensation for Injuries to Employees	65	*Printed.*
Corn Growers' Association, Report	35	"
Dairymen's Association, Report	38	*Printed.*
Demonstration Orchards, Apples at	75	*Not Printed.*
Dempsey. S. J., Correspondence	83	"
Division Courts, Report	5	*Printed.*
Education Report	16	*Printed.*
Education, Orders-in-Council	57	*Not Printed.*
Education, English-French Schools Report	62	*Printed for Distribution.*
Education, Correspondence, Teaching in Springer	78	*Not Printed.*
Elections, Interference in, by Officials	72	"
Elections, Returns from Records	49	*Printed.*
Employers and Employees, Compensation for Injuries, Report	65	"

Title.	No.	Remarks.
English-French Schools, Merchant's Report	62	*Printed for Distribution.*
Entomological Society, Report	36	*Printed.*
Estimates	2	"
Factories, Report	45	*Printed.*
Farmers' Institutes, Report	40	"
Feeble-Minded, Report	23	"
Fruit Branch, Report	33	"
Fruit-Growers' Report	32	"
Game and Fisheries, Report	13	*Printed.*
Game and Fisheries Commission, Report	52	"
Government Employees, Interference in Elections	72	*Not Printed.*
Hardy, Judge, Commutation	63	*Not Printed.*
Health, Report	20	*Printed.*
Highways, Permanent, Correspondence *re* Construction	74	*Not Printed.*
Highways, Improvement, Report	14	*Printed.*
Horticultural Societies, Report	42	"
Hospitals and Charities, Report	24	"
Hydro-Electric Power Commission, Report	47	"
Idiots and Epileptics, Report	22	*Printed.*
Industries Report	44	"
Infant Mortality, Report	60	"
Insane Hospitals, Report	21	"
Insurance, Report	10	"
James Bay Surveys, Report	70	*Printed for Distribution.*
Judicature Act, Commutation	63	*Not Printed.*
Labour, Report	15	*Printed.*
Lands, Forests and Mines, Report	3	"
Legal Offices, Report	6	"
Library, Report	51	*Not Printed.*
Liquor License Acts, Report	27	*Printed.*
Liquor, Illegal Sale of, Prosecutions for	55	*Not Printed.*
Live Stock Associations, Report	39	*Printed.*
Loan Corporations, Statements	11	"
Mines, Report	4	*Printed.*
Municipal Auditor, Provincial, Report	8	"

Title.	No.	Remarks.
Ne Temere Decree, Questions	58	*Not Printed.*
Northern Ontario, Prosecutions in	55	"
Ontario and Manitoba Boundary, Order-in-Council	59	*Not Printed.*
Ontario and Manitoba Boundary, Correspondence	54	*Printed.*
Ontario Railway and Municipal Board, Report	48	"
Political Contests, Official Interference in	72	*Not Printed.*
Provincial Municipal Auditor, Report	8	*Printed.*
Printing Paper Agreements	66 67 68	"
Prisons and Reformatories. Report	25	"
Psychiatry in Ontario, Bulletin	69	*Printed for Distribution.*
Public Accounts	1	*Printed.*
Public Works, Report	12	"
Queen Victoria Niagara Falls Park, Report	9	*Printed.*
Railway and Municipal Board, Report	48	*Printed.*
Registrar-General, Report	19	"
Registry Offices, Report	7	"
Sarnia, Typhoid Fever in, Cause of	71	*Printed.*
Secretary and Registrar, Report	18	"
Springer Township, Teaching French in, etc.	78	*Not Printed.*
Statutes. Distribution of	73	"
Statute Revision, Payments made	77	"
Subject, Charles, Correspondence	61	"
Surrogate Court, Orders-in-Council	56	"
Temiskaming and N. O. Railway, Report	46	*Printed.*
Temiskaming and N. O. Railway, Running Rights over, etc.	64	*Not Printed.*
Temiskaming and N. O. Railway, Elk Lake Branch	76	"
Timber Limits, Number of Sales of, since 1905	79	"
Toronto University. Report	17	*Printed.*
Typhoid Fever in Sarnia	71	"
Vegetable Growers' Association, Report	34	*Printed.*
Veterinary College, Report	30	"
Women's Institutes, Report	41	*Printed.*

LIST OF SESSIONAL PAPERS

Arranged in Numerical Order with their Titles at full length; the dates when presented to the Legislature; the name of the Member who moved the same, and whether ordered to be Printed or not.

CONTENTS OF PART I.

No. 1 Public Accounts of the Province for the year ending 31st October, 1911. Presented to the Legislature, 19th February, 1912. *Printed.*

No. 2 Estimates—Supplementary for the service of the Province for the year ending 31st October, 1912. Presented to the Legislature, 26th February and 28th March, 1912. *Printed.* Estimates for the year ending 31st October, 1913. Presented to the Legislature, 1st April, 1912. *Printed.*

CONTENTS OF PART II.

No. 3 Report of the Minister of Lands, Forests and Mines for the year 1911. Presented to the Legislature, 9th April, 1912. *Printed.*

No. 4 Report of the Bureau of Mines, for the year 1911. Presented to the Legislature, 15th March, 1912. *Printed.*

No. 5 Report of the Inspector of Division Courts, for the year 1911. Presented to the Legislature, 1st March, 1912. *Printed.*

No. 6 Report of the Inspector of Legal Offices, for the year 1911. Presented to the Legislature, 13th March, 1912. *Printed.*

CONTENTS OF PART III.

No. 7 Report of the Inspector of Registry Offices, for the year 1911. Presented to the Legislature, 26th March, 1912. *Printed.*

No. 8 Report of the Provincial Municipal Auditor, for the year 1911. Presented to the Legislature, 11th April, 1912. *Printed.*

No. 9 Report of the Commissioners for the Queen Victoria Niagara Falls Park, for the year 1911. Presented to the Legislature, 18th March, 1912. *Printed.*

No. 10 Report of the Inspector of Insurance and Registrar of Friendly Societies, for the year 1911. Presented to the Legislature, 1st March, 1912. *Printed.*

CONTENTS OF PART IV.

CONTENTS OF PART V.

CONTENTS OF PART VI.

CONTENTS OF PART VII.

CONTENTS OF PART VIII.

CONTENTS OF PART IX.

CONTENTS OF PART X.

CONTENTS OF PART XI.

CONTENTS OF PART XII.

CONTENTS OF PART XIII.

No. 50 Report of the Archivist of Ontario. Presented to the Legislature, 3rd April, 1912. *Printed.*

No. 51 Report on the State of the Legislative Library. Presented to the Legislature, 8th February, 1912. *Not Printed.*

No. 52 Report of the Game and Fisheries Commission, for 1909-11. Presented to the Legislature, 2nd April, 1912. *Printed.*

CONTENTS OF PART XIV.

No. 53 Statements of Provincial Auditor under Audit Acts. Presented to the Legislature, 26th March, 1912. *Printed.*

No. 54 Return to an Address to His Honour the Lieutenant-Governor of the Fourteenth day of February, 1912, praying that he will cause to be laid before this House a Return of copies of—

1. All correspondence which has passed since the 1st day of August, 1908, between the Government of the Province of Ontario or any member thereof or any person on its behalf, and the Government of the Dominion of Canada, or any member thereof or any person on its behalf, in reference to the Boundary between the Provinces of Ontario and Manitoba, through the territory now known as the District of Keewatin.

2. All correspondence which has passed since the 1st day of August, 1908, between the Government of the Province of Ontario or any member thereof or any person on its behalf, and the Government of the Province of Manitoba or any member thereof or any person on its behalf, in reference to the boundary between the Province of Ontario and Manitoba through the territory now known as the District of Keewatin.

3. All other papers in the possession of the Government in reference to the said boundary, including all reports in the possession of the Government in reference to the character and resources of the territory now known as the District of Keewatin. Presented to the Legislature, 20th February, 1912. *Mr. Rowell. Printed for Distribution.*

No. 55 Return to an Order of the House of the Fourteenth day of February, 1912, shewing—

1. What prosecutions have been instituted against parties in Northern Ontario for the illegal sale of liquor in Northern Ontario during the calendar year 1911.

2. The result of such prosecutions.

3. What amount the Government has received during the calendar year 1911 by way of fines imposed for the illegal sale of liquor in Northern Ontario. Presented to the Legislature, 20th February, 1912. *Mr. McDonald. Not Printed.*

No. 56 Copies of Orders-in-Council in accordance with the provisions of s-s. 6 of s. 78 of the Surrogate Courts Act. Presented to the Legislature, 22nd February, 1912. *Not Printed.*

No. 57 Copies of Orders-in-Council and Regulations required by section 27 of the Department of Education Act. Presented to the Legislature, 22nd February, 1912. *Not Printed.*

No. 58 Copy of Questions submitted to the Supreme Court, by the Government of Canada, relative to the *Ne Temere* decree and an Act to amend the Marriage Act. Presented to the Legislature, 27th February, 1912. *Not Printed.*

No. 59 Copy of an Order-in-Council of the Government of Canada, respecting the Boundary Line between Ontario and Manitoba. Presented to the Legislature, 27th February, 1912. *Not Printed.*

No. 60 Report upon Infant Mortality in the Province. (*Not Presented.*)

No. 61 Return to an Order of the House of the 23rd of February, 1912, for a Return of all correspondence from August, 1st, 1911, to date, between the Attorney-General or any official of his Department and any person or persons of the Town of Chesley or elsewhere, respecting the prosecution, conviction and fining of one Charles Subject by Magistrate Montgomery for an infringement of the provisions of the Liquor License Act. Presented to the Legislature, 1st March, 1912. *Mr. McDonald. Not Printed.*

No. 62 Merchant's report on the condition of English-French Schools in the Province. Presented to the Legislature, 6th March, 1912. *Printed for Distribution.*

No. 63. Copy of an Order-in-Council increasing the commutation paid to His Honour A. D. Hardy, Judge of the County Court of Brant. Presented to the Legislature, 13th March, 1912. *Not Printed.*

No. 64 Return to an Order of the House of the Twenty-sixth day of February, 1912, for a Return of copies of: 1. All correspondence between the Government or any member or official thereof or the Temiskaming and Northern Ontario Railway Commission or any member or official thereof and the Grand Trunk Pacific Railway Company or the Grand Trunk Railway or any official of either of them with respect to.

(*a*) The acquisition of running rights over the Temiskaming and Northern Ontario Railway;

(*b*) The leasing, running, or operating of dining, cafe, or buffet cars on the tracks of the Temiskaming and Northern Ontario Railway.

2. All agreements between the Government of Ontario or any department thereof or the Temiskaming and Northern Ontario Railway Commission and any other person or corporation with respect to:

(*a*) The acquisition of running rights over the Temiskaming and Northern Ontario Railway;

(*b*) The leasing, running, or operating of dining, cafe, or buffet cars on the tracks of the Temiskaming and Northern Ontario Railway. Presented to the Legislature, 19th March, 1912. *Mr. Rowell. Not Printed.*

No. 65 Interim Report on Laws, relating to the liability of employers to make compensation to their employees for injuries received in the course of their employment which are in force in other countries and as to how far such laws are found to work satisfactorily. Presented to the Legislature, 29th March, 1912. *Printed.*

No. 66 Agreement made by and between the Kinleith Paper Company, Limited, of the first part, and His Majesty the King, represented by the Honourable the Treasurer, of the second part, conditioned for the supply of printing paper for the use of the Province. Presented to the Legislature, 20th of March, 1912. *Printed.*

No. 67 Agreement made by and between the Montrose Paper Mills, Limited, of the first part and His Majesty the King, represented by the Honourable the Treasurer, of the second part, conditioned for the supply of printing paper for the use of the Province. Presented to the Legislature, 20th March, 1912. *Printed.*

No. 68 Agreement made by and between the Georgetown Coated Paper Mills, Limited, of the first part, and His Majesty the King, represented by the Honourable the Treasurer, of the second part, conditioned for the supply of printing paper for the use of the Province. Presented to the Legislature, 20th March, 1912. *Printed.*

No. 69 Bulletin of the Ontario Hospitals for the Insane in the interests of Psychiatry. Presented to the Legislature, 21st March, 1912. *Printed for Distribution.*

No. 70 Report on James Bay Survey Explorations, Cochrane to James Bay, June 9th to September 12th, 1911. Presented to the Legislature, 21st March, 1912. *Printed for Distribution.*

No. 71 Report of special investigation into the cause of Typhoid Fever in the Town of Sarnia. Presented to the Legislature, 21st March, 1912. *Printed.*

No. 72 A Return to an Order of the House of the 14th February, 1912, for a Return shewing: 1. All complaints received by the Government since the first day of January, 1911, in reference to the participation of any officers, officials or employees of the Government in political contests or taking part in political matters in this Province.

2. All correspondence arising out of or incidental to such complaints.

3. All correspondence passing between the Government or any Department or Member thereof and any officer, officials, or employees of the Government with reference to the participation of such officers, officials or employees in political contests or taking part in political matters in this Province since the first day of January, 1911. Presented to the Legislature, 22nd March, 1912. *Mr. Mageau. Not Printed.*

No. 73 Statement of the distribution of Revised and Sessional Statutes. Presented to the Legislature, 25th March, 1912. *Not Printed.*

No. 74 Return to an Address to His Honour the Lieutenant-Governor of the 14th February, 1912, praying that he will cause to be laid before this House a Return of copies of all correspondence between the Government of the Province of Ontario or any member thereof, or any person on its behalf, and the Government of the Dominion of Canada, or any member thereof, or any person on its behalf, with reference to the construction of permanent highways in the Province or grants to aid in such construction. Presented to the Legislature, 26th March, 1912. *Mr. Ferguson (Kent). Not Printed.*

No. 75 Return to an Order of the House of the 27th February, 1912, showing:—1. How many barrels of apples were produced in each year in each of the 45 Demonstration Orchards instituted by the Government. 2. What was the sale price *per* barrel of the apples from each of the said Demonstration Orchards. 3. What are the names and qualifications of the several orchard demonstrators now in the employ of the Government. Presented to the Legislature, 26th March, 1912. *Mr. Anderson (Bruce). Not Printed.*

No. 76 Return to an Order of the House of the 8th March, 1912, for a Return of copies of all correspondence between any person and the Government or any member thereof with respect to the construction of a Branch of the Temiskaming and Northern Ontario Railway to Elk Lake or further, with memorandum of dates upon which delegations waited upon the Government or any member thereof in support of the construction of the said Branch; also all surveyors' or other reports received by the Government with respect to the feasibility and cost of construction of the said Branch and all other papers or documents bearing upon the question of the construction of the said Branch. Presented to the Legislature, 27th March, 1912. *Mr. Mageau. Not Printed.*

No. 77 Return to an Order of the House of the 23rd February, 1912, for a Return shewing: The names of all persons to whom payments have been made in connection with the present Revision of the Statutes, and the total amount paid to each, and the services or other matter in respect of which such payments were made. Presented to the Legislature, 29th March, 1912. *Mr. Proudfoot. Not Printed.*

No. 78 Return to an Order of the House of the 15th March, 1912, for a Return of copies of all correspondence since the first day of January, 1911, between the Minister of Education, the Deputy-Minister of Education or any Official of the Department of Education and any School Trustee, Board of Trustees, or any person in the Township of Springer, with respect to the character of teaching in the Schools of the said Township, with respect to the teaching of French in the said Schools, with respect to the employment of teachers in the said Schools, or with respect to the giving or withholding of grants from the said Schools or any of them. Presented to the Legislature, 1st April, 1912. *Mr. Marshall. Not Printed.*

No. 79 Return to an Order of the House of the 28th day of February, 1911, for a Return shewing: (*a*) The number of sales of timber limits which have taken place in each year since 1905; (*b*) The location and acreage of each limit sold; and (*c*) The name of the purchaser in each case; (*d*) The price paid per acre, or otherwise, in each case; (*e*) The berth, or area of each berth, which had been under permit previous to the sale, with the original date of the permit; (*f*) The area of each berth damaged by fire previous to the sale; (*g*) The berth, or berths, which were virgin territory; (*h*) The reasons which caused each timber sale to be held from 1905 down to date; (*i*) The number of permits to cut timber current in the season of 1904-5; the number of permits to cut timber current in the season of 1910-11. Presented to the Legislature, 3rd April, 1912. *Mr. MacKay. Not Printed.*

No. 80 — Report of Proceedings of the Twelfth Canadian Conference of Charities and Correction. Presented to the Legislature, 10th April, 1912. *Printed for Distribution.*

No. 81 — Report of the Sixth Annual Meeting of the Canadian Hospital Association. Presented to the Legislature, 10th April, 1912. *Printed for Distribution.*

No. 82 — Return to an Order of the House of the 14th February, 1912, for a Return of copies of all correspondence passing in the years 1905 and 1906 between the Attorney-General or any officer or official of his Department and Mr. J. W. Curry, K.C., Crown Attorney of the City of Toronto, or his successor, with reference to the prosecution of any alleged combines and all briefs, statements or other documents furnished by Mr. Curry to the Attorney-General or any officer or official of his Department with reference to any of the said alleged combines. Presented to the Legislature, 10th April, 1912. *Mr. Elliott. Not Printed.*

No. 83 — Return to an Order of the House of the 9th April, 1912, for a Return of copies of (1) All correspondence between the Government or any Minister or Officer thereof and any person, association, board or organization whatsoever, between the 1st day of July, 1911, and the present date; and also (2) All protests, resolutions, objections or written statements of any kind whatsoever received by the Government or any Minister or Officer thereof, between the said dates with respect to: (*a*) The conduct of one S. J. Dempsey, in his official capacity as Police Magistrate or as Crown Lands Agent; (*b*) The participation of the said S. J. Dempsey in the Federal Election contest in South Renfrew; (*c*) The participation of the said S. J. Dempsey in the Provincial Election contests held in December, 1911. Presented to the Legislature, 12th April, 1912. *Mr. McQueen. Not Printed.*

REPORT

OF THE

Minister of Lands, Forests and Mines

OF THE

PROVINCE OF ONTARIO

For Year Ending 31st October

1911

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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CONTENTS.

Report of the Minister of Lands, Forests and Mines of the Province of Ontario

For the Year ending 31st October, 1911.

To His Honour THE HONOURABLE J. M. GIBSON,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

As required by law, I submit for the information of your Honour and the Legislative Assembly a report of the management of the Crown Lands of the Province for the year ending 31st October, 1911.

CLERGY LANDS.

The amount collected on account of sales of Clergy Lands was $4,522.15. (See Appendix No. 3, page 7.)

COMMON SCHOOL LANDS.

The area of these lands sold during the year was .50 acres for $25. The collection on account of these and former sales was $6,281.24. (See Appendix No. 3, page 7.)

GRAMMAR SCHOOL LANDS.

The amount collected on account of sales of Grammar School Lands was $200. (See Appendix No. 3, page 7.)

UNIVERSITY LANDS.

The area of these lands sold during the year was 5,626 acres for $2,818.25. The collection on account of these and former sales was $1,889.12. (See Appendix No. 3, page 7.)

CROWN LANDS.

There was sold for agricultural purposes during the year 118,573 acres for $159,889.89. There was collected on account of these and former sales $109,681.31. There was sold for mining purposes 27,924 acres for $58,997.77. There was collected on account of these and former sales $64,268.43.

There was leased for mining purposes 10,292 acres, for $11,758.64. There was collected on account of mining leases $25,797.14. There were 5,213 acres leased for other than mining purposes and collected on account of Crown Leases $21,577.82. The total area of lands of the Crown disposed of during the year was 167,629.57 acres and the total collection on account of lands sold and leased was $234,217.21. (See Appendix No. 3, page 7.)

Free Grants.

During the year settlers evidenced an increased desire to take up free farms, there being nearly 200 more locations carried out than in the previous year. No less than 1,568 applicants were located for 224,042 acres. The Department is insisting upon a vigorous compliance with settlement regulations, and is continuing the practice of inspecting located lands to ascertain where there is a default in the conditions. The Department is also endeavouring to prevent lands that are unsuitable for farming being located merely for the purpose of getting the timber.

Part of the Township of Morgan in the Sudbury District and the Township of Melgund in the Kenora District have been opened for location. Locations and patents in these townships carry the mines and minerals, and in the case of Melgund the settler also gets the pine timber.

Military Grants.

The total number of Military Certificates issued to date, under I. Edward VII., cap. 6, is 13,995.

Forty-three Location Certificates were issued this year and 237 new locations were made, making the total number of locations 7,732.

Twenty-one Certificates were surrendered to the Crown for $50.00, making a total disposed of in this manner of 3,322.

The number of Certificates that have been applied in payment for Crown Lands is 688.

The number of locations cancelled for non-compliance with the regulations of settlement duties on lots located under assigned Military Certificates was nine.

The total number therefore that are shown to have been redeemed is 11,742, leaving as still outstanding 2,257.

Patents were issued during the year for 674, making a total of 4,563 issued to the end of the year.

The Mineral Industry.

The aggregate value of the mineral products of Ontario increases year by year. In 1911 the output of the mines and metalliferous works of the Province amounted in value to about 42 millions of dollars. Of this, metallic products contributed about 29 millions and non-metallic products 13 millions.

In their yield of silver the mines of Cobalt provide one-seventh of the world's output, the production for 1911 being thirty-one and a half million ounces. A feature of the camp is the development of concentration and refining processes on the spot. Most of the high-grade ore is now treated within the bounds of the Province, and the mines are finding it increasingly profitable to concentrate their lower-grade material, thus escaping the payment of freight charges on much waste rock. A number of the companies are now shipping merchantable bars direct to London. South Lorrain and Gowganda are also producing silver.

The development of the gold mines at Porcupine was not a little impeded by the disastrous fires which swept that neighborhood in the summer of 1911, and which caused so lamentable a loss of human life. The two largest and most advanced plants, those at the Dome and Hollinger mines, were completely destroyed, but are both being re-built. Several other mining properties suffered severely. As a result, the actual gold production at Porcupine was small. Early in 1912, however, it is expected that the two mines mentioned as well as some others will be yielding bullion, and it may confidently be expected that Porcupine will make an appreciable contribution to the gold supply of the Dominion. The Temiskaming and Northern Ontario branch line from Iroquois Falls was approaching completion at the end of the year. Power for operating the mines is being obtained from Sandy Falls on the Mattagami River, in the Township of Mountjoy, and Wawaitin Falls farther up the same river are also undergoing development. Promising finds of gold bearing quartz have been made at West Shining Tree Lake, in the Temagami Forest Reserve.

The output of nickel and copper from the mines of the Sudbury District was somewhat less than in 1910, the yield of nickel being 17,049 tons, and of copper 8,966 tons, the whole having a value in the form of matte of about 5 million dollars. The Canadian Copper Company have increased the smelting capacity of their plant, the ores for which are being taken from the Creighton, Crean Hill and No. 2 mines. The Mond Nickel Company's new smelting works at Coniston, east of Sudbury, were greatly advanced during the year. On the northern range the Dominion Nickel Copper Company did a good deal of drilling and testing.

A notable addition to the iron ore resources of the Province has been made at Magpie in the Michipicoten District, where a large deposit of sideritic ore is being opened up by the Lake Superior Corporation. It is proposed to roast the ore for the removal of sulphur and carbonic acid previous to smelting. The Helen mine in the same district has been systematically worked, and at Moose Mountain, north of Sudbury, a plant for concentrating the magnetic ores of that mine is being installed.

It is evident that the mining industry will prove of great service in the settlement of population in the northern parts of the Province. As exploration is extended, the pre-Cambrian formations are revealing their riches of metallic ores—gold, silver, nickel, copper, iron—and the mining camps which have already come into existence and which are bound to spring up in the future will afford the very best market for all sorts of farm products. Now that railways are rendering Northern Ontario more accessible to prospectors, lumbermen and farmers, the natural wealth of the country, hitherto lying dormant, is being more easily and rapidly developed.

Collections.

The total collections of the Department from all sources for the year were $2,710,242.68. Of this amount $64,268.43 was derived from mining lands; $285,913.26 from royalties; $1,711,438.87 from woods and forests; $941,709.28 from supplementary revenue; $78,800.60 from mining licenses and $126,676.59 from recording fees. (See Appendix No. 4, page 8.)

Disbursements.

The gross expenditure of the Department for all services during the year was $672,655.48. The principal services were: Agents' salaries and disbursements $57,039.71; Forest ranging $106,714.17; Fire ranging $110,111.90; Forest reserves $80,588.90; Mines and mining $22,822.62; Explorations and investigations $12,213.30; Mining Recorders $32,804.37; Veterans' commutation $1,050.00; Surveys $167,428.64; Refunds $20,546.54; Parks $20,685.25; Contingencies $20,898.67. (See Appendices Nos. 6 and 7, pages 10 to 32.)

Woods and Forests.

The revenue accrual under this head for the year ending the 31st of October last was $2,151,258.14, which is $315,393.82 in excess of the revenue accrual for the previous year.

The increased accrual is caused by the coming in force this year of the regulation increasing the timber dues on old limits. The dues on sawlogs have been advanced by 50c. per thousand feet board measure, and on square timber by $25 per thousand feet cubic. The ground rent was increased last year from $3 to $5, and the transfer bonus was also increased from $3 to $5 per mile.

The revenue collected during the year was $1,711,436.87, being $123,543.84 less than that of the previous year. The decrease in revenue was caused by lumbermen failing to pay in before the 31st of October, the end of our fiscal year, a number of them finding it impossible to pay at that date.

The cut of pine sawlogs and boom timber was 29,000,000 feet board measure less than that of last year. There was also a small decrease in the quantity of other kinds of timber cut. The cut of pulpwood was 9,000 cords less than that of 1910. There was an increase of 467,171 railway ties over the previous year, and a small increase in the quantity of square timber cut. Under the system of culling and measurement in force with respect to recent timber sales the Crown appoints and pays the men who measure, which has caused an increased expenditure under the head of forest ranging. Half of the expense, however, is refundable by the licensees whose timber is measured under this system.

There were no timber sales of any consequence held during the year. A few areas which had been injured by fire were offered for sale by tender so as to obtain the value of the timber for the public.

Fire Ranging.

The terrible forest fires that occurred in the Porcupine and Cochrane districts during the past year are still fresh in the public mind. Great destruction of timber took place and a number of lives were lost. The Department has made every effort to ascertain the cause of these fires and locate the responsibility for them, but it has been impossible to fix the responsibility upon any one in particular. The circumstances were such as to render certain the occurrence of terrible forest fires if any one even dropped a lighted match on the ground. Those people who were building small houses used such timber as they required, leaving the tops and limbs lying on the ground. The same thing happened with respect to the cutting of trees for fuel. When mining is being carried on extensively large numbers of trees are cut for buildings, fuel and other purposes. Where villages or towns spring up suddenly the same thing occurs on a more extensive scale, until the whole neighborhood is carpeted with limbs and brush, and as Jack pine and Spruce are the principal timbers in that country, and the limbs and needles of the trees are full of resin and highly inflammable, when the summer comes the sun dries them up and they will ignite easily and burn fiercely. This was the state of affairs that existed in the regions of Porcupine and Cochrane last summer when the fires occurred. The fires extended into the towns and when the buildings became ignited it was impossible to save them, surrounded as they were by a sea of fire.

The prevention of similar catastrophes will only be secured by those who cut down the trees for any purpose, piling the brush and debris as they cut and burn it as occasion warrants. The Town of Porcupine was completely destroyed and many extensive mining plants were wiped out, and there was a great loss of life. A similar tragedy overtook the Town of Cochrane, where the loss of life was not so serious, but the town was almost destroyed. These fires were practically the only forest fires of any moment occurring last year. Naturally a great deal of sympathy for these unfortunate people was aroused and large sums of money were subscribed to relieve the necessities of those who lost their all, and were left bare to the wind. Every effort to give them a start again was made. Humanly speaking, everything was done promptly and generously by a sympathetic public. These two towns have risen from their ashes and are again becoming active business centres, but the loss of life was irremediable and deplorable.

The timber damaged consisted of Jack pine and Spruce, there being no Red or White pine of any moment in that locality.

Forest Reserves.

In all the forest reserves adequate numbers of fire rangers were put on duty, and the utmost care exercised to prevent the occurrence or spread of forest fires.

The Temagami Forest Reserve has an area of about 6,000 miles; the Mississaga of about 3,000; the Nepigon, 7,300; the Quetico, 1,560; the Eastern, 100, and the Sibley 70, making a total of about 18,030 miles set apart as forest reserves for the conservation and protection of the timber therein.

There is also the National Park known as Algonquin Park, with an area of 2,060 miles, and Rondeau Park with 8 square miles. It is gratifying to be able to state that no fires occurred in these reserves or parks, which is in a large measure attributable to the close supervision that is kept during the summer months.

Railways.

Along the lines of railways penetrating the forest careful supervision by forest rangers was exercised. The Transcontinental extending from one end of the Province to the other, through a dense Spruce forest, was largely in the building stage. Here a large staff of fire rangers under the supervision of careful chiefs was placed, and as a consequence no forest fires of any moment took place. On the Temiskaming and Northern Ontario, the Canadian Pacific, the Canadian Northern, the Algoma Central and the Thunder Bay Branch of the Grand Trunk Pacific, staffs of fire rangers were on duty under capable superintendents, and no fires occurred on any of these lines or adjacent to them, which is an evidence that care was exercised by the rangers, and this, together with the active sympathy and support of the managements and the employees of the railways, brought about the good results which obtained.

General.

The number of rangers on duty in forest reserves was 190; on railways, 171; on Crown Lands, 91, or a total of 452 fire rangers employed by the Crown.

The cost of this service was $190,700.80. There was on licensed lands a staff of 431 rangers, who were paid by the licensees. In addition there were about 15 supervising rangers, or a total ranging staff of 898.

The Canadian Northern Railway is now entering upon the building of its Transcontinental line through the Province of Ontario. This line runs about midway between the National Transcontinental Railway and the Canadian Pacific.

The Algoma Central is also building its railway extending north from the junction with the Canadian Pacific at Hobon to the junction with the National Transcontinental at Hearst, and an additional staff of fire rangers will have to be placed on these lines during the coming summer—probably an additional 200 men.

The expenditure on account of fire ranging in the Province has been a large one, but the results have justified the expenditure.

Culler's Examinations.

Culler's Examinations were held during the year at North Bay, Kenora, Fort Frances and Port Arthur. Forty-seven candidates were successful at these examinations and were granted certificates authorizing them to act as cullers.

(For list of cullers see Appendix No. 46, page 103.)

Crown Surveys.

The following Crown surveys have been undertaken this year.

Instructions for sub-division of an addition to the Township of Lyon, east of Port Arthur, and part of a township along the Grand Trunk Pacific Railway north-west of Fort William, in the District of Thunder Bay, were issued.

Instructions were also issued for the sub-division of an addition to the Township of Zealand, near Wabigoon, in the District of Kenora.

Instructions were also issued for a survey of a tract of land into lots near Mack Station, on the Grand Trunk Pacific Railway, in the District of Thunder Bay.

Instructions were also issued for the continuation of the survey of islands in Georgian Bay, which survey was uncompleted last season.

Instructions were also issued for the survey of islands in the Lake of the Woods, of islands in the Winnipeg River, Sand and Gun Lakes in the District of Kenora, and in Rainy Lake in the District of Rainy River; also for the survey of islands in Sesekinika Lake on the line of the Temiskaming and Northern Ontario Railway, north of Swastika, in the District of Nipissing.

Instructions were also issued for a traverse of the Mattagami River from the Transcontinental Railway north to its junction with the Missinaibi River; also for the survey of the Ground Hog and Kapuskasing Rivers north of the Transcontinental Railway in the District of Sudbury, including all water powers therein.

Instructions were issued for a number of base and meridian lines in the Districts of Sudbury and Nipissing.

Instructions were also issued for the survey of outlines of townships in the Districts of Sudbury, Nipissing and the Temagami Forest Reserve.

One hundred and twenty-seven miles of base and meridian lines were run in the District of Sudbury through the unsurveyed section of said district along the Metagami River, north of the Transcontinental Railway.

Instructions were also issued for the survey of three Town Plots on the Transcontinental Railway, at Low Bush River, Mattagami, Mattawishguia (or Hearst), in the Districts of Nipissing, Sudbury and Algoma, respectively, and for the Village Plot of Waldhof, on the Canadian Pacific in the District of Kenora.

A survey of the water ways between Biscotasing Lake and Fort Mattagami was performed.

Several surveys of water powers and other minor surveys have been performed.

The reports of the Surveyors so far received and examined will be found in Appendices 18 to 43 inclusive, pages 47 to 97 inclusive.

Municipal Surveys.

On the petition of the Municipal Council of the Township of Nepean, instructions were issued to survey the original road allowance between lot 30, concession 2, Ottawa front, and lots lettered J, K, L, M and N, concession A, Rideau front, in the Township of Nepean. Also on the petition of the Municipal Council of the Township of Williamsburg, instructions were issued to survey the road allowance between the 7th and 8th concessions of the Township of Williamsburg, from the east limit of lot 25, or the nearest undisputed monument to the west limit of the township. Also on the petition of the Municipal Council of Elmsley North, instructions were issued to survey the original road allowance between the 6th and 7th concessions from lot 22 to lot 30 inclusive, and to define the road allowance by permanent stone or iron monuments on each side thereof.

The following municipal surveys have been confirmed under the provisions of the Revised Statutes of Ontario 1897, chapter 181, sections 14 and 15, such surveys being final and conclusive: Part of the concession line between concessions 4 and 5, in the Township of Williamsburg from the west side of lot No. 9 to the east boundary of the township, and to define the road allowance between the said concessions with stone or iron monuments. Also the road allowance along the west bank of the Otonabee River, from Wolfe Street to Hunter Street, in the Town of Peterborough, and to define the western limit of said road allowance by stone or iron monuments. Also the concession road allowance between the 8th and 9th concessions of the Township of Hinchinbrooke from lot 12, south to lot 8, and to define the same by permanent boundaries. Also the survey of the town line between the Townships of Nepean and North Gower, and to define the same by permanent monuments.

Mining and Other Surveys.

The Mining Act of Ontario requires that applicants to purchase or lease mining lands in unsurveyed territory shall file in the Department surveyor's plans (in triplicate) of the proposed mining claims with field notes and description by metes and bounds, before any sale or lease can be carried out, and under Orders-in-Council, dated February 26th, 1906, 2nd October, 1907, 7th November, 1907, applicants to purchase islands, or locations for pleasure and summer resorts or for agricultural purposes in unsurveyed territory, are required to file surveyor's plans (in triplicate) of their islands or locations as the case may be, with field notes and descriptions by metes and bounds, together with the necessary affidavits as to there being no adverse claim by occupation or improvement, etc.

Under the above Act, Orders-in-Council and Regulations in the Districts of Parry Sound, Nipissing, Sudbury, Algoma, Thunder Bay, Rainy River and Kenora, an area of 22,448.75 acres has been sold and patented during the year, for which the sum of $83,518.60 has been received, and an area of 11.138.12 acres has been leased for the sum of $12,699.24 as the first year's rental.

W. H. Hearst,
Minister.

Department of Lands, Forests and Mines.
Toronto, October 31st, 1911.

APPENDICES

Appendix No. 1.

Return of Officers and Clerks of the Department of Lands, Forests and Mines for the year ending October 31st, 1911.

Branch.	Name.	Designation.	When appointed.	Salary per annum. $ c	Remarks.
	Hon. F. Cochrane	Minister	1905, May 13	6,000 00	Resigned October 11, 1911.
	Hon. W. H. Hearst	do	1911, Oct. 12	6,000 00	
	Aubrey White	Deputy Minister	1882, Jan. 1	4,000 00	
	Geo. Kennedy	Law Clerk	1872, Feb. 1	2,650 00	
	Geo. W. Yates	Minister's Secretary	1899, Feb. 26	2,000 00	
	E. S. Williamson	Secretary to Department	1889, May 1	1,800 00	
	Janet Garvie	Stenographer	1905, Jan. 1	700 00	
	James Farrington	Clerk and Stenographer	1910, Dec. 14	550 00	
Sales and Free Grants	J. J. Murphy	Chief Clerk	1872, May 1	2,150 00	
	Walter C. Cain	Clerk	1903, March 6	1,550 00	
	W. R. Ledger	do	1894, Feb. 5	1,200 00	
	Selby Draper	do	1903, Jan. 1	1,200 00	
	S. A. Platt	do	1907, March 13	1,000 00	
	F. Lucas	do	1909, March 24	950 00	
	F. Samuels	do	1909, March 24	725 00	
	May Bengough	Stenographer	1896, Oct. 23	700 00	
	Jean C. Oram	do	1907, Jan. 16	675 00	
	Nan McQueen	do	1909, March 24	650 00	
Military Grants.	R. H. Browne	Chief Clerk	1900, March 2	1,800 00	
	R. T. Winter	Clerk	1904, Jan. 13	1,000 00	Resigned August 31st, 1911.
	E. M. Browne	do	1909, March 24	625 00	Resigned March 31, 1911.
	E. F. O'Neil	Stenographer	1904, Nov. 9	650 00	
Surveys and Patents	G. B. Kirkpatrick	Director of Surveys	1886, Jan. 30	2,600 00	
	J. F. Whitson	Surveyor and Draughtsman	1892, Sept. 1	2,400 00	
	L. V. Rorke	Ass't Surveyor & Draughtsman	1909, May 1	2,000 00	
	W. F. Lewis	Clerk	1872, May 5	1,250 00	
	D. G. Boyd	Draughtsman	1897, Sept. 27	1,450 00	
	E. M. Jarvis	Clerk	1904, Oct. 19	1,150 00	
	J. B. Proctor	do	1897, Jan. 15	1,050 00	
	H. Treeby	Draughtsman	1904, Jan. 13	1,100 00	
	John Work	do	1911, March 3	1,000 00	
	F. E. Blanchet	do	1907, March 13	950 00	

	J. L. Byrne	Draughtsman	1909, March 24	950 00	
	A. Leaman	do	1909, March 24	950 00	
	M. H. Kirkland	Stenographer	1904, Nov. 23	675 00	
	E. G. Halliday	do	1909, March 24	625 00	
	E. C. Armer	do	1911, March 3	550 00	
	B. Benson	do	1911, March 3	550 00	
	C. O'Connor	do	1911, March 3	550 00	
	C. S. Jones	Chief Clerk	1890, May 22	1,900 00	
	C. E. Burns	Clerk	1900, April 9	1,250 00	
	W. S. Sutherland	do	1902, Jan. 13	1,200 00	
	W. Carrell	do	1904, Jan. 15	1 100 00	
	A. E. Robillard	do	1894, May 8	900 00	
	A. E. Roe	do	1909, March 24	1,000 00	
Woods and Forests ...	J. A. G. Crozier	Chief Clerk	1867, Dec. 1	2,150 00	
	J. B. Cook	Clerk	1898, Aug. 1	1,550 00	
	H. Gillard	do	1900, April 9	1,350 00	
	F. J. Niven	do	1903, March 6	1,150 00	
	W. F. Trivett	do	1904, Jan. 13	1,100 00	
	R. H. Hodgson	do	1904, Nov. 23	1,050 00	
	J. Houser	do	1907, March 13	1,100 00	
	A. J. Lamb	do	1907 March 13	950 00	Resigned June 28,1911.
	A. H. O'Neil	do	1909, March 24	850 00	
	G. W. Harris	do	1909, March 24	850 00	
	N. L. Rogers	do	1911, Nov. 1	800 00	
	S. D. Meeking	do	1910, June 1	750 00	
	Florence Lennon	Stenographer	1907, March 13	650 00	
	Amy Thompson	do	1909, March 24	650 00	
	Mary E. Bliss	do	1909, Sept. 1	550 00	
Accounts	D. G. Ross	Accountant	1861, April 15	2,350 00	
	E. Leigh	Clerk	1873 Dec. 20	1,200 00	Resigned March 14, 1911.
	H. M. Lount	do	1904, Jan. 13	1,350 00	
	H. E. Johnston	do	1907, March 13	1,050 00	
	H. G. Harris	do	1907, March 13	1,000 00	
	C. J. Clarke	do	1907, March 13	1,000 00	
	C. Bowland	Clerk and Stenographer	1911, March 3	600 00	
	Frank Yeigh	Registrar	1880, March 1	1 500 00	
	Chester Dies	Clerk	1907, March 13	1,000 00	
Bureau of Mines.	Thomas W. Gibson	Deputy Minister	1891, June 19	3,500 00	
	R. D. Fisher	Secretary	1907, March 13	1,150 00	
	W. H. Morris	Clerk	1906, Jan. 1	1 000 00	

Appendix No. 1.—Continued.

Return of Officers and Clerks of the Department of Lands, Forests and Mines for the year ending October 31st, 1911.

Branch.	Name.	Designation.	When appointed.	Salary per annum.	Remarks.
				$ c.	
Bureau of Mines.	R. A. Sinclair	Clerk	1907, March 13	1,000 00	
	W. Lemoine	do	1908, April 8	1,000 00	
	A. Burritt	Clerk	1908, April 8	1,000 00	
	Anne Moffatt	do	1901, March 1	950 00	
	D. H. Barr	do	1907, March 13	1,000 00	
	A. G. Scovell	do	1909, March 24	900 00	
	C. W. St. John	do	1910, April 14	850 00	
	Ethel Craig	Stenographer	1906, May 16	725 00	
	Flossie McDougall	do	1907, March 13	675 00	
	J. L. McNaughton	do	1909, March 24	675 00	
	H. Brophy	Messenger	1893, Oct. 1	800 00	

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Deputy Minister Lands and Forests.

Appendix No. 2.

List of Land Agents and Homestead Inspectors for the year ending October 31st, 1911.

Name.	Post office address.	District or county.	Date of appointment.	Salary per annum.	Remarks.
				$ c.	
Baker, R. H.	Minden	Part of Victoria	1907, Oct. 1	350 00	
Barr, James	Fort Frances	Homestead Inspector	1906, Nov. 23	1,200 00	
Both, Charles	Denbigh	Part of Frontenac and Addington	1905, Oct. 20	100 00	
Brown, J. B.	Bracebridge	Homestead Inspector and Crown Lands Agent	1905, July 28	900 00	
Byers, R. J.	Massey	Part of District of Sudbury	1905, July 3	500 00	
Buchanan, T.	Thessalon	do do Algoma	1901, Nov. 30	300 00	
Burnes, C. W.	Sundridge	Homestead Inspector	1905, Nov. 15	900 00	
Campbell, W.	Stratton Station.	Part of District of Rainy River	1897, Aug. 12	500 00	Died December 6th, 1910.
Campbell, J. G.	Cochrane	do do Nipissing	1908, Nov. 19	500 00	Resigned January 31st 1911
Cameron, W.	Stratton Station	do do Rainy River	1911, April 27	500 00	
Chester, T.	New Liskeard	Homestead Inspector	1906, June 8	1,200 00	
Child, F. A.	Matheson	Part of District of Nipissing	1909, Jan. 8	500 00	
Dean, Thomas	Sault Ste. Marie	Homestead Inspector	1908, July 29	600 00	
Dempsay, S. J.	Cochrane	Part of District of Nipissing	1911, Feb. 1	500 00	
Eastland, T. G.	Apsley	Part of County of Peterboro	1896, July 10	300 00	Resigned April 25th, 1911.
Ellis, H. J.	Powassan	do District of Parry Sound	1909, May 20	500 00	
Freeborn, Dr. J. S.	Magnetawan	do do Parry Sound	1905, Nov. 10	500 00	
Grills, J. J.	New Liskeard	Lake Temiskaming, District of Nipissing	1905, July 3	500 00	
Groulx, R. J.	Chelmsford	Homestead Inspector	1906, May 7	600 00	
Hales, W.	Apsley	Part of County of Peterboro	1911, July 17	250 00	
Hollands, C. J.	Fort Frances	Part Town Plot of Alberta and part of District of Rainy River	1892, Oct. 12	300 00	
Hughes, Thomas	Murillo	Homestead Inspector	1908, July 20	600 00	
Jenkin, William	Emsdale	Part of District of Parry Sound	1908, July 29	500 00	
Keefer, H. A.	Port Arthur	do do Thunder Bay	1907, Oct. 30	500 00	Resigned July 8th, 1911.
Langlois, E.	Warren	do do Sudbury	1911, April 4	500 00	
Lemieux, J. A.	Blezard Valley	do do Sudbury	1908, July 1	400 00	
MacLennan, J. K.	Sudbury	do do Sudbury	1905, July 3	500 00	
McFayden, Alex	Emo	do do Rainy River	1905, Sept. 8	500 00	
Parsons, W. J.	North Bay	do do Nipissing	1908, April 8	500 00	
Philion, J. A.	Sturgeon Falls	do do Nipissing	1907, Sept. 13	500 00	
Powell, F. R.	Parry Sound	do do Parry Sound	1907, May 31	500 00	

Appendix No. 2.—Continued.

List of Land Agents and Homestead Inspectors for the year ending October 31st, 1911.—*Continued.*

Name.	Post office address.	District or county.	Date of appointment.	Salary per annum.	Remarks.
				$ c.	
Prince, Adam	Wilno	Part of Renfrew	1905, July 12	500 00	
Pronger, R. H.	Dryden	do District of Rainy River	1906, May 7	400 00	
Quenneville, I.	Sturgeon Falls	Homestead Inspector	1906. May 7	600 00	
Rothwell, B. J.	Sault Ste. Marie.	Part of District of Algoma	1909, March 1	300 00	
Smith, James	Kenora	Homestead Inspector	1909, June 18	3 00	per day while employed.
Small, Robert	Mattawa	Part of District of Nipissing	1910. June 30	500 00	
Spry, W. L.	Kenora	do do Rainy River	1909, Sept. 21	400 00	Also Mining Recorder.
Tait, J. R.	L'Amable	Part of Hastings	1869, May 28	500 00	
Wilson, James	Kinmount	do Peterboro	1905, May 31	150 00	
Warren, D. B.	Pembroke	do Renfrew	1905, July 3	300 00	
Wright, E. A.	Warren	do District of Sudbury	1905, July 14	500 00	Resigned March 21st. 1911.
Whybourne, W. E.	Marksville	do St. Joseph Island	1905. April 7	250 00	
Watson, T. P.	New Liskeard	Homestead Inspector	1905. May 10	912 50	
Woollings, J.	Englehart	Part of District of Nipissing	1908, June 30	500 00	

D. GEO. ROSS
Accountant.

AUBREY WHITE,
Deputy Minister Lands and Forests.

Appendix No. 3.

Statement of Lands Sold and Leased. Amount of Sales and Leases and Amount of Collections for the year ending October 31st, 1911.

Service.	Acres sold and leased.	Amount of sales and leases.	Collection on sales and leases.
Crown Lands:		$ c.	$ c.
Agricultural	118,573.04	159,889 89	109,681 31
Mining	27,924.08	58,997 77	64,268 43
Clergy Lands	....	....	4,522 15
Common School Lands	.50	25 00	6,281 24
Grammar School Lands	....	....	200 00
University Lands	5,626.90	2,818 25	1,889 12
Leases:			
Mining	10,292.05	11,758 64	25,797 14
Crown	5,213	589 00	21,577 82
	167,629.57	$234,078 55	$234,217 21

D. GEO. ROSS.
Accountant.

AUBREY WHITE.
Deputy Minister Lands and Forests.

Appendix No. 4.

Statement of Revenue of the Department of Lands, Forests and Mines for the year ending October 31st, 1911.

Service.	$ c.	$ c.	$ c.
LAND COLLECTIONS.			
Crown Lands:			
Agricultural	70,945 86		
Townsites	38,735 45		
		109,681 31	
Mining		64,268 43	
		173,949 74	
Clergy Lands	4,522 15		
Common School Lands	6,281 24		
Grammar School Lands	200 00		
University Lands	1,889 12		
		12,892 51	
Rent:			
Mining Leases	25,797 14		
Crown Leases	21,577 82		
		47,374 96	
Miners' Licenses	78,800 60		
Permits	6,291 38		
Recording Fees	126,676 59		
		211,768 57	
Royalties	285,913 26		
Provincial Mines	348 73		
		286,261 99	
Supplementary Revenue:			
Acreage Tax	14,570 91		
Profit Tax	176,314 23		
Gas Tax	18,576 37		
		209,461 51	
			941,709 28
WOODS AND FORESTS.			
Bonus		426,718 71	
Timber Dues		1,173,283 85	
Ground Rent		104,325 96	
Transfer Fees		7,110 35	
			1,711,438 87
Provincial Assay Fees	1,362 37		
Casual Fees	791 01		
Cullers' Fees	288 00		
		2,441 38	
Algonquin Park	5,415 92		
Rondeau Park	357 80		
Forest Reserves	1,309 00		
		7,082 72	
			9,524 10
REFUNDS.			
Wood Ranging		9,818 89	
Fire Ranging		33,679 66	
Surveys		3,598 63	
Agents' Salaries		310 00	
Contingencies		150 00	
Explorations and Investigations		12 00	
Bureau of Mines		1 25	
			47,570 43
			$2,710,242 68

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Deputy Minister of Lands and Forests.

Appendix No. 5.

Statement of Receipts of the Department of Lands, Forests and Mines for the year ending October 31st, 1911, which are considered as Special Funds.

Service.	$ c.	$ c.
Clergy Lands.		
Principal..	2,628 05	
Interest	1,894 10	4,522 15
Common School Lands.		
Principal	2,397 08	
Interest	3,884 16	6,281 24
Grammar School Lands.		
Principal	99 00	
Interest	101 00	200 00
University Lands.		
Principal	1,731 57	
Interest	157 55	1,889 12
		$12,892 51

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Deputy Minister of Lands and Forests.

Appendix No. 6.

Statement of Disbursements of the Department of Lands, Forests and Mines for the year ending October 31st, 1911.

Service.	$ c.	$ c	$ c.
AGENTS' SALARIES AND DISBURSEMENTS.			
Land, $14,790.20.			
Baker, R. H.	350 00		
Disbursements	4 57		
		354 57	
Both, C.	100 00		
Disbursements	23 65		
		123 65	
Brown, James B.	900 00		
Disbursements	132 60		
		1,032 60	
Buchanan, Thomas	....	300 00	
Byers, R. J.	500 00		
Disbursements	10 64		
		510 64	
Campbell, J. G.	125 00		
Disbursements	18 45		
		143 45	
Campbell, Wm.	49 31		
Disbursements	14 20		
		63 51	
Campbell, A. B.	210 95		
Disbursements	20 20		
		231 15	
Cameron, W.	241 45		
Disbursements	13 85		
		255 30	
Child, F. A.	500 00		
Disbursements	32 95		
		532 95	
Dempsay, S. J.	375 00		
Disbursements	12 80		
		387 80	
Eastland, T. G.	....	212 35	
Hales, W.	....	62 50	
Ellis, H. J.	....	500 00	
Freeborn, J. S.	500 00		
Disbursements	13 50		
		513 50	
Grills, J. J.	500 00		
Disbursements	68 84		
		568 84	
Hollands, C. J.	....	300 00	
Jenkin, W.	500 00		
Disbursements	6 74		
		506 74	
Keefer, H. A.	343 75		
Disbursements	40 00		
		383 75	
Langlois, E.	....	276 70	
Lemieux, J. A.	....	400 00	
McFayden, A.	500 00		
Disbursements	77 58		
		577 58	
MacLennan, J. K.	500 00		
Disbursements	111 90		
		611 90	
Carried forward	....	8,849 48	

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		8,849 48	
AGENTS' SALARIES AND DISBURSEMENTS—*Continued.*			
Land.—Continued.			
Parsons, W. J.	500 00		
Disbursements	12 50		
		512 50	
Philion, J. A.	500 00		
Disbursements	17 29		
		517 29	
Powell, F. R.	500 00		
Disbursements	14 00		
		514 00	
Prince, A.	500 00		
Disbursements	22 50		
		522 50	
Pronger, R. H.	400 00		
Disbursements	31 00		
		431 00	
Rothwell, B. J.		300 00	
Small, Robert	500 00		
Disbursements	4 60		
		504 60	
Spry, W. L.	400 00		
Disbursements	260 50		
		660 50	
Tait, J. R.		500 00	
Warren, D. B.	300 00		
Disbursements	3 00		
		303 00	
Whybourne, W. E.	250 00		
Disbursements	6 03		
		256 03	
Wilson, J.	150 00		
Disbursements	9 00		
		159 00	
Woollings, Jos.	500 00		
Disbursements	37 00		
		537 00	
Wright, E. A.		223 30	
Homestead Inspectors, $10,010.44.			
Barr, James	1,200 00		
Disbursements	911 76		
		2,111 76	
Burnes, C. W.	900 00		
Disbursements	683 65		
		1,583 65	
Chester, T.	1,200 00		
Disbursements	569 43		
		1,769 43	
Dean, T.	600 00		
Disbursements	32 85		
		632 85	
Groulx, R. J.		600 00	
Hughes, Thomas	600 00		
Disbursements	355 25		
		955 25	
Carried forward		22,443 14	

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		22,443 14	
AGENTS' SALARIES AND DISBURSEMENTS—*Continued.*			
Homestead Inspectors.—Concluded.			
Quenneville, I.	600 00		
Disbursements	99 00		
		699 00	
Watson, T. P.	912 50		
Disbursements	746 00		
		1,658 50	
Timber, $28,071.37.			
Christie, W. P.	1,600 00		
Disbursements	441 22		
		2,041 22	
Hawkins, S. J.	1,400 00		
Disbursements	453 36		
		1,853 36	
Henderson, C.	1,766 00		
Disbursements	530 54		
		2,296 54	
Johnson, S. M.	1,600 00		
Disbursements	318 49		
		1,918 49	
McDonald, H.	1,400 00		
Disbursements	501 00		
		1,901 00	
McDougall, J. T.	1,600 00		
Disbursements	374 06		
		1,974 06	
McDonald, S. C.	1,600 00		
Disbursements	233 47		
		1,833 47	
Margach, Wm.	1,600 00		
Legris, John	900 00		
Disbursements	2,751 28		
		5,251 28	
Maughan, J.	1,400 00		
Disbursements	563 25		
		1,963 25	
Oliver, J. A.	1,625 00		
Disbursements	1,580 60		
		3,205 60	
Stevenson, A.	1,400 00		
Disbursements	504 23		
		1,904 23	
Watts, George	1,500 00		
Disbursements	428 87		
		1,928 87	
Miscellaneous, $984.19.			
Ames, D. H., Caretaker Islands in Dog and Loughborough Lakes	....	20 00	
Belleperche, P. A., Valuating Lots in Sandwich East	....	15 00	
Bilton, George, Caretaker Island North and South Crosby	....	25 00	
Davis, S., Caretaker Islands in Leonard Lake	....	20 00	
Guthrie, Wm., Caretaker Islands in Devil's Lake	....	25 00	
Carried forward	....	52,977 01	

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		52,977 01	
AGENTS' SALARIES AND DISBURSEMENTS—*Continued.*			
Miscellaneous.—Concluded.			
Hunt, J. McK., Examination of Lots West of Nepigon		148 52	
McKelvey, Wm., Inspection of Lots in Mills, Hardy and McConkey		500 00	
McArthur, T. A., Disbursements of Inspector of Agencies		183 92	
Proulx, A., Inspection of Land in Township of Phelps		17 50	
Howie, R. G., Supplies		29 25	
			53,856 20
OTTAWA.			
Darby, E. J., Agent		1,500 00	
Larose, S. C., Clerk		1,000 00	
Rent	625 00		
Disbursements	58 51		
		683 51	
			3,183 51
WOOD RANGING.			
Adams, William		9 00	
Ainsley, Alex.		665 00	
Allen, R. A.	1,728 00		
Disbursements	143 75		
		1,871 75	
Ansley, J. J.		795 00	
Ansley, W. E.		730 00	
Arnill, W.		815 00	
Barrett, Thomas		1,035 00	
Bates, R.		616 00	
Bailey, J. S.		845 00	
Baulke, G. R.		368 00	
Berlinquet, J.		780 00	
Bennie, Thomas		880 00	
Bliss, C. L.		830 00	
Bliss, L. E.	940 00		
Disbursements	66 50		
		1,006 50	
Brown, J. F.		532 00	
Buie, D.		856 54	
Buchan, H.		134 04	
Buisson, W.		725 00	
Burns, G.		459 00	
Callaghan, Thomas		548 00	
Carter, George		675 00	
Castonguay, A. C.		1,095 00	
Clark, D. A.		480 00	
Cleffy, E. D.		348 00	
Comer, B. F.		624 00	
Chenier, D. A.		940 00	
Corrigan, John		544 00	
Corrigan, R. T.		1,015 00	
Coyne, Phin		970 00	
Cross, R. J.		644 00	
Dickie, D.		336 00	
Didier, H.		900 00	
Carried forward		23,071 83	57,039 71

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		23.071 83	57,039 71
WOOD RANGING.—*Continued.*			
Dougherty, J. M.	....	484 00	
Durrell, W.	....	1,315 00	
Duval, C. A.	....	840 00	
Eldridge, R.	....	352 00	
Faulkner, Joe	....	100 00	
Ferguson, E. A.	....	1,080 00	
Fink, J.	....	408 00	
Fiddes, J.	....	440 00	
Fisher, George	....	795 00	
Fitzgerald, E. C.	....	910 00	
Foster, E. G.	....	170 00	
Fraser, Duncan	....	1,250 00	
Fraser, W. A.	....	650 00	
Gamey, W. H.	....	850 00	
Gilligan, E.	....	660 00	
Gorman, J. P.	....	836 92	
Graham, John	....	140 00	
Hagan, E. C.	....	690 00	
Hamilton John	....	66 00	
Hartley, C.	....	1,370 00	
Hartt, J. I.	....	645 00	
Hawkins, H. C.	....	865 00	
Henderson, C., Disbursements	....	227 65	
Hogarth, J. R.	....	430 00	
Huckson, A. H.	....	1,355 00	
Humphrey, John	....	416 00	
Hurdman, W. H.	....	635 00	
Hutton, John	....	1,025 00	
Irving, Ed.	....	668 00	
Johnson, R. E.	....	280 00	
Johnson, S. M., Disbursements	....	33 33	
Johnston, G. N.	....	516 00	
King's Printer, Log Books	....	2,000 00	
Kirby, D. F.	....	444 00	
LaBelle, A.	....	136 00	
LeBrun, D.	....	476 00	
Lee, J. B.	....	940 00	
Leroy, L. H.	....	380 00	
Londry, W. E.	....	719 23	
Long, H. E.	1,025 00		
Disbursements	11 75		
		1,036 75	
Lowe, W. C.	....	404 00	
Mackey, R. L.	....	308 00	
Macdonell, R. D.	....	920 00	
Manice, W.	....	1,480 00	
Margach, J. A.	....	292 00	
Margach, William, Disbursements	....	1,001 02	
Matheson, William	....	209 63	
Menzies, A.	....	1,070 00	
Mickolson, John	....	105 00	
Miller, William	....	100 00	
Milway, J. H.	....	1,565 00	
Molyneaux, Geo.	....	230 00	
Morel, H.	....	42 00	
Morley, F. W.	....	404 00	
Mulroney, W. J. & G.	....	12 30	
Murray, William	....	1,575 00	
Carried forward	....	59,424 66	57,039 71

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		59,424 66	57,039 71
Wood Ranging.—*Continued.*			
McAuley, W. D.		756 54	
McCaw, J. E.		795 00	
McCaw, J. G.		1,895 00	
McCall, Alf.		220 00	
McCallum, Donald		196 00	
McDonald, Hector, Disbursements		2 00	
McDonald, Jos.		645 00	
McDonald, A. J.	1,360 00		
Disbursements	99 00		
		1,459 00	
McDonald, J. D.		1,405 00	
McDonald, Thomas		177 00	
McDougall, J. T.		3 00	
McGillivray, D. D.		1,164 00	
McGregor, C. F.		510 00	
McGregor, W. H.		441 00	
McIvor, J. A.		508 00	
McKinley, J. H.		510 00	
McLeod, W. A.		1,280 00	
McNamara, J.		205 00	
McPherson, J. S.		1,395 00	
McNabb, Alex.		1,190 00	
McKenzie, Robert		672 00	
McWhinney, F.		376 00	
Nevison, W. H.		256 00	
Newburn, William		280 00	
Niblett, James		312 00	
Nicholson, J.		67 50	
Oliver, J. A.		102 50	
O'Sullivan, J.		25 00	
Paul, C. A.		1,366 54	
Piggott, John		1,270 00	
Purdy, John		805 00	
Revell, L. O.		1,448 00	
Ridley, Robert		1,205 00	
Ritchie, J. A.		170 00	
Rogers, F.		581 92	
Ross, S.		308 00	
Rothera, C. F.		468 00	
Rusk, O.	1,040 00		
Disbursements	32 90		
		1,072 90	
Shaw, Alf.		720 00	
Shaw, George		485 00	
Sharpe, J. A.		838 00	
Shields, F.		508 00	
Shilling, H.		42 00	
Simmons, A. G.		980 00	
Simpson, William		680 00	
Smith, J. D. C.		1,062 95	
Smyth, W. F.		258 00	
Stein, P.		850 00	
Stewart, J.		408 00	
Stewart, A.		126 00	
Strickland, R.		765 00	
Sutton, J.		135 00	
Taylor, G. N.		238 00	
Thompson, G. S.		960 00	
Carried forward		94,023 51	57,039 7

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		94,023 51	57,039 71
WOOD RANGING.—*Concluded.*			
Thompson, R. D.		655 00	
Thompson, W. B.		595 00	
Tucker, L. A.		520 00	
Urquhart, A.		1,100 00	
Vincent, H. T.		625 00	
Wagner, Fred.		488 00	
Watts, George, Disbursements		57 05	
Watts, J. J.		240 00	
Webster, H. R.		340 00	
Webster, W. A.		1,000 00	
Whalen, P. J.		1,695 00	
White, A. T.		880 00	
Wilkins, G. N.		915 00	
Wilkins, B.		60 80	
Wilson, D.		1,405 00	
Wood, W. D.		1,114 81	
Yuill, Thomas		1,000 00	
			106,714 17
EXPLORATION AND ESTIMATION OF TIMBER BERTHS.			
Allen, R. A., Disbursements		25 60	
Annis, Thomas		116 00	
Fraser, Duncan		185 00	
Henderson, Charles, Disbursements		238 95	
Margach, William, Disbursements		182 00	
McDonald, Thomas	237 00		
Disbursements	9 15		
		246 15	
Webster, W. A.	150 00		
Disbursements	74 79		
		224 79	
FIRE RANGING.			1,218 49
Adams, A.		382 50	
Allen, W. T.		382 50	
Allen, D.		415 00	
Allen, Wm.		420 00	
Alison, M. B.		365 00	
Anger, Leon		387 50	
Armstrong, W. H.		347 50	
Armstrong, F. C.		375 00	
Aylward, Jas.		555 00	
Baird, S.		28 00	
Baird, A. W.		277 50	
Baker, H. S.		332 50	
Barr, James		147 50	
Bartlett, G. W.		22 22	
Barbeau, J.		375 00	
Bates, Robert		55 00	
Beaton, D.		80 00	
Begg, D.		97 50	
Belanger, E.		360 00	
Bertram, A. S.		317 50	
Bentham, William		387 50	
Birmingham, E. B.		360 00	
Bisaillon, John	382 50		
Disbursements	800 53		
		1,183 03	
Carried forward		7,653 25	164,972 37

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		7,653 25	164,972 37
FIRE RANGING.—*Continued.*			
Bisaillon, J. H.	980 00		
Disbursements	534 20		
		1,514 20	
Blaise, O.		375 00	
Bliss, L. E., Disbursements		449 80	
Blythell, J. R.		387 50	
Blondin, A.		237 50	
Boldt, A.		390 00	
Bolger, P. W.		282 50	
Bonter, S.		390 00	
Bookhout, H.		410 00	
Brasher, S. M.		382 50	
Breadon, L. M.		2 50	
Brazeau, O.		387 50	
Brozeau, X.		235 00	
Brozeau, A.		145 00	
Brooks, A.		455 00	
Brown, T. E.		372 50	
Brown, Thomas		387 50	
Bruce, George		382 50	
Bruce, J. D.		335 00	
Brunet, A.		395 00	
Brunner, Thomas		357 50	
Buchan, S.		360 00	
Buchanan, R. F.		362 50	
Burger, William		382 50	
Burden, John, Disbursements		85 65	
Burnham, H.		265 00	
Burns, W.		287 50	
Burns, Gordon		432 50	
Callighan, A.		607 50	
Campbell, D.		390 00	
Campbell, W.		367 50	
Campbell, F. A. A.		332 50	
Campbell, G. C.		117 50	
Campbell, S.		135 00	
Capps, S.		400 00	
Carr, S.		127 50	
Carruthers, R.		20 00	
Carnochan, G.		382 50	
Cassidy, J.	392 50		
Disbursements	1 50		
		394 00	
Cassidy, J. A.	392 50		
Disbursements	1 50		
		394 00	
Ceasar, H. P.		365 00	
Chambers, J. K.		110 00	
Chambers, Thomas		377 50	
Chapman, C. N.		360 00	
Charlton, T.		302 50	
Chenier, E.		375 00	
Chittick, W. J.		410 00	
Cochlan, E.		215 00	
Connolly, H. E.		382 50	
Coghlan, S. J.		367 50	
Coombs, F. H.		397 50	
Cousineau, A.		382 50	
Carried forward		25,815 90	164,972 37

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		25,815 90	164,972 37
FIRE RANGING.—*Continued.*			
Cousineau, Charles		360 00	
Coyne, Phin	548 00		
Disbursements	187 73		
		735 73	
Craigie, Herbert		357 50	
Crerar, J. A.		285 00	
Crompton, C. R. B.		292 50	
Cross, J. C. G.		77 50	
Cuyler, T. W.		380 00	
Davidson, Ira		392 50	
Davidson, L.		390 00	
Davies, J. Y.		45 00	
Dean, A.		402 50	
Dedine, Joel		365 00	
De LaRonde, D.		422 50	
Deschene, Ant.		405 00	
Dial, A. C.		312 50	
Dixon, J. H.		355 00	
Dougherty, E. A.		395 00	
Douglas, F. W.		382 50	
Donald, R.		360 00	
Dudgeon, J. T.		340 00	
Dugan, J. K.		387 50	
Dumas, A.		422 50	
Dunsmore, R. L.		340 00	
Dyson, W.		395 00	
Earl, R. O.		382 50	
East, W. J.		400 00	
Eilber, George		365 00	
Elliott, J.		545 00	
Evans, George		335 00	
Faries, R.		70 00	
Ferguson, George		212 50	
Ferguson, William		382 50	
Fisher, George		556 00	
Flett, N.		12 50	
Forsyth, W. W.		382 50	
Foster, E. G.		460 00	
Fraser, W. A.		395 00	
Fuller, E. W.		350 00	
Gagne, F.	905 00		
Disbursements	707 80		
		1,612 80	
Gale, J. W.		390 00	
Gammond, G.		360 00	
Gemmill, John		976 00	
Guilfoil, G.		365 00	
Gordon, W. J.		93 75	
Gordon, Thomas B.		20 00	
Gordon, H. V.		350 00	
Groulx, R.		360 00	
Guthrie, William		387 50	
Hand, Thomas		640 00	
Hardy, F.		425 00	
Harper, G.		207 50	
Hebert, L.		382 50	
Carried forward		45,835 18	164,972 37

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		45,835 18	164,972 37
FIRE RANGING.—*Continued.*			
Hector, A.	252 50		
Disbursements	5 80		
		258 30	
Hefferman, J. J.		385 00	
Henderson, C., Disbursements		43 50	
Higgins, Robert		367 50	
Higgins, D. G.		382 50	
Hindson, C.		7 66	
Hoggins, E. M.		322 50	
Hollis, John		350 00	
Hornick, George		382 50	
Humphrey, W.		75 00	
Hurtibuise, A.		375 00	
Husband, A. C.		320 00	
Hutton, H. L.		72 50	
Ireton, Frank		200 00	
Irish, W. M.		377 50	
Irving, E.		317 50	
James, F.		437 50	
Johnston, George		380 00	
Jordan, W. H.		382 50	
Keenahan, M.		357 50	
Kiely, M.		360 00	
King, T.		212 50	
Kipplin, J.		39 00	
Kirby, D. F.		320 00	
Kirbyson, Henry		352 50	
Kirkpatrick, P.		330 00	
Kruger, A. P.		382 50	
Labelle, D.		117 00	
Lalonde, E.		370 00	
Lalonde, J. M.		130 00	
Lamarche, A.		70 00	
Langlois, E.		185 00	
Laurien, C.		375 00	
Laurien, J.		375 00	
Leblanc, A.		395 00	
Lee, J. B.	825 00		
Disbursements	265 59		
		1,090 59	
Levis, C.		25 00	
Levis, H.		77 50	
Locheed, R.		382 50	
Locke, Alton		695 00	
Long, H. E.	725 00		
Disbursements	421 59		
		1,146 59	
Lumsden, J. W.		382 50	
Lunan, M.		187 50	
Luton, R. L.		72 50	
Lynch-Peckham Co.		34 00	
MacDonald, S. C.		77 00	
Macdonnell, R. D.		430 50	
MacGillivray, E. F.		44 00	
Mackie, Thomas		280 00	
Margach, William, Disbursements		940 32	
Margach, J. A.		12 50	
Carried forward		61,521 14	164,972 37

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		61,521 14	164,972 37
FIRE RANGING.—*Continued.*			
Martin, E. H.		212 50	
May, H.	895 00		
Disbursements	72 22		
		967 22	
Menard, M.		325 00	
Merchant, J.		387 50	
Merchant, H.		387 50	
Michael, A.		422 50	
Miller, A. S.		360 00	
Mole, W. H.		297 50	
Monahan, P.		420 00	
Morand, L.		390 00	
Morin, John		382 50	
Muncer, W. G.		152 50	
Murdock, John		100 00	
McArthur, J. C.		380 00	
McCann, J. C.		210 00	
McClure, J. R.		327 50	
McColl, Arthur		67 00	
McCormick, R.		427 50	
McDonald, L. P.		355 00	
McDonald, J.		696 00	
McDonald, J.		335 00	
McDonald, T.		500 00	
McDonald, J. D.		137 50	
McDougall, J. T.		31 23	
McDougall, D. J.		375 00	
McFaul, L.		57 50	
McGregor, G. B.		415 00	
McIntyre, James		67 50	
McKenzie, R.	300 00		
Disbursements	11 45		
		311 45	
McKinnon, H.		347 50	
McKay, J.		180 00	
McLaren, W. A.		110 00	
McLaughlin, J.		365 00	
McMurray, J. J.		377 50	
McNabb, A.		295 00	
McNally, A.		395 00	
McRae, D. A.		380 00	
McTavish, M.		285 00	
Nadon, A.		152 50	
Nadon, D.		337 50	
Neelon, G. M.		317 50	
Newburn, William		740 00	
Newell, John		357 50	
Newhouse, A.		290 00	
Newmuller, A.		350 00	
Nicholson, J.		345 00	
Nundy, George		355 00	
O'Boyle Bros. Construction Co.		20 00	
Oliver, J. A., Disbursements		72 74	
O'Malley, D.		425 00	
Onegut, J.		417 50	
Orr, A.		25 00	
Carried forward		77,959 28	164,972 37

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		77,959 28	164,972 37
FIRE RANGING.—*Continued.*			
Ouelette, F.		382 50	
Palquin, N.		375 00	
Phead, D.		75 00	
Philip, T.		382 50	
Pigeon, C.		377 50	
Philon, X.		375 00	
Pingle, A.		387 50	
Poulin, N.		375 00	
Prestley, J.		137 50	
Preston, I. E.		387 50	
Prevost, D.		425 00	
Price, P. R.		332 50	
Pronger, J. F.		75 00	
Proulx, A.		387 50	
Quilty, J. J.		345 00	
Quinn, J. J.		377 50	
Reynolds, N.		382 50	
Richardson, E. S.		357 50	
Ridley, John		282 50	
Robinson, P.		435 00	
Rochfort, A.		382 50	
Rochon, Joseph		70 00	
Rodden, M. J.		445 00	
Rusk, O.	616 00		
Disbursements	398 36		
		1,014 36	
Russell, A.		342 50	
Ryan, Thomas		177 50	
Sanderson, F.		170 00	
Sauvie, John		275 00	
Savard, A.		395 00	
Sawyers, W. L.		342 50	
Schrenk, N.		360 00	
Scott, Robert		600 00	
Shabwawekesick, A.		22 50	
Shabwawekesick, J.		20 00	
Shabwawekesick, S.		10 00	
Shields, F.		317 50	
Shilling, H.		430 00	
Shipman, G. W.		337 50	
Silver, William		140 00	
Simpson, A.		831 20	
Simpson, J. B.		280 00	
Simpson, William		352 50	
Sikes, James		72 00	
Smith, E. J.		342 50	
Spence, E. J.		377 50	
Spillett, J. J.		367 50	
Spillett, A.		382 50	
Stathem, Henry		370 00	
Stewart, C.		317 50	
Storey, V.		272 50	
Storey, W. E.		382 50	
Strain, J.		342 50	
Stovin, J. T.		380 00	
Sullivan, J., Sr.		387 50	
Sullivan, J., Jr.		387 50	
Sullivan, Joseph		207 50	
Carried forward		96,519 34	164,972 37

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		96,519 34	164,972 37
FIRE RANGING.—*Concluded.*			
Sutherland, A.		307 50	
Sweltzer, S.		75 00	
Swinston, Charles		355 00	
Sykes, G. F.		212 50	
Taylor, E. H.		7 50	
Thayer, W. I.		452 00	
Tribert, P.		385 00	
Thompson, G. S.	600 00		
Disbursements	540 10		
		1,140 10	
Thompson, J. C.		225 00	
Townsend, E.		362 50	
Travis, T. H.		425 00	
Tremblay, A.		392 50	
Trembley, E.		382 50	
Twigg, J. F.		360 00	
Urquhart, A.		548 00	
Valentine, D.		455 00	
Vivaris, D.		70 00	
Ward, W. D.		380 00	
Watson, M. S.		375 00	
Watts, George, Disbursements		98 96	
Wendt-Wriedt, A. J. P.		387 50	
West, Walter		260 00	
Westman, L. E.		262 50	
Whiteoak, D.		387 50	
Whytock, H. W.		382 50	
Williams, E. L.		382 50	
Williams, R. E.		380 00	
Williams, J.		150 00	
Wilkins, G. N.		556 00	
Winn, P.		407 50	
Wood, H. C.		375 00	
Wood, L.		342 50	
Woodcock, G.		412 50	
Woodseller, J. H.		357 50	
Wright, H. H.		380 00	
Wright, J. J.		387 50	
Yealland, E. R.		382 50	
Young, R.		390 00	
			110,111 90
FOREST RESERVES			
Temagami Reserve—$44,620.84.			
Allan, W. R.		2 50	
Asslestine, William		367 50	
Aubut, William		465 00	
Bailey, S. J.		342 50	
Barr, James		790 00	
Barrett, Thomas	765 00		
Disbursements	75 24		
		840 24	
Bissette, Joseph		365 00	
Breadon, L. H. N.		365 00	
Brisbois, P.		360 00	
Carried forward		3,897 74	275,084 27

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		3,897 74	275,084 27
FOREST RESERVES.—*Continued.*			
Temagami Reserve.—Continued.			
Butcher, G. C.		362 50	
Butler, F. B.		360 00	
Caskenett, F.		345 00	
Cayen, F. B.		247 50	
Chanier, H.		360 00	
Chauvin, J. C.		207 50	
Chase, Joseph		387 50	
Coatsworth, W. B.		347 50	
Cosh, R. F.		135 00	
Coombs, W.		2 50	
Crashley, W. T.		352 50	
Dambremont, F.		380 00	
Davidson, R. D.		365 00	
Desrosiers, J.		367 50	
Douisette, T.		195 00	
Downs, G.		340 00	
Duff, H. D.		370 00	
Duff, J. H.		367 50	
Earnshaw, P.		365 00	
Enright, T. J.		350 00	
Faries, R.		1,064 00	
Forsyth, G. O.		347 50	
Fraser, D. A.		357 50	
Gadsby, H. G.		362 50	
Garnham, W. H.		387 50	
Gardner, C. A.		360 00	
Greene, M. A.		337 50	
Grenier, J.		360 00	
Griffiths, R. G.		337 50	
Gordon, T. V.		180 00	
Hamilton, J. E.		360 00	
Harbottle, W. T.		340 00	
Harrison, J. W.		382 50	
Hawley, D. J.		147 50	
Hayden, G. F.		352 50	
Henderson, C.		11 00	
Higley, C. E.		352 50	
Hillier, J. H. B.		345 00	
Higgins, L. T.		367 50	
Hindson, C.	1,300 00		
Disbursements	273 00		
		1,573 00	
Holland, A. G.		302 50	
Holland, B. J.		362 50	
Hughes, F. G.		367 50	
James, J.		2 50	
Jocko, J.		360 00	
Keenan, J. T.		340 00	
Kelso, R. F.		360 00	
King, C. L.		347 50	
Knox, J. E.		297 50	
Lamarche, A.		920 00	
Latoure, J.		360 00	
LeBlanc, O.		365 00	
Mackenzie, C. H.		365 00	
Maloney, A.		110 00	
Carried forward		23,290 74	275,084 27

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		23,290 74	275,084 27
Forest Reserves.—*Continued.*			
Temagami Reserve.—Continued.			
Maynard, J. C.		287 50	
Menard, E.		175 00	
Montfort, F.		145 00	
Montgomery, A.		492 50	
Moore, C. A.		350 00	
Mundl, F.		372 50	
Murphy, Peter		365 00	
McCrea, E.		180 00	
McCullough, D. G.		340 00	
McElroy, H.		355 00	
McGregor, P.		575 00	
McLaughlin, J.		27 50	
McLeod, J. D.		350 00	
McNaughton, F. D.	216 00		
Disbursements	13 80		
		229 80	
McNeil, E. H.		367 50	
McPhee, D.		327 50	
McPhee, H. A.		337 50	
Nadon, P.		372 50	
Neil, W. C.		372 50	
Nicholas, H.		365 00	
O'Connor, J.		7 50	
O'Neil, M. S.		357 50	
Pechoski, J.		360 00	
Petrant, William		415 00	
Potvin, A.		267 50	
Prudhomme, Ad.		445 00	
Quesnell, F.		197 50	
Ranger, A.		365 00	
Ranger, P.		400 00	
Raymond, A.		342 50	
Reesor, George		2 50	
Rochon, F.		367 50	
Rochon, J.		920 00	
Rodgers, W.		355 00	
Rogers, G. S.		335 00	
Scott, E. H.		352 50	
Shelson, H.		350 00	
Stevenson, L.		332 50	
Spence, W. J.		347 50	
Speers, A. J.		347 50	
Stark, C. C.		365 00	
Stewart, J. A.		365 00	
Sutton, Fred		347 50	
Sweeney, D.		5 00	
Thompson, Thomas		357 50	
Turner, J.		420 00	
Valois, P.		367 50	
Valois, S.		367 50	
Vivaris, D.		920 00	
Vivaris, M.		372 50	
Wagner, H. W.		357 50	
Wallace, F.		370 00	
Warren, F.		347 50	
Washburn, B. L.		330 00	
Carried forward		41,838 04	275,084 27

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		41,838 04	275,084 27
FOREST RESERVES.—*Continued.*			
Temagami Reserve—Concluded.			
Wilcox, G. A.		352 50	
Williams, C.		360 00	
Williams, Fred		295 00	
Wison, H. P.		357 50	
Wodehouse, R. P.		207 50	
Wright, R. M.		365 00	
Young, R. J.	796 00		
Disbursements	49 30		
		845 30	
Metagami Reserve.—$8,325.29.			
Adams, G.		345 00	
Ainslie, D.		365 00	
Alley, H. R.		327 50	
Bertrand, A.		365 00	
Brewster, H. S.		327 50	
Burden, John	612 00		
Disbursements	473 29		
		1,085 29	
Chambers, E. V.		382 50	
Eveline, A.		400 00	
Eveline, J. M.		400 00	
Farley, J.		447 50	
Fraser, E. E.		297 50	
Groulx, E.		360 00	
Harris, R. J.		330 00	
Lower, A. R. M.		325 00	
Macauley, A. F.		372 50	
Nelson, P. A.		377 50	
Noble, C. V.		372 50	
Poisson, A.		375 00	
Reid, J.		400 00	
Saunders, C. A.		372 50	
Stratford, A. H.		297 50	
Mississaga Reserve.—$8,915.39.			
Albright, E. J.		240 00	
Albright, L.		372 50	
Arnill, L.		345 00	
Bicknell, R. R.		367 50	
Bothwell, G. E.		335 00	
Boyd, W. J.		335 00	
Burden, William		310 00	
Dewar, E. H.		232 50	
Dobson, H. E.		367 50	
Duval, C. A.	728 00		
Disbursements	479 89		
		1,207 89	
Dyson, I.		362 50	
Easton, L. C.		335 00	
Graham, S. W.		117 50	
Greer, John		117 50	
Lucas, J. F.		302 50	
Luke, A.		137 50	
McCaw, J. E.		162 50	
Carried forward		58,594 02	275,084 27

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		58,594 02	275,084 27
FOREST RESERVES.—*Continued.*			
Mississaga Reserve.—Concluded.			
McDougall, D.		392 50	
McKenzie, W. L.		190 00	
Miller, J. W.		257 50	
Omelia, H. S.		322 50	
Price, H. S.		357 50	
Stephens, A		330 00	
Thomas, E. G.		365 00	
Tillson, L. B.		317 50	
Wheeler, J. A.		367 50	
Wismer, H.		367 50	
Nepigon Reserve.—$10,556.69.			
Allan, W. N.		417 50	
Blair, H.		255 00	
Bliss, L. E.	890 00		
Disbursements	1,017 95		
		1,907 95	
Bothwell, G.		2 50	
Bouchard, J.		402 50	
Bouchard, N.		117 50	
Cook, K. E.		2 50	
Davies, E. L.		377 50	
Day, O.		325 00	
DeLaronde, C.		10 00	
Ferris, R. H.		380 00	
Judge, S.		427 50	
Kinnear, A. R.		335 00	
Kerr, A.		437 50	
Lampshire, H.		147 50	
Leitch, P. A.	312 00		
Disbursements	569 24		
		881 24	
Lucas, F.		5 00	
McGowan, T.		307 50	
McGloughlin, W. B.		381 25	
McIntyre, J. S.		392 50	
McQuay, R. W.		97 50	
Montgomery, R. L.		376 25	
Noxon, S. C.		227 50	
Ritchie, W.		77 50	
Robinson, W. C.		370 00	
Rose, J.		437 50	
Scott, H.		77 50	
Scott, R. R.		377 50	
Smith, J. R.		235 00	
Sutherland, F. B.		375 00	
Sutor, F. J.		387 50	
Wagner, N.		5 00	
Eastern Reserve.—$1,699.87.			
Bishop, H.		382 50	
Gilmour, J.		382 50	
Tapping, Thomas	400 00		
Disbursements	152 37		
		552 37	
Watkins, R.		382 50	
Carried forward		74,118 08	275,084 27

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		74,118 08	275,084 27
FOREST RESERVES.—*Concluded.*			
Sibley Reserve.—$630.00.			
Cross, J. G.		245 00	
Oliver, J. A.		100 00	
Smeltzer, S.		285 00	
Quetico Reserve.—$5,840.82.			
Cox, A.		347 50	
Crawford, E. J.		365 00	
Darby, W.		365 00	
Darlington, E.		365 00	
Fraser, G.		365 00	
Hempshire, F.		347 50	
Henry, A.		365 00	
Johnston, R.		365 00	
Kates, G.		365 00	
Musleman, William		365 00	
Readman, R.		584 00	
Todd, C. C.		365 00	
Wall, G.		365 00	
Wall, S.		365 00	
Watts, George Disbursements		546 82	
			80,588 90
MINES AND MINING.			
Miller, G. W. Provincial Geologist, services	4,250 00		
Disbursements	486 10		
		4,736 10	
Mickle, G. R., Mine Assessor, services	4,000 00		
Disbursements	759 31		
		4,759 31	
Price, S., Mining Commissioner, services	3,200 00		
Disbursements	1,333 45		
Dance, R. W., services	827 50		
Disbursements	547 10		
		5,908 05	
Corkill, E. T., Inspector of Mines, services	2,300 00		
Disbursements	1,138 80		
		3,438 80	
Sutherland, T. F., Assistant Inspector of Mines, services	875 00		
Disbursements	524 45		
		1,399 45	
Knight, C. W., Assistant Geologist, services	2,000 00		
Disbursements	580 91		
		2,580 91	
			22,822 62
EXPLORATIONS AND INVESTIGATIONS.			
Baker, M. B., Disbursements		27 30	
Bowen, N. L., Disbursements		21 30	
Bruce, E. L.	415 39		
Disbursements	44 20		
		459 59	
Burrows, A. G.	1,900 00		
Disbursements	750 16		
		2,650 16	
Carried forward		3,158 35	378,495 79

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		3,158.35	378,495 79
EXPLORATIONS AND INVESTIGATIONS.—*Concluded.*			
Firth, Thomas	....	35 88	
Harcourt, R. Disbursements	....	21 00	
Hopkins, P. E.	507 70		
Disbursements	16 90		
		524 60	
McArthur, T. A. Disbursements	....	383 93	
Moore, E. S.	12 00		
Disbursements	7 84		
		19 84	
Mahaffy, A. F.	....	337 49	
Knight Bros. & McKinnon, Geological building	....	418 00	
Parsons, A. L.	485 58		
Disbursements	629 73		
		1,115 31	
Freeman, D.	....	288 47	
Robinson, A. H. A.	1,000 00		
Disbursements	375 05		
		1,375 05	
Rogers, W. R.	1,725 00		
Disbursements	337 32		
		2,062 32	
Rothwell, T. E. Disbursements	....	13 55	
Sharpe, D.	657 40		
Disbursements	359 65		
		1,017 05	
Scott, John	600 00		
Disbursements	223 20		
		823 20	
Smith, R. M.	....	305 00	
Stewart, R. D.	150 00		
Disbursements	164 26		
		314 26	
MINING RECORDERS.			12,213 30
Bowker, S. T.	950 00		
Disbursements	307 69		
		1,257 69	
Bruce, A. E D.., Recorder	1,326 60		
Millard, C. S., Clerk	1,125 96		
Graham, F. W., Clerk	1,022 08		
Gray, J. B., Clerk	17 30		
Dowsley, G. W., Clerk	435 57		
Jamieson, Mrs. E. F., Stenographer	45 00		
Welsh, Mrs. M., Stenographer	142 69		
Clarke, W. K., Clerk	519 99		
Keenan, H. F., Clerk	572 30		
Gordon, T. S., Clerk	35 00		
O'Brien, J. D., Clerk	250 76		
Disbursements	1,557 61		
		7,050 86	
Campbell, C. A., Recorder	750 00		
Washburn, H., Clerk	587 30		
Glazier, M. B., Clerk	76 15		
Young, Miss E., Stenographer	456 54		
Disbursements	334 40		
		2,204 39	
Hough, J. A., Recorder	1,200 00		
Browning, A. J., Clerk	900 00		
Carried forward	....	10,512 94	390,709 09

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward		10,512 94	390,709 09
MINING RECORDERS.—*Concluded.*			
Keenan, H. F., Clerk	100 96		
Glazier, M. B., Clerk	671 53		
Disbursements	439 14		
		3,311 63	
McArthur, T. A., Recorder	300 00		
Disbursements	107 00		
McLaren, Kate, Stenographer	120 00		
		527 00	
McArthur, T. A., Salary as Inspector for 9 months		900 00	
McQuire, H. F., Recorder	500 00		
Disbursements	143 80		
		643 80	
Morgan, J. W., Recorder	950 00		
Disbursements	319 93		
		1,269 93	
Sheppard, H. E., Recorder	1,000 00		
Gordon, T. C., Clerk	1,080 00		
Keenan, H. F., Clerk	340 37		
Glazier, M. B., Clerk	93 46		
Disbursements	300 60		
		2,814 43	
Skill, A., Recorder	1,200 00		
Glazier, M. B., Clerk	318 46		
Disbursements	227 85		
		1,746 31	
Smith, G. T. Recorder	2,300 00		
Meagher, T. J., Clerk	900 00		
Sarsfield, J. M., Clerk	1,100 00		
Munroe, Eva L., Stenographer	720 00		
Smith, Miss M. H., Stenographer	480 00		
Ferguson, L. H., Clerk	912 50		
Smith, G. L., Clerk	162 00		
Disbursements	2,521 72		
		9,096 22	
Spry, W. L., Recorder	600 00		
Disbursements	96 75		
		696 75	
Dominion Express Company	266 02		
King's Printer	913 23		
Methodist Book Room	33 80		
Harcourt, E. H., Co.	72 31		
		1,285 36	
			32,804 37
PROVINCIAL ASSAY OFFICE.			
Turner N. L.	1,200 00		
Disbursements	407 54		
		1,607 54	
Rothwell, T. E.	1,000 00		
Disbursements	102 55		
		1,102 55	
Disbursements		338 90	
Supplies		573 02	
			3,622 01
Carried forward			427,135 47

Appendix No. 6.—Continued.

Service.	$ c.	$ c.	$ c.
Brought forward			427,135 47
CULLERS' ACT.			
Oliver, J. A., Disbursements		6 75	
Margach, Wm., Disbursements		26 15	
McDougall, J. T., Disbursements		2 35	
Watts, George, Disbursements		2 75	
Meelor, C., Services		4 00	
McLeod, D., Services		5 50	
Livery		68 25	
Advertising		20 20	
Floyd, Wm., Rent of tables		5 00	
Town of Fort Frances, Rent of hall		5 00	
			145 95
SURVEYS			167,428 64
BOARD OF SURVEYORS			200 00
CONTINGENCIES.			
Departmental.			
Printing and Binding	4,335 38		
Stationery	4,610 28		
		8,945 66	
Postage	1,939 51		
Express	407 45		
		2,346 96	
Telegraphing	600 85		
Bell Telephone Company	66 20		
Car Fare	70 00		
		737 05	
Subscriptions	289 45		
Advertising	4,417 49		
		4,706 94	
Typewriters, rent and repairs		412 00	
White, A., Travelling expenses	58 45		
Whitson, J F., Travelling expenses	343 64		
Rorke, L. V., Travelling expenses	364 35		
Yates, G. W., Travelling expenses	5 15		
		771 59	
Extra Clerks	2,898 46		
Sundries	80 01		
		2,978 47	
			20,898 67
BUREAU OF MINES.			
Printing and Binding	5,421 59		
Stationery	1,616 52		
		7,038 11	
Telegraphing	206 06		
Express and Cartage	75 40		
Advertising	668 75		
Subscriptions	235 35		
Postage	490 00		
		1,675 56	
Gibson, T. W., Travelling expenses	100 50		
Whitson, J. F., Travelling expenses	51 30		
		151 80	
Typewriters rent and repairs	110 95		
Bell Telephone Company	30 40		
		141 35	
Carried forward		9,006 82	615,808 73

Appendix No. 6.—Concluded.

Service.	$ c.	$ c.	$ c.
Brought forward		9,006 82	615,808 73
BUREAU OF MINES.—*Concluded.*			
Extra Clerks		119 49	
Nicholas, F. J., Preparing index	96 50		
Determination of Leases	2,055 86		
Legal Fees	118 01		
Sundries	636 30		
		2,906 67	
			12,032 98
SPECIAL SERVICES AND UNFORESEEN EXPENSES.			
McNeil, W. K., Services		195 00	
Disbursements re Toronto Exhibition		1,321 67	
			1,516 67
UNFORESEEN AND UNPROVIDED.			
Funeral Expenses of N. L. Jones, Forest Reserves		53 50	
Funeral Expenses of F. Ireton, Fire Ranger		90 00	
Funeral Expenses of Donald Ross, Clerk in Department		52 40	
Wright, P. J., Refund Cullers Fee		4 00	
McIntosh, H. D., Refund Cullers Fee		4 00	
White, A., Special Services		250 00	
			453 90
REFUNDS			20,546 54
			650,358 82

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Deputy Minister, Lands and Forests.

Appendix No. 7.

Statement of Expenses on account of various services under the direction of the Department of Lands, Forests and Mines for the year ending October 31st, 1911.

Service.	$ c.	$ c.
ALGONQUIN PARK	....	18,044 89
RONDEAU PARK	....	2.640 36
VETERANS COMMUTATION	....	1,050 00
Bounty Act VII., Edward VII., Cap. 14.		
Deloro Mining Reduction Company	140 09	
Coniagas Reduction Company	421 32	
		561 41
		$22,296 66

D. GEO. ROSS,
Accountant.

AUBREY WHITE.
Deputy Minister of Lands and Forests.

Appendix No. 8.

WOODS AND FORESTS.

Statement of revenue collected during the year ending October 31st, 1911.

——	$ c.
Amount of Western collections at Department	1,596,520 65
do Belleville collections	19,461 67
do Ottawa collections	95,456 55
	$1,711,438 87

J. A. G. CROZIER,
Chief Clerk in Charge.

AUBREY WHITE,
Deputy Minister.

Appendix No. 9.

PATENTS BRANCH.

Statement of Patents, etc., issued by the Patents Branch from 1st November, 1910, to 31st October, 1911.

Crown Lands	851
School do	22
Mining do	687
Public do (late Clergy Reserves)	16
Free Grant Lands (A. A.)	117
do (Act of 1880)	439
Mining Leases	244
Licenses of Occupation	36
Crown Leases	25
Crown Lands (University)	21
Free Grant, Act of 1901 (Veterans)	675
Temagami Islands	3
Rondeau Leases	1
Pine	1
Total	3138

CHARLES S. JONES,
Chief Clerk.

AUBREY WHITE,
Deputy Minister.

Appendix

WOODS AND

Statement of Timber and Amounts accrued from Timber Dues, Ground

QUANTITY AND

Agencies.	Area covered by timber license.	Saw logs.			
		Pine.		Other.	
	Square miles.	Pieces.	Feet B.M.	Pieces.	Feet B.M.
Western Timber District	12,953¼	10,827,755	464,040,275	1,435,747	54,295,082
Belleville Timber District	1,016½	361,941	10,305,935	248,085	8,826,378
Ottawa Timber District	5,380	1,535,284	76,082,079	530,070	19,547,926
	19,349¾	12,724,980	550,428,289	2,213,902	82,669,386

General Statement

Agencies.	Cordwood.		Tan Bark.	Railway ties.	Posts.	Poles.	Stave Bolts.	Shingle Blocks.	Pulpwood.
	Hard.	Soft.							
	Cords.	Cords.	Cords.	Pieces.	Cords.	Pieces.	Cords.	Cords.	Cords.
Western Timber District	22,029	34,995	16,414	4,257,445	139	3,667	6,973	12	82,739
Belleville Timber District	127	72	156	7,674	328	1,140	......	......	201
Ottawa Timber District	....	1,663	....	5,713	248	10,144	......	......	7,786
	22,156	36,730	16,570	4,270,832	715	14,951	6,973	12	90,726

J. A. G. CROZIER,
Chief Clerk in Charge

No. 10.

FORESTS.

Rent and Bonus during the year ending 31st October, 1911.

DESCRIPTION OF TIMBER.

Boom and Dimension.				Square Timber.		Piling.	
Pine.		Other.		Pine.		Spruce.	
Pieces.	Feet B.M.	Pieces.	Feet B.M.	Pieces.	Cubic feet.	Pieces.	Feet B. M.
221,701	23,673,569	59,507	7,925,920	12,927	552,876	2,750	248,053
3,095	427,866	3,726	723,646	....	....	....	....
31,059	3,067,553	18,405	1,897,056	75	2,693	....	....
255,855	27,168,988	81,638	10,546,622	13,002	555,569	2,750	248,053

of Timber.—Concluded.

Amounts accrued.

Transfer bonus.	Interest.	Trespass.	Timber dues.	Bonus.	Deposits timber sales 1911.	Ground rent.	Total.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
6,490 35	9,491 38	22,187 13	1,196,054 32	582,891 67	54,802 17	68,574 00	1,940,491 02
230 00	27 55	4,887 77	23,318 10	....	....	5,330 00	33,793 42
390 00	675 82	4,580 71	141,414 17	....	....	29,913 00	176,973 70
7,110 35	10,194 75	31,655 61	1,360,786 59	582,891 67	54,802 17	103,817 00	2,151,258 14

AUBREY WHITE,
Deputy Minister.

Appendix No. 11.

Statement of the work done in the Military Branch of the Department of Lands, Forests and Mines, during the year ending the 31st October, 1911.

Letters received	5,750
Letters written	6,673
Maps supplied to Veterans	2,650
Location Certificates issued	43
Locations made	237
Surrenders	21
References for Patents issued	674
Locations cancelled for non-compliance with the regulations	9

R. H. BROWNE,
Chief Clerk in Charge.

AUBREY WHITE,
Deputy Minister.

Appendix No. 12.

Statement of the number of Letters received and mailed by the Department in 1909, 1909-10 and 1910–11.

Year,	Letters received.					Names indexed.	Orders-in-Council.	Returned letters.	Letters, circulars and reports mailed from Department.
	Sales and Free Grants.	Surveys.	Woods and Forests.	Mines.	Totals.				
1909 (10 months).	19,500	16,016	9,086	8,398	53,000	59,400	178	72	62,800
1909–10. new fiscal year.	23,700	18,290	9,752	8.498	60,240	67,210	201	81	69,400
1910–11.	24,705	14,478	9,212	8,220	56,615	63,200	180	94	67.150

FRANK YEIGH,
Registrar,

AUBREY WHITE,
Deputy Minister.

Appendix No. 13.

Statement showing the number of Locatees and of acres located; of purchasers and of acres sold; of lots resumed for non-performance of the settlement duties and of patents issued under "The Free Grants and Homesteads Act" during the year ending 31st October, 1911.

Township.	District or County.	Agent.	No. of persons located.	No. of acres located.	No. of purchasers.	No. of acres sold.	No. of lots resumed.	No. of patents issued.
Baxter	Muskoka.	J. B. Brown, Bracebridge...	....	....	1	18	....	2
Brunel	"	" "	....	....	...	....	....	3
Cardwell	"	" "	4	600	...	....	5	5
Chaffey	"	" "	....	....	...	....	....	1
Draper	"	" "	1	100	...	....	1	1
Franklin	"	" "	3	314	5	204	2	8
Freeman	"	" "	9	1,353	10	303	2	11
Macaulay	"	" "	3	298	...	....	3	....
Medora ...	"	" "	....	....	1	15½	....	1
Monck	"	" "	....	....	...	....	....	....
Morrison	"	" "	7	827	9	61	9	11
Muskoka	"	" "	1	100	...	....	1	1
McLean	"	" "	3	298	...	....	4	6
Oakley	"	" "	10	1,505	2	123	7	5
Ridout	"	" "	4	664	1	7½	3	3
Ryde	"	" "	2	400	...	....	2	1
Sherborne....	Haliburton ...	" "	8	801	...	....	4	....
Sinclair......	Muskoka	" "	8	1,330	2	215	6	10
Stephenson...	"	" "	1	100	...	....	1	....
Stisted	"	" "	1	100	...	....	1	3
Watt	"	" "	3	351	...	....	3	2
Wood	"	" "	4	630	8	69	4	14
Burpee	Parry Sound..	F. R. Powell, Parry Sound..	1	206	1	46	....	3
Carling	"	" "	14	1,988	8	131	8	7
Christie......	"	" "	7	871	...	....	3	2
Conger	"	" "	8	1,072	1	2½	6	5
Cowper	"	" "	....	....	2	76	....	2
Ferguson . ..	"	" "	....	....	1	5	....	1
Foley	"	" "	1	100	1	7	....	4
Hagerman	"	" "	....	....	2	164	1	2
Harrison	"	" "	1	222½	10	84	....	23
Humphrey ...	"	" "	1	190	...	....	1	1
McConkey....	"	" "	....	....	4	121	....	....
McDougall ...	"	" "	1	111	...	....	....	1
McKellar	"	" "	3	292	...	....	1	....
McKenzie	"	" "	....	....	2	111	1	2
Monteith	"	" "	7	1,140	3	19	2	4
Shawanaga ..	"	" "	2	343	2	19	2	5
Wilson	"	" "	....	....	...	....	....	2
Chapman	Parry Sound .	Dr. J. S. Freeborn, Magnetawan.	5	517	...	....	7	6
Croft	"	" "	....	....	1	32	....	11
Ferrie	"	" "	....	....	...	....	....	....
Gurd	"	" "	1	202	5	486	....	3
Lount.... ..	"	" "	2	293	1	3	2	4
Machar	"	" "	4	512	1	38	4	4
Mills	"	" "	1	100	...	....	....	....
Pringle	"	" "	1	100	1	100	....	1

Appendix No. 13.—Continued.

Township.	District or County.	Agent.	No. of persons located.	No. of acres located.	No. of purchasers.	No. of acres sold.	No. of lots resumed.	No. of patents issued.
Ryerson......	Parry Sound..	Dr. J. S. Freeborn, Magnetawan.	3	445	...	....	3	3
Spence	"	" " "	6	840	...	....	4	5
Strong	"	" " "	2	292	...	....	1	5
Armour......	Parry Sound..	W. Jenkin, Emsdale.	7	887	...	....	7	4
Bethune	"	" "	7	997	1	4	6	3
Joly	"	" "	3	584	4	409	....	5
McMurrich ...	"	" "	5	508	2	22	3	8
Perry	"	" "	....	....	...	....	....	4
Proudfoot	"	" "	1	200	...	....	1	5
Hardy	Parry Sound..	H. J. Ellis, Powassan..	....	....	...	....	....	....
Himsworth ..	"	" "	15	2,261	1	21	11	9
Laurier......	"	" "	1	100	...	....	1	7
Nipissing....	"	" "	3	303	1	½	1	4
Patterson....	"	" "	1	194	1	5½	....	2
Bonfield.... .	Nipissing	W. J. Parsons, North Bay...	9	1,060	...	....	4	2
Boulter (pt) ..	"	" "	....	....	...	....	....	....
Chisholm	"	" "	15	1,981	3	182	7	8
Ferris	"	" "	16	1,436½	...	....	11	6
Anson	Haliburton ...	R. H. Baker, Minden........	1	200	...	....	2	....
Glamorgan ..	"	" "	13	1,591	...	....	5	1
Hindon	"	" "	2	251	...	....	1	....
Lutterworth..	"	" "	6	654	...	....	2	....
Minden . ..	"	" "	3	285	...	....	4	4
Snowdon ...	"	" "	6	784	...	....	4	2
Stanhope	"	" "	7	551	...	....	8	1
Anstruther ...	Peterboro'. .	William Hales, Apsley	1	85	...	....	1	1
Burleigh, N.D.	"	" "	1	81	...	....	1	....
" S.D.	"	" "	....	....	1	2	....	....
Chandos	"	" "	....	....	...	....	....	....
Methuen	"	" "	1	100	...	....	....	1
Cardiff.......	Haliburton ...	James Wilson, Kinmount...	5	737	...	....	4	1
Cavendish....	Peterboro'....	" "	1	103	...	....	....	1
Galway	Peterboro'....	" "	2	199	...	....	2	....
Monmouth ...	Haliburton ...	" "	13	1,489	...	....	10	3
Bangor	Hastings	J. R. Tait, L'Amable........	3	384	...	....	....	....
Carlow.......	"	" "	3	391	1	5	3	1
Cashel	"	" "	....	....	...	....	....	1
Dungannon .	"	" "	1	97	...	....	1	....
Faraday	"	" "	3	283	...	....	2	5
Herschel	"	" "	13	1,440½	...	....	5	1
Limerick.....	"	" "	1	134	...	....	1	5
Mayo	"	" "	....	....	...	....	....	7
Monteagle ...	"	" "	7	740	...	....	4	6
McClure	"	" "	7	654	2	39	....	5
Wicklow ...	"	" "	5	570	...	....	2	4
Wollaston....	"	" "	1	100	1	20	1	2
Algona, S.....	Renfrew	Adam Prince, Wilno........	2	200	...	....	....	1
Brougham ...	"	" "	13	1,803	...	....	....	5
Brudenell ...	"	" "	5	497	...	....	2	1

Appendix No. 13.—Continued.

Township.	District or County.	Agent.	No. of persons located.	No. of acres located.	No. of purchasers.	No. of acres sold.	No. of lots resumed.	No. of patents issued.
Burns	Renfrew	Adam Prince, Wilno	10	999	1	37	8	....
Grattan	"	" "	4	409	4	166	1	6
Griffith	"	" "	1	191	...	....	....	....
Hagarty	"	" "	2	167½	...	....	2	3
Jones	"	" "	2	200	1	4	2	1
Lyell	Nipissing	" "	7	1,182	4	29	4	7
Lyndoch	Renfrew	" "	12	1,482	1	3½	4	13
Matawatchan	"	" "	1	100	...	....	....	1
Radcliffe	"	" "	4	383	1	4	1	1
Raglan	"	" "	8	876	1	50	4	6
Richards	"	" "	4	287	...	....	3	1
Sebastopol	"	" "	....	....	...	....	....	1
Sherwood	"	" "	4	419	...	....	....	5
Algona, N.	Renfrew	D. B. Warren, Pembroke	2	200	...	....	2	....
Alice	"	" "	2	200	...	....	2	....
Buchanan (pt)	"	" "	2	267	...	....	1	2
Fraser	"	" "	3	219	2	127	....	4
Head	"	" "	....	....	2	262	....	....
Maria	"	" "	....	....	...	....	....	1
McKay (pt)	"	" "	....	....	...	....	....	....
Petawawa	"	" "	1	100	8	227	1	2
Rolph	"	" "	3	290	...	....	3	6
Wilberforce	"	" "	1	100	...	....	....	2
Wylie (pt)	"	" "	2	182	...	....	1	....
Calvin	Nipissing	Robert Small, Mattawa	4	401	...	....	2	2
Cameron (pt)	"	" "	3	388	...	....	1	2
Lauder	"	" "	....	....	...	....	....	1
Mattawan	"	" "	3	292	...	....	2	....
Papineau	"	" "	4	445	1	50	4	6
Korah	Algoma	B. J. Rothwell, Sault Ste.	....	....	...	....	....	2
Parke	"	" " Marie	....	....	...	....	....	1
Prince	"	" "	2	294	...	....	2	7
Aberdeen	Algoma	Thos. Buchanan, Thessalon	3	528½	1	80	1	3
" add.	"	" "	....	....	...	....	....	....
Galbraith	"	" "	4	640½	...	....	....	3
Lefroy	"	" "	....	....	...	....	....	....
Plummer	"	" "	2	320	...	....	1	....
" add.	"	" "	....	....	...	....	....	....
St. Joseph Is'd	Algoma	W. E. Whybourne, Marksville	9	906	...	....	9	7
" " Channel Is'd	"	" "	....	....	1	10	....	....
Merritt	Algoma	R. J. Byers, Massey	2	250½	2	139	....	4
Blake	Thunder Bay	W. A. Burrows, Port Arthur	14	2,162	3	400	5	5
Conmee	"	" "	21	3,285	4	530	26	15
Crooks	"	" "	12	2,040	5	494	5	1
Dawson Road	"	" "	28	2,953	2	77	99	1
Dorion	"	" "	7	1,105	5	628½	6	8
Gillies	"	" "	10	1,566½	1	150½	5	6
Gorham	"	" "	36	5,048½	20	957	31	6
Lybster	"	" "	11	1,627¾	3	285½	7	15
Marks	"	" "	15	2,369	5	321½	31	1

Appendix No. 13.—Continued.

Township.	District or County.	Agent.	No. of persons located.	No. of acres located.	No. of purchasers.	No. of acres sold.	No. of lots resumed.	No. of patents issued.
McGregor	Thunder Bay .	W. A. Burrows, Port Arthur	13	2,068	...	....	8	7
McIntyre ...	"	" "	8	1,183	2	3	7	13
O'Connor... .	"	" "	14	2,178	1	160	14	13
Oliver........	"	" "	16	2,568	3	7½	13	6
Paipoonge, N R	"	" "	2	200	...	....	1	8
" S R	"	" "	9	1,100	3	116	8	12
Pardee..... .	"	" "	....	....	...	....	....	5
Pearson......	"	" "	19	3,065½	4	323½	14	7
Scoble........	"	" "	20	3,086	4	203	20	6
Strange.... .	"	" "	28	4,383	7	870½	23	8
Ware (pt)	"	" "	32	5,529½	9	608½	18	4
Atwood .. .	Rainy River..	William Cameron, Stratton..	....	....	1	1	....	1
Blue	"	" "	14	2,054	8	287½	11	5
Curran.... .	"	" "	10	1,536	3	48	6	....
Dewart	"	" "	2	320½	1	36½	2	2
Dilke	"	" "	2	242	1	82	....	1
Morley	"	" "	9	1,132½	5	124	3	6
Morson	"	" "	54	8,050	19	830	29	....
McCrosson ...	"	" "	22	3,070	4	130	18	3
Nelles........	"	" "	12	1,528	6	135	10	7
Pattullo... ..	"	" "	9	1,080½	5	54	6	1
Pratt	"	" "	5	800	2	126	8	5
Rosebery	"	" "	....	....	...	....	....	....
Shenston.....	"	" "	1	162	2	86	1	5
Sifton	"	" "	15	2,517	4	169	12	8
Spohn	"	" "	14	1,958	4	205	14	6
Sutherland ...	"	" "	17	2,881½	5	250	14	2
Tait	"	" "	9	1,445	9	216	10	6
Tovell	"	" "	15	2,471½	5	225	9	3
Worthington..	"	" "	2	323	2	6	2	1
Aylsworth ...	Rainy River .	Alex. McFayden, Emo	....	....	...	....	1	1
Barwick	"	" "	....	....	...	....	....	....
Burriss	"	" "	20	3,011	7	370	16	12
Carpenter	"	" "	8	1,342	5	215	6	8
Crozier.......	"	" "	12	1,835¾	4	10	7	6
Dance........	"	" "	20	3,331	5	174	18	3
Devlin	"	" "	2	324	4	125	....	7
Dobie	"	" "	15	2,392	3	66	14	2
Fleming	"	" "	....	....	...	....	....	1
Kingsford . ..	"	" "	20	3,084	10	508	15	10
Lash.........	"	" "	5	812	4	92	6	11
Mather	"	" "	13	2,145	1	40	10	10
Miscampbell .	"	" "	12	1,924	1	½	11	5
Potts	"	" "	42	6,661	3	19½	20	4
Richardson...	"	" "	24	3,950¼	2	120	8	4
Roddick......	"	" "	....	....	1	123	....	2
Woodyatt	"	" "	....	....	...	....	....	2
Aubrey	Kenora	R. H. Pronger, Dryden	11	1,501½	2	31	9	5
Eton.........	"	" "	5	707½	...	....	3	3
Langton	"	" "	1	205	...	....	1	....
Melgund	"	" "	21	2,965½	1	48	2	4
Mutrie......	"	" "	16	2,581	3	159	13	6
Rugby	"	" "	....	....	...	....	....	....
Sanford......	"	" "	6	835	...	....	4	4
Southworth ..	"	" "	6	827½	1	33	....	2
Temple	"	" "	13	2,297½	...	....	5	....

Appendix No. 13.—Concluded.

Township.	District or County.	Agent.	No. of persons located.	No of acres located.	No. of purchasers.	No. of acres sold.	No. of lots resumed.	No. of patents issued.
Van Horne ...	Kenora	R. H. Pronger, Dryden......	2	235	1	80	1	8
Wabigoon	"	" "	14	2,119	1	33½	10	....
Wainwright ..	"	" "	9	1,429¼	2	40	7	8
Zealand	"	" "	13	1,728	5	261	8	4
Melick	Kenora	W. L. Spry, Kenora	20	3,032	4	242	24	6
Pellatt	"	" "	18	2,586½	4	74	32	5
Blezard	Sudbury......	J. A. Lemieux, Blezard Valley	9	1,305¾	..	....	1	....
Capreol	"	" "	26	5,628¾	1	4	4	10
Hanmer......	"	" "	15	2,040	1	2	9	5
Lumsden.....	"	" "	.....	....	...	....	....	....
Balfour	Sudbury	J. K. MacLennan, Sudbury ..	7	989½	...	....	1	4
Broder.......	"	" "	14	1,958½	3	32	6	7
Chapleau.....	Algoma	" "	3	173	...	....	....	....
Dill..........	Sudbury	" "	6	952½	6	663	....	4
Garson.......	"	" "	11	1,423½	6	186	2	6
Morgan (pt) ..	"	" "	9	1,187	...	....	....	2
Neelon.......	"	" "	14	1,944	13	1,264	5	11
Rayside......	"	" "	4	318	1	⅓	....	7
Appleby	Sudbury	Emile Langlois, Warren.....	7	960	3	10	....	4
Casimir	"	" "	6	882½	...	....	....	3
Dunnet.......	"	" "	2	320	...	....	....	1
Hagar	"	" "	5	771	1	160	....	3
Jennings	"	" "	6	844	...	....	1	4
Kirkpatrick ..	Nipissing ...	" "	7	1,065	2	41	....	8
Ratter	Sudbury	" "	7	1,107½	2	20	....	3
Caldwell	Nipissing	J. A. Philion, Sturgeon Falls.	8	864	1	80	....	10
Cosby........	Sudbury	" "	11	1,759	4	7½	....	8
Grant......	Nipissing . ..	" "	11	1,662	...	....	1	....
Macpherson ..	"	" "	9	1,382½	...	....	1	5
Martland	Sudbury	" "	4	637	...	....	....	4
Springer	Nipissing	" "	6	915	...	....	....	9
Abinger......	Lennox and Addington	Charles Both, Denbigh	5	802	...	....	3	1
Canonto, S....	Frontenac....	" "	.....	....	...	....	....	2
" N...	"	" "	.....	....	...	....	....	1
Clarendon.. .	"	" "	3	290	...	....	2	1
Denbigh.. .	Lennox and Addington	" "	.....	....	...	....	1	....
Palmerston	Frontenac....	" "	1	212	...	....	1	1
Airy.........	Nipissing	Unattached	7	656	1	1	1	1
Finlayson....	"	"	.....	....	...	....	....	....
Murchison ...	"	"	1	200	...	....	....	2
Sabine	"	"	6	599	...	....	1	....
			1,568	224,042	418	18,831⅓	1069	899

W. C. CAIN,
Clerk in Charge.

AUBREY WHITE,
Deputy Minister.

Appendix No. 14.

Statement of Municipal Surveys for which instructions issued during the 12 months, ending October 31st, 1911.

No.	Name of Surveyor.	No.	Date of Instructions.	Description of Survey.
1	S. E. Farley	682	Nov. 16th, 1910..	To survey the original road allowance between lot 30, concession 2, Ottawa Front, and lots lettered J, K, L, M and N, concession A, Rideau Front, in the township of Nepean, in the county of Carleton, and to define said road allowance by permanent monuments on each side thereof.
2	W. J. Moore....	683	Aug. 24th, 1911..	To survey the original road allowance between the 6th and 7th concessions of the township of Elmsley North, in the county of Lanark, from lot 22 to lot 30, inclusive, or between such points in which an original or undisputed point can be found, and to define said road allowance by permanent stone or iron monuments on each side thereof, in accordance with the provisions of the Revised Statutes of Ontario, 1897, chapter 181, section 14.

GEORGE B. KIRKPATRICK,
Director of Surveys.

AUBREY WHITE,
Deputy Minister of Lands and Forests.

Appendix No. 15.

Statement of Municipal Surveys confirmed during the 12 months ending October 31st, 1911.

No	Name of Surveyor.	No.	Date of Instructions.	Description of Survey.	Date when confirmed under R.S.O., 1897, Chap. 181, secs. 10-15 inclusive.
1	George L. Brown....	622	Jan. 27, 1900 ...	To survey part of the line between concessions 4 and 5, in the township of Williamsburg, in the county of Dundas, from the west side of lot No. 9 to the eastern boundary of the township, and to define the road allowance between said concessions, between said points with stone or iron monuments planted on either side of said road allowance.	May 27, 1911.
2.	Alfred J. Cameron...	648	March 29, 1904 .	To survey the right of way or road allowance along the west bank of the Otonabee River, from Wolfe Street to Hunter Street, in the town of Peterboro', and to define the western limit of the said right of way or road allowance by stone or iron monuments, to be planted at the intersection of the several streets from Wolfe Street to Hunter Street with said western limit, and at other places if necessary.	Feb. 21, 1911.
3.	E. T. Wilkie	679	Dec. 27, 1909 ...	To survey the concession line between the 8th and 9th concessions of the township of Hinchinbrooke, from lot 12, south, to lot 8, and to define the same by permanent boundaries.	Nov. 18. 1910.
4.	E. T. Wilkie	680	Jan. 18, 1910	To survey the town line between the townships of Nepean and North Gower, in the county of Carleton, and to plant permanent monuments at all points of intersection with concession lines or side roads running thereto through either township.	Dec. 9, 1910.

GEORGE B. KIRKPATRICK,
Director of Surveys.

AUBREY WHITE,
Deputy Minister of Lands and Forests.

Appendix No. 16.

Statement of Crown Surveys in progress during the twelve months ending October 31st, 1911.

No.	Date of Instructions.	Name of Surveyor.	Description of Survey.	Amount Paid.
				$
1	May 29, 1911.	A. Bell...........	To survey outlines of new townships, District of Nipissing	5,200
2	June 10, 1911.	D. Beatty.........	To survey islands in Georgian Bay in front of Conger and Cowper	4,300
3	July 25,1911 & June 20. 1911.	E. D. Bolton	To survey tract of land near Mack Station, District Thunder Bay, and survey of township of Lyon, additional	1,700
4	May 2, 1911..	H. J. Beatty	To survey township outlines, District of Sudbury	6,000
5	June 20. 1911.	Code & Code.......	To survey township outlines, District of Sudbury	5,000
6	May 4, 1911 .	J. S. Dobie	To survey township outlines, District of Sudbury	5,000
7	May 17, 1911.	C. H. Fullerton...	To survey township outlines, District of Nipissing	6,300
8	June 8. 1911..	J. W. Fitzgerald..	To survey township outlines, District of Sudbury	5,500
9	July 18, 1911.	T. D. Green	To survey islands in Gun and Sand Lakes, Winnipeg River, District of Kenora	7,000
10	June 17. 1911.	D. J. Gillon.......	To survey islands in Rainy Lake, District of Rainy River	3,000
11	July 31, 1911.	A. D. Griffin......	To traverse Sesekinika Lake, District of Nipissing	700
12	June 12, 1911.	Jas. Hutcheon	To survey base and meridian lines, District of Sudbury	6,200
13	July 21, 1911.	J. E. Jackson.....	To survey base and meridian lines, District of Nipissing	4,700
14	June 2. 1911 .	J. J. Newman	To survey township outlines, District of Nipissing	2,500
15	June 28, 1911.	Paulin & Anderson	To survey Zealand, additional, and townsite in Wabigoon Township, District of Kenora	3,000
16	May 22, 1911.	Sutcliffe & Neelands...........	To traverse the Mattagami River, District of Sudbury	4,000
17	May 20, 1911.	Speight & Van Nostrand...........	To survey base and meridian lines, District of Sudbury	8,000
18	June 8, 1911..	Walter Smith.....	To traverse lakes and rivers, lying between Bisco Station and Mattagami Lake, District of Sudbury	2,900
19	May 4, 1911..	R. W. Demorest ..	To survey islands in Lake of the Woods, District of Kenora	20,440
				101,440

GEORGE B. KIRKPATRICK,
Director of Surveys.

AUBREY WHITE,
Deputy Minister of Lands and Forests.

Appendix No. 17.

Statement of Crown Lands surveyed, completed and closed during the 12 months, ending October 31st, 1911.

No.	Date of Instructions.	Name of Surveyor.	Description of Survey.	Amount paid.	No. of acres.
				$ c	
1	March 19, 1910 ..	A. G. Ardagh......	To survey islands in Georgian Bay in front of Harrison and Shawanaga	5,635 43	
2	March 21, 1910..	D. Beatty.........	To survey islands in Georgian Bay in front of Conger and Cowper	4,378 84	
3	March 23, 1910..	C. H. Fullerton ..	To survey islands in Night Hawk Lake in townships of Cody and Macklem	537 75	
4	April 18, 1910...	C. H. Fullerton ..	To survey outlines of townships surrounding Night Hawk Lake and to south thereof, District of Nipissing	855 84	
5	April 16. 1910...	J. H. Burd	To survey islands in Georgian Bay in front of McDougall and Carling	2,903 18	
6	April 22, 1910 ...	L. R. Ord	To survey islands in Georgian Bay in front of Wallbridge...	1,535 63	
7	April 18. 1910 ...	C. H. Fullerton....	To survey Night Hawk Lake and islands therein, in townships of Carman, Thomas and Langmuir	803 47	
8	May 2, 1910.....	Speight & Van Nostrand	To survey base and meridian lines, District of Algoma	72 00	
9	May 3, 1910	J. W. Fitzgerald.	To survey outlines of townships, Districts of Nipissing and Sudbury	565 01	
10	May 10, 1910 ..	Alex. Niven	To survey town plots of Superior Junction and Reddit, District of Kenora	1,387 58	
11	May 11, 1910. ..	J. Hutcheon	To survey township of Machin, District of Sudbury	2,958 50	53,812
12	May 17, 1910 ...	A. S. Code	To survey outlines of townships north of Aylmer, District of Sudbury	675 60	
13	May 27. 1910....	J. J. Newman	To survey outlines of townships north of McNish, District of Nipissing	2,359 68	
14	June 9, 1910.. ..	Bush & Paulin....	To traverse lakes, District of Algoma	1,800 52	
15	July 5, 1910.....	W. Beatty	To survey part of township of Alexandra, District of Nipissing	1,480 60	34,806
16	July 17, 1910....	A. D. Griffin	To survey residue of townships of Maisonville and Benoit, District of Nipissing	233 10	27,106
17	Sept. 2, 1910	E. Seager.........	To survey timber berths, K 1 to 7, District of Kenora	367 93	
18	Aug. 19, 1910....	T. B. Speight	To survey town plot of Missinaibi, District of Algoma	488 35	
19	... .	L. V. Rorke	Inspection of surveys	1,338 72	
20	April 26. 1911 ...	E. Seager.........	To survey town plot of Waldhof, District of Kenora	230 14	
21	May 22, 1911.	Cavana & Watson..	To survey township outlines, District of Sudbury	5,406 60	
22	June, 19, 1911.	C. E. Fitton.......	Inspection of surveys	2,669 20	

Appendix No. 17.—Continued.

Statement of Crown Lands surveyed, completed and closed during the 12 months.—Continued.

No.	Date of Instructions.	Name of Surveyor.	Description of Survey.	Amount paid. $ c.	No. of acres.
23	May 17. 1911....	W. J. Johnston	To survey township outlines, District of Sudbury	4,154 09	
24	May 5. 1911.....	Lang & Ross......	To survey township outlines, District of Sudbury	5,391 15	
25	May 22. 1911....	H. M. Anderson ...	To survey town plot of Mattawishguia, District of Algoma.	979 51	
26	May 17. 1911....	Pierce & Phillips..	To survey broken lot No. 5, con. 1, Tisdale, District of Sudbury	115 45	
27	July 26, 1911....	H. M. Anderson ...	To survey town plot of Mattagami, District of Sudbury	948 00	
28	July 26. 1911....	H. M. Anderson ...	To survey town plot of Low Bush, District of Sudbury ...	1,206 00	
29	May 8. 1911.....	T. J. Patten	To survey township outlines, District of Sudbury	5,729 40	
			Rice Lewis & Son, iron posts...	265 90	
			C. Tarling & Co., mounting maps	662 15	
			E. H. Harcourt & Co., printing maps	7,113 50	
			Link & Henderson, horse drowned on R. W. Demorest's survey	200 00	
			Rolph Clark & Co., maps Georgian Bay	514 02	
			J. A. Pollard, mounting maps..	20 80	
			Map Publishing Co., maps	5 00	
				$65,988 64	115,724

GEORGE B. KIRKPATRICK,
Director of Surveys.

AUBREY WHITE,
Deputy Minister of Lands and Forests.

Appendix No. 18.

Survey certain Base and Meridian Lines, District of Sudbury.

Windsor, Ont., Dec. 17th, 1910.

Sir,—In compliance with your instructions dated May 27th, 1910, I have completed the survey of certain base and meridian lines west of Lake Temagami and north of the Townships of McNish and Pardo in the District of Sudbury.

I left Windsor on the 1.20 a.m. Canadian Pacific Railway train, July 19th, and arrived in Toronto at 8.30 a.m., where I found that owing to a strike on the Grand Trunk, trains were not running between Toronto and North Bay, so I had to get our tickets changed and proceed via Canadian Pacific Railway to Sudbury, thence to North Bay where I arrived about 10.30 a.m., July 20th, and found that the men I had engaged from Sturgeon Falls, had gone back home on learning that the Grand Trunk trains were not running, so I had to drop off, telegraph to Sturgeon Falls and wait until the following morning before I could proceed north.

I left North Bay at 12.45 p.m. on July 21st, and proceeded to Temagami Station where I found the boat waiting, so I arrived at Temagami Inn with eleven men and my supplies about 6 p.m. the same day. That evening I engaged a man at Bear Island, who knew the canoe routes and portages, and arranged with the Steamboat Company to take the party and supplies to Skunk Lake Portage the following morning. I got in to Lake Manitopopawgi on the evening of July 23rd, where I camped and made preparations to commence my survey. On Monday the 25th, I located the north boundary of the Township of McNish and commenced my work proper on Tuesday, July 26th.

I commenced my survey at a 1¼ inch iron post, planted beside a 6 inch pine post in a cairn of stones, marked "XXVI" 1 Con. "VI" McNish, on southwest side; "XVIII" 1 Con. "VI" Pardo, on southeast side: "XIX" on east side and "XXVII" on west side. Thence I ran the second meridian due north six miles. From the 6th mile post on the second meridian I ran the first base line east 6 M. 2.85 chains to the west shore of Lake Temagami. I then returned to the second meridian and continued north 12 miles numbering the posts on the south side from 1 to 6 between the first and second base lines, and from 1 to 6 north of the second base line. I then returned to the second base line which I ran west from the 6th mile post on the second meridian, numbering the posts on the east side.

I then started and ran the second base line east to Lake Temagami, numbering the posts on the west side from 1 to 6 between the second and third meridians and 1 to 2 M. + 26.50 chains between the third meridian and the lake. I then ran the third meridian north 6 miles numbering the posts on the south side. I then returned to the first base line and ran west from the 6th mile post on the second meridian to the east boundary of the Township of McCarthy which I intersected at 3.54 chains south of the northeast corner. From the northeast corner of the Township of McCarthy I ran the first meridian north intersecting my second base line at 6 M. — 5.12 chains, from the northeast corner of the Township of McCarthy and 6 M. + 4.14 chains west of the second meridian. From the second base line I continued my first meridian north 12 M. 10 chains to the northeast corner of the Township of Seagram, numbering the posts from 1 M. to 6 M. between the second and third base lines and from 1 M. to 6 M. + 10 chains along the east boundary of Seagram. I then ran west along the north boundary of Seagram until I intersected the production of the west boundary of Seagram at 7 M. — 7.63 chains and

5.94 chains north of the north boundary of the Township of Turner. I then returned to the 6th M. post north of the second base line on the first meridian where I commenced my third base line and ran east to Lake Temagami, intersecting my second meridian at 6 M. — 6.51 chains, north of the second base line, and the third meridian at 6 M. — 6.20 chains north of the second base line.

Where a mile post or corner intersection would fall in a lake, a post was planted on the shore and marked with the chainage to the point where the post was planted.

All posts were marked in accordance with your instructions as shown by accompanying plan and field notes. All iron posts were 3 feet long, 1⅞ inches in diameter, forged at the top, pointed at the bottom and painted red.

I took frequent observations on Polaris at elongation and used an azimuth of 1 degree .44 m. for the field work. The magnetic variation is fairly uniform, varying from 8 degrees to 10 degrees west for the most of the territory worked over, the only marked change being on the second meridian in the 6th M. north of the Township of McNish, where the compass varied from 8 degrees west to 30 degrees east in a distance of about 3 chains.

All lines were well cut out and blazed.

The Sturgeon and Obabika were the only large streams crossed during the progress of the work, but there are quite a number of lakes of various sizes, the more important of which were fairly accurately shown on the projected map accompanying your instructions.

The country on the whole is quite rocky, rough and hilly, particularly the east part around Lake Temagami and the other lakes, but the land is much more level and far better timbered along the first meridian.

The timber consists chiefly of white Norway and Banksian pine, spruce, white and yellow birch, poplar and balsam, with small patches of hard maple and red oak: the latter two are mostly scrubby and of little commercial value. The pine is quite well distributed over the whole area and ranges from 6 to 30 inches on the stump. The thickest and most uniform timber is along the Sturgeon and the Obabika Rivers.

A considerable portion of this area has been prospected over, but I did not notice a single survey line of any mineral claims.

Of large game, moose and bear are quite plentiful and several were seen by members of the party. There are a few red or fallow deer, while partridge, duck, beaver, rabbits and muskrats are numerous. Trout, black bass and pike were caught in nearly all the lakes and streams. There were scarcely any berries of any kind found during the summer.

I completed the survey on the evening of October 12th, and arrived home on the evening of October 15th.

Accompanying this report you will find a plan on the scale of 1 mile to 1 inch, field notes, chainer's oaths, and accounts in triplicate.

All of which is respectfully submitted.

I have the honor to be,

Sir,

Your obedient servant,

(Sgd.) J. J. Newman.

The Honourable the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 19.

Survey of Base and Meridian Lines in the Temagami Forest Reserve, District of Nipissing.

Alvinston, Ont., Nov. 22nd, 1910.

Sir,—I beg to submit the following report on the survey of base and meridian lines in the Temagami Forest Reserve, in the District of Nipissing made under instructions from your Department and dated May 17th, 1910.

On 22nd July, I proceeded to Sudbury and after arranging for teaming supplies and engaging men I proceeded to Wahnapitae Lake, and from there northerly by canoe to Lake Chinicoochichi. The return was made to Sturgeon Falls down Sturgeon River.

The survey as shown on the accompanying plan and field notes was commenced at the north west angle of Mackelcan, where after waiting two days for an observation I produced the line between the Townships of Aylmer and Mackelcan, but succeeded in getting an observation at 73 chains from the north boundary of Mackelcan. This meridian was run north for a distance of eighteen miles and at the 6th, 12th and 18th mile posts the base lines were run east and west therefrom. The second meridian line was however run south. All observations were made from Polaris at elongation and are shown in the field notes accompanying this report. The plan shows the location of the lines and the approximate waterways.

The magnetic variation runs from 4½ to 8½ degrees west and is not at all constant.

Twelve iron posts were planted and marked as shown in the field notes, and at the head of each mile a wooden post was planted, except where the end of a mile came in water when a witness post was put in marked with the proper chainage.

General Features and Soil.

The country is in general of a rolling character and is sometimes broken sharply by rocky hills and cliffs. Many lakes occur and the character of country near the lakes is nearly always rocky. A few narrow muskegs occur. The Sturgeon River might be said to mark the divide of country with regard to timber and somewhat with regard to soil. It is a rough broken stream with a very small flow at low water. Numerous expansions occur.

Travel in any direction almost, can be made over the lakes. The portages are well cut out where travelled.

There are a few burnt areas but such are small. Some brulé occurs as well.

The soil is of a sandy nature and not of great depth. The country can never be termed "agricultural" for where the soil is not underlaid with rock about three or four inches from the surface, the land is full of boulders and stones. The timber is however valuable, and there are numerous seams of white quartz and some indications of mineral.

There are numerous small falls and rapids on the Sturgeon River, but the flow is very small at low water.

Timber.

Nearly the whole area is covered with a growth of red and white pine, jack pine, birch, poplar, spruce and cedar and the forest is as a rule thick.

The pine is more plentiful south of the Sturgeon River than on the north side, and runs from ten to thirty inches in diameter. Some of the larger pine is beginning to rot at the centre and it might be wise to cut some of the full grown trees.

The timber might be driven down the Sturgeon River in freshet. There is a small area of good sound pine at the south-east angle of McConnell, recently burned, which should be got out before it becomes wormy.

The other timber averages from four to eighteen inches and is in a good state of preservation. The necessity for efficient rangers in this territory is very apparent.

Fish and Game.

The fishing in these waters is unequalled. Pike, pickerel, bass and lake trout are easily caught with the troll and some of the fish are exceptionally large.

Red deer, moose and bear were seen, and plenty of muskrat and a few signs of beaver.

Accompanying this report I submit,

(1) A general plan,

(2) Field notes of the survey with index map.

All of which is respectifully submitted.

I have the honor to be,

Sir,

Your obedient servant,

(Sgd.) A. S. Code, C.E.
Ontario Land Surveyor.

The Honourable the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 20.

Survey of Base and Meridian Lines, District of Algoma.

Toronto, 15th December, 1910.

Sir,—We have the honour to submit the following report upon the survey of certain meridian and base lines in the District of Algoma, north of Missanabie Lake, made by us under instructions from your Department dated 2nd May, 1910.

Leaving Toronto on 25th May, with four men we proceeded to Missanabie Station on the Canadian Pacific Railway, where by previous arrangement we were joined by fourteen others from Sudbury, Chapleau, Heron Bay and other points in New Ontario.

At Missanabie it was discovered that one of the Toronto men had a diseased foot, and he was obliged to return to his home. The total number of men employed during the season was thirty-seven, although the maximum force at any given time was twenty-two. The party was in charge of T. B. Speight, O.L.S., assisted by John Van Nostrand, O.L.S.

We left Missanabie on 28th May with twenty men, five canoes and about two tons of supplies and equipment, and travelled by way of Dog Lake, Crooked Lake and Missanabie Lake, to the point where the latter is crossed by O.L.S. Niven's base line run in 1899. This journey of about thirty-five miles occupied two days and the only difficulty of importance met with was the rounding of Fairy Point, where the prevalence of rough water is usually a source of danger to canoemen.

We began the work on 1st June, by re-tracing and opening out the Niven base line for a distance of nearly two and a half miles east from lake, arriving at the one hundred and eighth mile post after two days of work in rain, chiefly through brulé which in places had obliterated all marks of the original survey. This point, the initial point of the survey, was found to be marked by an iron post planted alongside a tamarac post, the position being further identified by a spruce "bearing tree" six inches in diameter, north ten degrees, east ten links from the posts. This part of the base line being well defined and the weather too cloudy for astronomical work, the required angle was turned off from the base line and we ran due north three and a half miles, at which point the first observation was obtained and the line found to be within one minute of a true meridian. The line was then continued due north to the 24th mile post at which point we ran due west forty-eight chains to tie in the Missanabie River. We then continued the main meridian line due north to the 42nd mile post and from that point started a base line to the east, for the purpose of connecting with the Missanabie River. Subsequently owing to the danger from forest fires and scarcity of water, which the long continued drought had produced, we continued this base line east to the 9th mile post, but failed to reach Opazatika Lake in that distance.

On 30th June, the second day east from the meridian, a sad casualty occurred. Alan C. Henderson, a bright young student from Toronto University, succumbed to the intense heat, combined with drinking impure water from icy muskegs. He became faint while returning with his chaining mate from the day's work about 5.45 p.m. and was unable to proceed further. His companion took the news to camp and refreshment was at once sent out to him as it was thought to be a case of exhaustion only. On the arrival of the relief party he was found to be unconscious, and in spite of all that could be done the unfortunate young man expired about midnight. Early the next morning a picked crew of seven men carried the body to the canoe route and reached Missanabie in three days of forced travelling and, with as little delay as could be, brought the remains to Toronto for interment.

The effect of this calamity upon the superstitious Indians who largely composed the party, was such that eight expressed a desire to quit work and for the same reason it was found very difficult to get others to take their places.

The survey proceeded slowly for the next fortnight when the party received sufficient reinforcement to be able to make good headway, but the continued dry weather which lasted for seven weeks made it all-important to keep within reach of a body of water, sufficient for protection as well as for actual subsistence. The narrow escape made by our party in the season of 1908, from a fire started by prospectors, had shown the necessity for caution of this nature, and the most vigilant care was taken to see that every camp fire was quite dead before a camp ground was left. To the above causes the deviation from the written instructions is chiefly due.

From the 42nd mile post the meridian line was continued north to the 60th mile post, from which point base lines were run nine miles east and west respectively.

The meridian line was then continued to the south boundary of the Township of Staunton, a total length of sixty-nine miles six chains and thirty-two links, the intersection with that boundary being made at a point five chains and seventy-four links west from the south-east angle of lot 21 in concession 1.

Returning to the 51st mile post we ran east, sixteen miles and thirty-three chains, to the Opazatika River.

We next continued this base line west from the meridian for a distance of twenty-seven miles at which point we ran meridians three miles and thirty chains north to a small river, also nine and a half miles south in the hope of connecting with the located line of the Canadian Northern Railway, but owing to a deflection in that line, as we afterwards learned, we failed to reach it.

From the 27th mile post on this base line we continued it west, a total distance of thirty-seven miles six chains and forty-three links, from the main meridian line to the Kabinakagami River and terminated the work for the season.

All lines run were well opened out and blazed in the regulation manner. Iron posts were planted at the 6th, 15th, 24th, 33rd, 42nd, 51st and 60th miles on the main meridian line, and at each 9th mile on other meridian and base lines. The north end of the main meridian was marked by an iron post at its intersection with the south boundary of the Township of Staunton. With the exception of those at the 6th and 15th miles on the main meridian line all these posts were two inches in diameter, 3 feet long, forged at the top, pointed at the bottom and painted red. In the two exceptions above mentioned, the iron posts were one and one-quarter inches in diameter. In addition to the iron posts planted as above described, a wooden post of the most durable material within reasonable distance was planted at the end of each mile. On each wooden post and iron post the number of the mile it represented was carefully and durably marked on the side nearest the initial point of the line. Where a corner occurred in a lake or other natural feature precluding the planting of posts, the post was planted upon the nearest suitable point of land and upon the line run, the distance of such post from the true corner being entered in the notes and marked upon the post. In all cases where wooden and iron posts are planted side by side, the iron post indicates the proper corner.

Frequent astronomical observations, records of a number of which are appended, were taken for the purpose of verifying the course of the lines run, the average magnetic declination being about five degrees west.

The return journey was made by way of Oba River and Lake, Wabatongashene Lake to Dog Lake and thence to Missanabie Station which was reached on 5th September.

General Features.

The country embraced by this survey comprises the hitherto unexplored territory bounded on the south by the Canadian Pacific Railway, on the north by the National Transcontinental Railway, on the east by the Opazatika and Missanabie Rivers and on the west by the Oba and Kabinakagami Rivers. On the whole the surface may be termed rolling, the only elevations of note being two or three hills about ten miles west of the 50th mile post on the main meridian. These rise to a height of about two hundred feet above the surrounding country.

The other elevations shown by the accompanying plan and field notes vary from ten to thirty feet, with an occasional one of fifty feet.

In addition to the rivers above named the Mattawitchewan, or Albany Branch, crosses the main Base Line about twenty miles west of the main Meridian Line, and flowing north-easterly, enters the Missanable River about one mile west of the 64th mile post on that Meridian.

The lakes include Missanable, Brunswick, Opazatika, Oba and Kabinakagami, with a fair number of smaller lakes of minor importance.

In the valley of the Missanabie River, the soil is generally clay and clay loam with occasional sandy and rocky ridges, Along the main Base Line the soil is of less value for agricultural purposes. The valleys of the other rivers have a smaller percentage of clay than that of the Missanabie. Laurentian and Huronian alternately compose the formation met with.

The ravages of fire of recent date are not much in evidence, but from indications we believe that nearly the whole of this region was fire swept some fifty or sixty years ago with the result that the present timber is largely second growth.

Soil.

Along the main Meridian Line we found clay and clay loam predominating, the northern thirty miles in particular being of excellent quality. Allowing for sandy ridges and occasional outcroppings of rock, sixty-five to seventy-five per cent. can be classed as good agricultural land. On the Base Line which passes through the 60th mile post nearly the whole is first class soil. Along the main Base Line west from the main Meridian, the clay appears in smaller areas, interspersed with rocky and sandy ridges, and only about thirty per cent. may be termed good farming land.

Timber.

Spruce, poplar, Banksian pine, white birch, balm of Gilead, tamarac, balsam and cedar, in about the above order of predominance, compose the timber met with, the largest specimens being in the valleys of the Missanabie and other rivers. As is characteristic of the clay belt, the timber remote from the river is less rapid in growth. Although no great quantity is at present of marketable size, there is sufficient for the ordinary uses of the settler. These conditions are general and vary but slightly. The best specimens of poplar were seen on the east and west shores of Brunswick Lake, and of spruce and Banksian pine, in the valley of the Missanabie.

Minerals.

As before intimated, the Laurentian and Huronian formations were met with alternately, and in the latter, some promising outcroppings of diorite and diabase in the 52nd and 53rd miles on the main Meridian Line were noticed, but we saw no actual indications of the precious minerals. Indications of iron ore were seen on the south-east bay of Brunswick Lake.

Water Powers.

Taking the rivers concerned, in order from the east, the Opazatika has numerous falls and rapids from ten to fifteen feet which are capable of development for local purposes.

The breadth of this stream varies from one hundred to two hundred feet, depth four to six feet with generally fair current and banks about eight to ten feet in height. Opazatika Lake, with an area of about twenty-five square miles, would serve as a natural reservoir, but its low shores and numerous islands would suffer if an attempt were made to increase to any considerable extent the natural elevation of the water.

Missanabie River has a breadth ranging from three hundred to five hundred feet with depth about ten feet. Its current in general is about one and a half to two miles an hour, with the exception of a stretch of about fifteen miles of what is known as "swampy ground," where the flow is almost imperceptible. The banks are usually about ten feet high, although in some places they attain forty to fifty feet. The Lake of the same name covers about fifty square miles, its extreme length being twenty-six miles. Its shores are chiefly rocky, rising gradually, and capable of an elevation of water to four or five feet without causing much flooding. Brunswick Lake, a fine sheet of water with extreme length of fourteen miles and breadth of one-half to two miles, covers an area of about twenty square miles, and is dotted with islands. Its shores are generally rocky with gradual slope, but along the south-west bay are low lying. Brunswick River, which flows from this lake, has an average width of about one hundred feet and depth eight to ten feet. The current is generally slow, but in the three miles above its junction with the Missanabie River rapids and falls amounting to about twenty feet would furnish a fair water power proposition. The ruins of the old Hudson's Bay Company's Brunswick House Post on the west shore of the lake of that name are still to be seen about three miles south from the mouth of the river. Chief amongst the falls and rapids on the Missanabie, within the scope of this survey are Island Falls, with a head of ten feet, about one mile east of the 16th mile post on the main Meridian Line; Green Hill Portage occurring at the 19th mile post, has a rapid about one mile in length with a total descent of twenty to thirty feet; St. Peter's or Split Rock Falls, situated about one mile west of the 23rd mile post, with a fall of twelve feet, and St. Paul's Falls, about four miles east of the 28th mile post, with a head of twenty feet.

Mattawitchewan, or Albany Branch, River, from one hundred to two hundred feet in width and four to six feet in depth has, as indicated by its Indian name, numerous minor falls and rapids. A unique feature of this stream is that its source is the Oba River, the divided waters of which flow in opposite directions from this source. The located line of the Canadian Northern Railway crosses the smaller stream near this intersecting point. The shores of the Mattawitchewan are low lying, but no lake expansions occur.

The Oba River is a stream about two hundred feet wide and six to eight feet deep with banks generally about eight feet high and fair current. A considerable number of small falls were noted. With Oba Lake as a reservoir, some eleven square miles in extent, those in the upper part can be utilized. The lake contains numerous islands and is flanked on the north-west by a range of hills which add to its beauty. At the source of the Mattawitchewan, the Oba, as before noted, yields a part of its waters to the former, the remainder flowing south-westerly to form the chief tributary of the Kabinakagami.

The Kabinakagami River on the western verge of this survey is a stream differing little from the Oba, has falls and portages very similar to those above described and is regulated in its flow by Kabinakagami Lake, with an area of about thirty square miles, and containing many islands.

An important feature in all these rivers is the existence of the large lakes mentioned, which add very materially to the value of the water powers by insuring, in great measure, a uniform flow of water.

Game.

Moose were numerous, but no red deer were seen. Bears were plentiful and on more than one occasion took advantage of want of care in protecting provisions. Indications of beaver were seen in numbers of places. Mink and marten also were noticed. Partridge are to be found in considerable numbers. Grey trout abound in the larger lakes and attain a great size. In the streams, particularly in the Mattawitchewan, Coat and Oba Rivers, speckled trout are abundant.

General Remarks.

Nearly the whole of the territory embraced by this survey lies within the clay belt and the greater part, particularly in the valleys of the Missanabie and Kabinakagami, will be available for farm land when the transport facilities warrant settlement.

In this connection the National Transcontinental Railway will be opened during the coming summer; the Canadian Northern Railway, which crosses the territory diagonally in a north-westerly direction about midway between the Canadian Pacific and National Transcontinental Railways, will be under construction as early as the opening of Spring will permit, and the Algoma Central has projected a line down the Oba and Kabinakagami Valleys to connect with the National Transcontinental Railway, with the estimate that this link will be completed during the next two or three years.

In work of this kind the surveyor finds it impossible to obtain information sufficient to arrive at any reliable conclusion as to the mineral possibilities. Outcroppings of rock were seen at intervals as already noted, and it may well be that these are deserving of the attention of expert prospectors.

The fact that the several railways mentioned are about to give easy access to a large part of this region should within a few years throw it open to the settler.

The abundance of wild fruits and the success with which vegetables are grown at Brunswick House Post, together with our own observations of the climatic conditions in the clay belt during the past ten years, convince us that there is a great agricultural future before this part of Ontario.

Accompanying this Report are a general plan, field notes and triplicate account.

We have the honour to be,

Sir,

Your obedient servants,

(Sgd.) Speight & Van Nostrand.

Ontario Land Surveyors.

The Honourable The Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 21.

SURVEY OF TOWNSHIP OUTLINES IN THE DISTRICT OF SUDBURY.

THESSALON, Nov. 22nd, 1911.

SIR,—In accordance with your instructions dated May 4th, 1911, I have made a survey of certain Township Outlines northwest of the Mississaga Forest Reserve, and beg to submit the following report:

The best route to this territory is via the Montreal River from the Algoma Central Railway.

I commenced the survey by running a base line east from a point 21.94 chains south of the 43rd mile post on the meridian line run in 1898 by T. B. Speight, O.L.S. This base line was run due east a distance of 12 miles and forms the north boundary of Range 16. The north boundary of Township 9 H., which is a continuation of this base line, was run later in the season. I returned to the northeast corner of Township 23, Range 16, which point is exactly 6 miles east of the starting point on O.L.S. Speight's meridian, and ran north astronomically a distance of 5 miles 20.40 chains, at which point this line was intersected later in the season by the north boundary of Range 17. Returning to the northeast corner of Township 23, Range 16, I ran south astronomically between Townships 23 and 22, Range 16, a distance of 6 miles, to the south-east corner of Township 23, Range 16. From this point I ran west astronomically a distance of 6 miles 1.13 chains, at which point I intersected the meridian line run by O.L.S. Speight in 1898, at a point 22.95 chains south of the 37th mile post. I returned to the south east corner of Township 23, Range 16, and ran south astronomically between Townships 23 and 22, Range 15, a distance of 5 miles 78.77 chains to the base line run by myself in 1908, which was intersected at a point 2.49 chains east of the 18th mile post. Returning again to the south-east corner of Township 23, Range 16, I ran east astronomically a distance of 6 miles to the south-east corner of Township 22, Range 16. From this point I continued this line east astronomically between Township 8 H. and Township 9 H., a distance of 5 miles 73.47 chains, at which point I intersected a meridian line run during this season at a point 12.35 chains south of an iron post marked 8 G., on the south-east side and 9 G. on the north-east side. I then returned to the south-east corner of Township 22, Range 16, and ran south astronomically between Township 22, Range 15, and Township 8 H., a distance of 5 miles 77.05 chains to the base line run by myself in 1908, which was intersected at a point 1.65 chains east of the 12th mile post, this mile post being the north-west corner of the Mississaga Forest Reserve. I returned to the south east corner of Township 22, Range 16, and ran north astronomically a distance of 6 miles to the south-east corner of Townshipp 22, Range 17. From this point I ran east astronomically between Township 9 H., and Township 10 H., a distance of 5 miles 68.80 chains, at which point I intersected a line run this season at a point 12.45 chains south of an iron post marked Township 10 G., on the south-east side. I returned to the south-east corner of Township 22, Range 17, and ran north astronomically between Township 22, Range 17 and Township 10 H., a distance of 5 miles 21.94 chains, to the south-east corner of Township 22, Range 17. From this point I ran east astronomically between Township 10 H. and Township 11 H., a distance of 6 miles.

I returned to the north-east corner of Township 22, Range 17, and ran west astronomically a distance of 5 miles 78.95 chains to the east boundary of Township 23, Range 17, which I intersected at a point 20.40 chains north of the 5 mile post, as previously mentioned in this report. From this point I continued due west astronomically a distance of 5 miles 77.17 chains, at which point I intersected the meridian line run in 1898 by O.L.S. Speight, at a point 3.05 chains south of the 48th mile post. In running the last line I intersected the lines run by Messrs. Lang and Ross, Ontario Land Surveyors, during this season, and moved their posts to the points where my line intersected theirs. The points where these posts were planted are shown in my field notes, and in accordance with your request, I have supplied Messrs. Lang and Ross, O.L.S., with the information necessary to complete their returns.

Throughout the survey the lines were carefully run and are well cut out and blazed. The posts are all of the best timber available, and stone mounds were built around the posts wherever possible. Some of these mounds are large enough to form permanent monuments for all time.

An iron post was planted at each township corner and marked with the number of the adjoining township on the side facing the township. The iron post at the south-east corner of Township 9 H. was not marked owing to an oversight. It is planted, however, in a good mound of large stones.

Astronomical observations were taken very frequently and the details are shown in the field notes at the points where the observations were taken. In running these lines I used a transit with an object glass large enough to take observations on Polaris in the day-time. I also carried a first-class sidereal watch which I checked at every possible opportunity. By this means I was able to take an observation every clear day, while the work was actually in progress, instead of having to wait for an elongation of the star at night.

The territory lying within the limits of the survey is practically a virgin forest. I do not think that five per cent. of the total area has been burnt. There is an area of brulé extending for some distance along the east bank of the Montreal River, and running back for a mile or more. An area of perhaps three or four square miles has been burnt some years ago near the Batchewana River in Townships 22 and 23, Range 16. There are also a few small burnt areas here and there, which have apparently been caused by lightning, as they are all far removed from any travelled route and do not in any case cover more than a few acres. There is also some brulé of recent date along the north boundary of Townships 23, Range 17.

The timber throughout is a mixed growth of spruce, balsam, white birch, jack pine and white pine. There is more or less white pine of good quality scattered over the whole area and in many places grows very thickly. This pine occurs mostly in bunches among other timber, but the total amount within the area covered by the survey is very large. There is also a large quantity of splendid spruce along the Batchewana River in Township 22, Ranges 15 and 16. There is a large quantity of fine jack pine suitable for railway ties.

These townships are close to the Montreal River, which is the most important stream, and flows along the west boundary of Township 23, Range 17, and part of Range 16. There are several falls on the Montreal River which would make good water powers. One in particular occurs about a mile south of the north-west corner of Township 23, Range 16. In half a mile, the river falls at least one hundred feet and probably more. This falls is partly east and partly west of

O.L.S. Speight's meridian line. A branch of the Montreal River flows through Townships 22 and 23, Range 16, and part of Townships 9 H. and 10 H. This is a rough stream, but with some improvements could be used for timber driving purposes. It is navigable for canoes across Township 23 and most of Township 22, but there are a number of portages to be made. The Batchewana River flows through the southern part of this territory, and is also a stream suitable for timber driving with some improvements. The Goulais River rises in Township 8 H. but is a small stream, being very near the source.

The country as a whole, is rough and hilly, and in some places almost mountainous. The soil is mostly sand and gravel, and in my opinion is not suitable for agriculture.

The geological formation is principally granite, but a large area of Huronian rocks occurs along the Batchewana River, which might yield results if carefully prospected. No indications of economic minerals were seen.

The magnetic variation averages about 3° 45′ west, but is very inconstant, variations of a degree or more being so frequently observed as to make it useless to attempt to keep a record of them. When the local attraction is very large the fact has been recorded in the field notes.

Moose are fairly plentiful and there are some deer. Wolves were heard occasionally. The partridge are becoming very plentiful after having almost disappeared. The ordinary fur-bearing animals appear to be fairly plentiful.

In the Montreal River large pike were caught with a troll, while in the Batchewana River some fine speckled trout were caught.

Enclosed herewith are field notes, plan, timber plan on tracing linen and accounts in triplicate.

I have the honor to be,

Sir,

Your obedient servant,

(Signed) James S. Dobie.

The Honourable, The Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 22.

Survey of Township Outlines, District of Sudbury.

New-Liskeard, Ont., Oct. 10, 1911.

Sir,—I beg to submit the following report on the survey of Township Outlines in the District of Sudbury, north-west of Porcupine, performed under instructions dated May 17th, 1911.

I went into the country by the Kamiskotia River, which, while navigable, has many short rapids and log jams.

Owing to its being almost unnavigable through the Township of Massey, I was forced to commence work at O.L.S. Niven's XVIII mile post on his second base line, or at the north-west corner of the Township of Turnbull. From here I ran south and north to the north-east corner of Whitesides and south-west corner of Kingsmill, respectively, a distance of thirty (30) miles.

The southerly three and one-quarter (3¼) miles of the west boundary of Byers, or Niven's second meridian line, was run and produced twelve miles to the south-west corner of the Township of Massey.

From the north-west corner of the Township of Robb, which is also the north-east corner of Coté, base lines were run east and west astronomically, a distance of six miles each way.

Similar base lines were run from the north-west corner of the Township of Thorburn.

The above lines were well opened up and the adjacent trees well blazed in the usual manner, while wooden posts of durable material were planted at every mile and half-mile; and where such distance came in a lake or river, a post was planted on the shore nearest the said distance, with the chainage carved on the proper face. On nearly all the lakes and larger rivers, posts were planted on the banks with the chainage carved thereon for the benefit of surveyors and prospectors in making a tie. The posts were planted as solidly as possible, and, where possible and necessary, a cairn of stones were built around them.

Iron posts of 1¼ inches were planted at the following points: south-west corner of township of Turnbull; north-west and north-east corners of township of Robb; north-west and south-west corners of township of Coté; south-west corner of township of Massey; north-west and south-east corners of township of Geary and north-west and north-east corners of township of Moberly.

The names of the townships were cut with a cold chisel on all of those iron posts, and the wooden posts at the same points were carved similarly with a scribe. No iron post was planted at the north-west corner of township of Loveland, which said point falls in the north branch of the Kamiskotia River.

Observations on Polaris were taken every six miles, and where possible, every three, for the purpose of keeping the lines astronomically correct; and magnetic variation was noted at these points as well as others where a change of variation took place. The variation ranges between six degrees and ten degrees west; the results being entered in the field notes.

The chain bearers were duly impressed throughout the survey with the necessity of accurate chainage and taking careful field notes so that the natural features, variety of soil and timber would be plainly shown.

During the months of June and July, forest fires were prevalent in the Townships of Massey, Turnbull, Robb, Coté, Loveland and Byers. The cause, I think, was mainly through prospectors neglecting to extinguish their fires before leaving a camp. There were quite a number of prospectors in these said townships, prospecting for gold, and several good finds were made in Turnbull, Robb, Loveland and Byers.

I had the misfortune to suffer rather heavily through the fires, being burned out twice, and having to take to the river with all our provisions and camp.

Soil.

The whole country may be termed low and flat, a large portion of it being rather swampy, though in the townships of Massey and Turnbull there is higher ground, there being many sand ridges. Throughout the northern townships, however, clay loam is found everywhere with ridges of sand occasionally cropping up and in some places in the swamp, sand exists under the muck, instead of clay. If properly drained, this would be valuable agricultural land. There are no settlers in this district at all, though much trapping is done by the Indians and trappers. The four northern townships, Wilhemina, Geary, Moberly and Thorburn are very low, level land.

Rock.

Rock occurs only in the southerly six townships and generally in low ridges and domes, rising out of low ground. It consists principally of porphyry, granite, diabase and schist. The schist occurs in narrow dykes of about one hundred to two hundred feet in width, and only three such dykes were found on the westerly boundary of Coté and Massey.

In Turnbull and Robb, where many claims are staked, the formation is a quartz porphyry changing to a diabase.

In the Township of Loveland, higher ridges of rock occur along the banks of the Kamiskotia, being in some places two hundred feet in height.

Another year will show the value of mineral in these townships if it exists.

Timber.

The entire townships are covered with pulpwood, with occasional good ridges of jack-pine in Massey, Turnbull and Robb. The ridges follow the course of the river to quite an extent. The timber in the northern six townships consists of spruce, balsam, birch, cedar and dead tamarac, to about fifteen inches in diameter. A noticeable feature throughout is the growth of young tamarac, being quite thick in several places. No white or red pine was seen at all. Old and new brulé follows the course of the river and across the Township of Turnbull.

Water-Power.

Only one water power of any size exists. This is in the Township of Coté on the Kamiskotia River about three hundred feet north of the boundary line, where a natural head of about twenty-five feet is obtained. A raise of ten feet by a dam would possibly give 1,000 H.P., though in a dry season this would be considerably diminished. In view of the fact that Porcupine and Cripple Creek are so close, this power may be of some value.

Accompanying this report is a general plan on a scale of one mile to an inch, a timber plan on same scale, field notes, oath of chainmen, and all other necessary documents, all of which are respectfully submitted.

I have the honor to be,

Sir,

Your obedient servant,

(Sgd.) W. J. Johnston.

The Honourable. The Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 23.

Survey of Township Outlines, District of Sudbury.

Little Current, Ont., Sept. 15, 1911.

Sir,—I have the honour to submit to you the following report on the Survey of Township Outlines in the District of Sudbury, under instructions from your Department dated May 8th, 1911.

After procuring my outfit, provisions and guides from Biscotasing, I proceeded by way of the canoe route from Old Wakami, mileage 94, west of Cartier, on the Canadian Pacific Railway, through Wakamagaming and Kebsquasheshing Lakes and River to Wenebegon Lake. I returned the same way as far as Wakamagaming Lake, where I turned to the route to Ridout Station, as a train at Old Wakami cannot be flagged. The fire rangers at Wakamagaming Lake have cut out the old portage to Ridout, making it much easier to travel.

I commenced the work where I had last year planted an iron post at the north-east angle of 8 D, about 70 chains south of Lake Wenebegon, and ran the first base line west astronomically 24 miles, between Townships 8 D and 9 D. 8 E and 9 E, 8 F and 9 F and 8 G and 9 G.

The first 3 miles, on account of a difficulty in obtaining my latitude, is some minutes astray, as recorded in the notes and plan.

At intervals of 6 miles on above base, I ran north 6 miles, and south 6 miles and a fraction to O.L.S. Dobie's Base Line, numbering each meridian, reckoning from the east, as 1st, 2nd, 3rd and 4th.

After running north from the 1st base on the 4th meridian, I ran east astronomically, the 2nd base along the north limits of 9 G, 9 F, 9 E and 9 D, 23 miles and about 11 chains to Wenebegon Lake. Where the meridians intersected this base, I planted the posts for the corners of the several townships.

At every mile a wooden post was planted and marked in Roman numerals, cut in the post, the mileage, which on the base lines was reckoned from the north-east angle of the township, and on the meridians it was reckoned from the south-west angle.

At every township corner, an iron post, of 1¼ inch pipe, was also planted and marked thereon with a cold chisel the adjacent township numbers. An exception to this is at the north-east angle of 9 G, where, on account of the packers having mislaid for a time one of the posts, no iron post was planted, but a large cairn of boulders was built around the wooden one. At every mile, where loose stone could be found convenient, a cairn was built around the post and noted.

On the wooden posts at township corners were marked the numbers of the adjacent townships only.

Where a mile post or township corner came in a lake or river, a witness post was planted on the nearest shore, and cut thereon the mileage and chains. Two bearing trees were marked and noted at each post, except in a few places where there was no timber.

All lines were run with a Solar compass, well adjusted and well cut out and blazed, the blazes being on the sides of the trees facing the line, also on the sides facing the direction of the line.

The timber throughout the tract surveyed is white birch, poplar, balsam, black and white spruce, jack pine and white pine, cedar, and in a few places sugar maple and black birch. Tamarac is growing again, though still very small.

The 1st base, along north limits of 8 D, 8 E, and 4½ miles of 8 F, runs mostly through an old brulé, the timber being 3 to 8 inches in diameter. The balance of the base, 1½ miles along north limit of 8 F, and continuing along north limit of 8 G, is in big timber, the white pine being mostly scattered. In the old brulé there are also some clumps of large white pine.

On the 2nd base, from Wenebegon Lake west to 5th mile post, Township 9 D, there is considerable large black spruce and jack pine. The remainder of this base runs through alternate old and new brulé and old bush past the 2-mile post on north limit of 9 G, where it enters solid green bush of large timber, including considerable jack pine, and continues in this the remainder of the base.

On the 1st meridian, nearly all the limit between 8 D and 8 E is in large timber. The limit between 9 D and 9 E is mostly in old brulé, with timber from 3 in. to 8 in. in diameter.

On the 2nd meridian, the limit between 8 E and 8 F is also nearly all in large timber, and the remainder between 9 E and 9 F, for 4½ miles, is in old brulé with small timber. The other 1½ miles, to the 2nd Base, is in large timber.

On the 3rd meridian, between 8 F and 8 G, the first 2½ miles, going north, is in large timber, the remainder, 3½ miles to the 1st Base, is alternate old brulé and heavy timber. For 5 miles, in going north on this meridian between 9 F and 9 G, the line is in large timber, the 6th mile being new brulé with no timber of any value.

On the 4th meridian, the first 2½ miles, in going north along west limit of 8 G, is in old brulé, with timber from 3 to 8 inches. The remainder of the meridian, 9½ miles to north-west corner of 9 G, is in large timber.

From the considerable amount of large white pine found along the limits between 8 D and 8 E, 8 E and 8 F, and 8 F and 8 G, it is probable that the southern portions of 8 D, 8 E, 8 F, and the south-east of 8 G, contain a considerable quantity of it. There appears to be also a considerable amount of white pine in the north-west portion of 8 G. In travelling along Wenebegon Lake, a considerable amount of it was also seen along the west shore.

I have shown, in dark green, on the timber map, where white pine was seen. In some places it is scattered. In the scattered pine a great deal of it is apparently unsound, owing probably to its great age.

All the land is a rich sandy loam. Along the north limit of 9 E and west part of north limit of 9 D, and as far north as the canoe route to the north of those townships, a distance of from two to four miles, as shown on the plan, and probably still further north, the country is comparatively free from rock and boulders, and fairly well suited for farming. The line between 9 D and 9 E also runs through some similar land.

The balance of the country is broken with ridges of granite rock and boulders, mostly red granite.

The country generally is rolling with hills from 60 to 200 feet high. A great deal of the country along the 2nd base is fairly level.

There were no indications of mineral, except some small showings of iron pyrites.

The magnetic variation was fairly steady. The mean variation of a great number of readings is 4° 30′ west.

Great care was taken to impress on every member of the party the necessity of thoroughly extinguishing all fires.

We used the canoe route which follows up the stream west from the north end of Wenebegon Lake to Waboose Lake, and from there into the east branch of the Aubinadong River, to the south west angle of 9 E. After about August 1st, the water in the creek flowing east out of Waboose Lake, as far as the first lake, a part of the said route becomes very shallow and makes it tedious in transporting big loads.

There does not appear to be any large water powers in the tract surveyed. The rapids on the streams give very little fall.

The only fish that we caught were pike.

There are moose, deer, wolves, bear, beaver, and the smaller fur-bearing animals, and partridge and duck in the tract.

Accompanying this report I have transmitted the plan, field notes, timber map and accounts in triplicate.

I have the honour to be,

Sir,

Your obedient servant,

(Sgd.) T. J. Patten,
Ontario Land Surveyor.

The Honourable, The Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 24.

Survey of Outlines of Townships, District of Sudbury.

Sault Ste. Marie, Ont., November 4th, 1911.

Sir,—We have the honor to submit the following report on the survey of certain township outlines in the Sault Ste. Marie Mining Division, in the District of Sudbury and Province of Ontario, made by us under instructions from your Department dated May 5th, 1911. The survey was commenced early in May and completed early in July.

Our first base line was run due east astronomcially 17 miles, 73 chains and 65 links from the 66th mile post on O.L.S. Speight's meridian line.

Our second base line was run due east astronomically 17 miles and 76 chains from the 60th mile post on O.L.S. Speight's meridian line.

Our first meridian line was run from the mile post on our second base line 6 miles east of O.L.S. Speight's meridian line due north 5 miles, 76 chains and 65 links and continued due south 12 miles.

Our second meridian line was run from a point in our second base line 11 miles and 76 chains and due east of O.L.S. Speight's meridian line, north astronomically 5 miles, 78 chains and 56 links and continued south astronomically 12 miles.

Our third base line was run from a post in our first meridian line 6 miles south of our second base line and due west astronomically 6 miles, 4 chains and 35 links of O.L.S. Speight's meridian line and continued east astronomically 11 miles 74 chains and 20 links.

We found it necessary to run the third base line from the point above mentioned, as we were unable to find the 54th mile post on O.L.S. Speight's meridian line. The entire neighborhood of this post has been swept by fire and the burnt trees all blown down. We intersected O.L.S. Speight's meridian line 7 links north of the 54th mile post.

Physical Features.

The entire area which we covered with these lines is very similar in its topography. For the most part it is made up of high sand and gravel hills of glacial origin with intervening swamps and muskegs. These ranges of hills run for the most part in northwesterly and southeasterly directions. Such rock exposures as we encountered were granite, with the exception of a few outcroppings of diabase on our second meridian between Township 22, Range 18 and Township 11 H. There was no evidence of prospectors or lumbermen in the district, possibly on account of the difficulty of access.

Timber.

The timber which we encountered was for the most part spruce and white birch. On some of the ridges and sand plains we encountered groves of jack pine. The entire area is heavily timbered, accompanied by a dense undergrowth of alder and moose maple. The only stand of timber of commercial value which we discovered, is in the neighborhood of Pine Lake in Township 22, Range 8, and Township 11 H. On the shores of this winding lake there is a stand of white pine of considerable extent. The trees average at least 30 inches in diameter and are sound to the core, and extend as far as the eye can reach from the shores of this lake. There are practically no other trees in this vicinity than the white and red pine.

Waters.

There is only one waterway worthy of mention, viz.: the Montreal River. It rises in a lake in Township 12 H and flows as a small and shallow stream in a southwesterly direction and does not become navigable even for canoes until it crosses our second meridian line. From this point southward it is easily navigable at all times in the open season. It flows through a great many small lake expansions in its course. In Township 23, Range 19, it is joined by a tributary from the northwest which passes O.L.S. Speight's meridian line a few chains south of the 60th mile post. This branch is a swift small stream winding through a swampy valley. There is, however, at all seasons of the year sufficient water flowing in it to carry canoes. We crossed numerous small lakes on the various lines, but none of them are worthy of mention.

Fish and Game.

The rivers and lakes, both large and small, abound in pickerel, pike and perch. To our knowledge these are the only fish in the waters of the District. There are great numbers of moose and a few red deer.

Accompanying this report, we submit plans and field notes and also accounts in triplicate.

We have the honor to be,

Sir,

Your obedient servants,

(Signed) Lang & Ross,
Ontario Land Surveyors.

The Honourable the Minister of Lands, Forests and Mines,
Toronto, Ontario.

Appendix No. 25.

Surveys of Outlines of Townships, District of Sudbury.

Orillia, October 17th, 1911.

Sir,—In compliance with instructions received from you bearing date of May 22nd, 1911, for the survey of outlines of certain townships in the District of Sudbury, extending westerly from the district line of Sudbury-Nipissing, between district line posts 78 M and 96 M, we left C.P.R. station of Metagama on June 8th and proceeded by way of Fort Mattagami and across the six-mile portage leading from Lake Mattagami to Sinclair Lake, thus reaching the base line run by O.L.S. Fitzgerald the previous year, which forms the southerly boundary of the townships in question.

This route is too well known to need any description, being one of the main arteries of travel into that section of the country. It is interesting, however, to note the changes that are creeping over it in the past few years, due to the construction of roads where formerly were only the deeply-worn trails, trodden for generations by the Indian packers of the Hudson's Bay Company, and the signs of still greater change soon to be wrought by the construction of the Canadian Northern Railway. These changes when complete, will render travel more expeditious, but working hand in hand with the fire fiend that invariably accompanies modern development, will utterly destroy the scenic beauty of the country and the romance of the old trails.

Our first business on arriving on the ground was to ascertain as nearly as possible the location of canoe routes through the area to be surveyed, and so enable us to place our supplies as economically as possible and to protect them so far as might be from the fires liable to spring up at any time, and from the depredations of the less responsible members of the wandering tribes of license holders at present so numerous in the north woods.

The actual work of the survey was commenced from the base line run by O.L.S. Fitzgerald, in 1910, and the development of the work can be seen at a glance over the index map accompanying the field notes of the survey. Our 2nd and 3rd meridians were commenced from the above base line and run north; while our first meridian was turned north and south from the first base line. Our first and second base lines were turned east and west from the 2nd meridian. This arrangement gave us the fullest use of canoe routes and the greatest protection against fire and theft in the matter of supplies.

Wooden posts were planted at half-mile intervals marked with the mileage from ½ M to 5½ M dating on meridian lines from south to north and on base lines from east to west. With two exceptions, iron posts, 1¼ inches in diameter, 3 feet long, forged at top and pointed at bottom, painted red, were planted beside the wooden posts to mark the several township corners. These iron posts were marked with the names of the townships facing diagonally into same, and in one instance where the base line between Zavitz and Hutt intersects the district line in Big Pike Lake, the iron post was planted west of the lake, and in addition to the names of the townships was marked with the distance from the district line intersection. No iron post was planted where the base line between Halliday and Hutt intersects the district line at a distance of twenty-seven links north from the iron post at 84 M, planted by O.L.S. Niven; nor was any planted where the meridian between Zavitz and English intersects the base line forming the northerly boundary of those townships at a distance of 5.565 chains easterly from the iron post at the south-west corner of the Township of Geikie. In both the above instances the wooden posts planted were heavily mounded with stone as an additional protection.

The area traversed by this season's operations, occupying about eighteen miles square and embracing the headwaters of the Redstone and Kapiskong or Grassy Rivers, presents topographically a neutral position between the gentle slopes of clay belt and the rougher sections of the rock country. It is the home of sluggish rivers and placid lakes with innumerable small lakes and streams throughout its area. While a very small proportion of it could be called level, or even approximately so, the hills and ridges are of low elevation, seldom exceeding twenty-five to thirty feet in height. These elevations are formed of drift material composed of sand, gravel and boulders, with an occasional rock outcrop showing.

Small areas of land could doubtless be obtained that would bear comparison with the less favoured cultivated parts of the older sections of the Province; but it is likely to be many years before any demand will arise among agriculturists for the kind of land represented by this section, and it is likely to remain more valuable as a producer of forest trees than of any other crop that might be introduced.

With the exception of two comparatively small areas where fire has destroyed the timber, the territory occupied by the survey is covered with forest. The timber cannot be considered of first value when viewing the area as a whole, as much of it is small and by far the greater part of the bush is composed of mixed timber, including spruce, white birch, poplar, cedar, jack pine, balsam and tamarac, the value of which as a lumbering proposition rests with the future. The locality would seem eminently suited for the growth of red pine and white pine, but as this timber is not greatly in evidence it would require practical encouragement in the way of planting. The present growth however, will doubtless increase rapidly in value if it can be protected from fire. There is a good stand of white pine and red pine around the shores of Sinclair Lake, and scattered trees, extending northerly along the Kapiskong and its lake widenings, through the Townships of Nursey and Moher, and also the meridian forming the west boundary of Sothman and Semple. There is also a good block of white pine round a lake of about three miles in length, extending southerly into the Township of Nursey and approaching to within half a mile of the north boundary of same opposite 3½ M. This last mentioned township is indeed the only one surveyed that could be considered important as a source of white or red pine. Along both the north and south boundaries of Semple there is a good stand of large jack pine. Cedar of good size and quality appears in a number of places, but the most important belt occurs on the meridian forming the boundary between Sothman and Halliday, where a thick, cedar swamp extends for two miles from the base line at the north of these townships with narrower belts at intervals until Lake Washagami is reached. The trees here run up to thirty inches in diameter, from thirty-five to forty feet long, stand thickly, and as far as could be observed from our cutting, appear to be generally sound. Young tamarac is also appearing in the swamps, but it will take many years to undo the mischief wrought by the passage of the sawfly, which destroyed the old timber, and the latter is getting rapidly beyond the stage of usefulness.

The first burnt area encountered was along the east branch of the Grassy River, where it is crossed by our first base line. This burn, which would appear to be about seven or eight years old, lies mostly on the east side of the river. A short distance south of the above base line, the green timber comes down to the banks on either side of the river, but as we did not travel the country to the south we are unable to say how far the burnt area runs in that direction. To the north burnt country extends along both sides of the river for about three miles. Another old burn of considerable extent occupies the north-westerly corner of English and extends northwesterly from Lake Muskasenda across the meridian forming the west boundary of English and the base line to the north. This burn was again run over by fire in 1910. A small burn was crossed on the Redstone at 4 to 4½ M. on first meridian and another of the present summer, between 2 and 3 M. on the west boundary of English.

Rock outcrops are not numerous, the rock formation being mostly covered by deposits of drift, and there appears to have been little prospecting done away from the immediate neighborhood of the canoe routes.

From the standpoint of waterways the district is an important one and has an interesting and intricate system of lakes and connecting streams. The Redstone River flows northerly from a small lake crossed by the base line forming the boundary between English and Semple, near its intersection with the meridian forming the east boundary of those townships, and affords a good canoe route for about one and three-quarter miles to the north, where a portage leaves to the east connecting with the main branch of the Grassy River. North of this portage, as far as followed, the river is shallow and travel is much impeded by driftwood and alder. The most important drainage outlet of the district is through the Grassy River and its tributary streams. From Lake Washagami crossed by the meridian between Halliday and Sothman at 1½ M. to 3 M.; two narrow lake-like expanses connected by a short stretch of stream extend about one and a half miles north of the base line Hutt and Halliday; and from thence it forms a stream of a chain in width entering the eastern branch of the Grassy River, some distance north of the centre of Hutt. This easterly branch of the Grassy River flows south across the base line Zavitz and Hutt near 4 M. and base line Hutt, Halliday, at 3 M. and continuing south across the south boundary of Halliday, turns west and north across the south boundary of Sothman entering a chain of small lakes and debouching into Sinclair Lake at its north-east corner. Turning a point in the last mentioned lake the water proceeds north through the Kapiskong or Grassy River and its lake widenings on its way to the Matagami River. In its passage through Hutt and Halliday this river occupies a wide marshy valley, containing a luxuriant growth of wild rice, rushes and other grasses, through which it winds from side to side with slow current. Numerous canoe routes cross the country in every direction. One of these leaves Wing Lake, through which the eastern branch of the Grassy River passes on its way to Sinclair Lake, and traverses several small lakes and portages to Lake Washagami and presents the peculiar circumstance, that a person taking this route may travel a distance of about fifty miles, returning to his starting point, and with the exception of a mile or so at the beginning and the crossing of a few light portages, may travel down stream all the way. Another important canoe route leaves the bay extending east across the meridian Nursey and Sothman between 2 M. and 3 M., and traverses the country north through Sothman, Semple and English to Lake Muskasenda. There are two lakes of considerable size crossed by this canoe route, Birch Lake lying to the south and extending up to the base line Semple-English; and Trout Lake lying between that line and Lake Muskasenda. Our information of these lakes, however, is not sufficient to show them properly on the plan returned.

As the numerous portages attest, and as the natural features of the country would lead one to surmise, this section has been the trapper's paradise, and many furbearing animals are still to be found within its confines. Moose are very plentiful and the high ground covered with thick growth of moosewood or scrub maple, which occupies so large an extent of the land surface, affords ample winter provision for large numbers of these animals; while the numerous shallow lakes and sluggish river stretches provide an abundant supply of succulent lily roots for summer feed. The wide valley of the Grassy River in its eastern branch, with its miles of rice beds, gives great promise of ducks for fall hunting, and indeed many of these birds breed here. We need only say that grouse are becoming plentiful, pickerel may be caught in all the deeper waters and the hungry pike everywhere but in the tree tops, while by dropping a few miles further down river toward the Matagami the angler may fill as large a creel as his conscience will permit with speckled trout; that he may make the acquaintance of the black bear, see the beaver at work, enjoy magnificent scenery, and with a little effort spent in clearing out portages, travel comfortably in almost any direction his fancy may suggest.

This picture is true to-day. Should there be a recurrence of the drought of the past two seasons, no better means devised of protecting the country from fire, and no improvement in the personnel of these licensed to wander through the woods at will and disposed to destroy at leisure, a person reading the above description a year hence and on the ground it fits may have cause to regard it as a satire. Much of this country is littered with dry windfallen timber, is high and ridgy, and only needs a fair start on a breezy day to leave behind a blackened waste. That matters are serious in this respect is amply attested by the Porcupine disaster of the present summer, and yet aside from the loss of life, it is probable that no greater loss of timber was occasioned by that fire than by numerous others raging at the same time. On the day of the above disaster we were camped in the valley of the Grassy River on the base line Halliday-Hutt, where the opening gave a horizon denied back in the woods, and could count three other fires on different sides of us, travelling with great rapidity and sending up vast volumes of smoke. Neither his supplies, his canoes, nor even the lives of his party, can under present conditions, be considered safe by the surveyor in the prospected area.

We have the honor to be,

Sir,

Your obedient servants,

(Sgd.) CAVANA & WATSON,
Ontario Land Surveyors.

The Honourable the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 26.

SURVEY OF OUTLINES OF TOWNSHIPS, DISTRICT OF SUDBURY.

PETERBOROUGH, ONT., October 25, 1911.

SIR,—I have the honor to submit the following report on the survey of Township outlines in the Temagami Forest Reserve, District of Sudbury, performed by me, under instructions from your Department, dated June 8th, 1911.

I commenced the survey by running a meridian due south astronomically eighteen miles, from a point ten chains west astronomically from the south-west angle of the Township of Cabot, and from the 6th, 12th and 18th mile posts on this meridian I ran east astronomically to intersect a meridian run by Ontario Land Surveyors De Morest and Stull in 1910, and west astronomically six miles. Having completed this part of the work I produced the south boundary of the Township of Cabot to a point six miles and ten chains west astronomically from the south-west angle of the above township, from which point I ran a meridian north astronomically twelve miles three chains and fifty-three links to a base line run by Ontario Land Surveyor H. J. Beatty this season, and south astronomically seventeen miles seventy-four chains and ninety links to intersect the south boundary of the Township of Garvey previously run by me. I then produced the south boundary of the Township of Burrows west astronomically to intersect my meridian, thus completing the work.

All lines in connection with the above survey were well opened out, blazed, chained and posted. At each of the angles of the various townships, iron posts, one and one-half inches in diameter, three feet long and painted red, were planted—on these posts the names facing the respective townships, were cut with a cold chizel. On the meridian lines durable wooden posts six inches square were planted at the end of each mile with the number of miles said posts are distant north of the south-east or south-west angle of the adjacent townships, cut on the south side with a scribing iron. Durable posts four inches square and similarly marked with the half mile points were also planted on all lines running east and west, durable posts six inches square were planted at the end of each mile with the number of miles said posts are distant west of the south-east or north-east angle of the adjacent townships, cut on the east side with a scribing iron. Durable posts four inches square and similarly marked with the half-mile points, were also planted.

Going south along the west boundary of the Township of Connaught, the line passes over an undulating sandy country timbered with Banksian pine, spruce, white birch, poplar, balsam, cedar, alder and willow. Considerable good red and white pine running up to 24 inches in diameter is seen between the fifth and sixth miles along the east side of Mattagami Lake.

Along the west boundary of the Township of Miramichi the country is of much the same general character and getting a little more rocky towards the south. A ridge of good red pine up to thirty inches in diameter is seen on this line between the third and fourth miles.

Along the west boundary of the Township of Garibaldi the country is of a more rocky nature—the timber being chiefly Banksian pine, spruce, dead tamarac, balsam, birch, cedar, alder and willow. No valuable pine is seen along this line, considerable windfall being encountered along the first mile.

Going east along the north boundary of the Township of Miramichi the line passes through a rocky broken country as far as Napawquazi Lake, where it becomes low and swampy and contiues of this general character up to the third mile, from which point to the north-east angle of the township the country is of a more sandy character, the line passing through some excellent white pine running up to twenty-four inches in diameter.

Going east along the north boundary of the Township of Garibaldi, the country is comparatively level or gently undulating, the timber being chiefly Banksian pine, birch, spruce and balsam up to fourteen inches in diameter. There is along this line a stretch of very nearly four miles absolutely destitute of water.

· Going east along the south boundary of the Township of Garibaldi to the Opikinimika River the country is rolling and rocky, the timber being chiefly Banksian pine, spruce, birch and balsam, up to twelve and fourteen inches in diameter, with a belt of good red pine up to fourteen inches lying immediately to the west of the river.

Going west along the north boundary of the Township of Togo the country is rolling and rocky, timbered chiefly with Banksian pine, spruce, poplar, and alder; there is no white or red pine along this line.

Along the north boundary of Brunswick Township the country is very similar in character, but along the first and second miles of this line considerable white pine up to thirty inches in diameter is seen.

On the north boundary of Londonderry Township, no valuable timber is met with, the prevailing varieties being Banksian pine, spruce, white birch, poplar and balsam averaging from eight to twelve inches in diameter.

Along the northern limit of the Township of Garvey the country is of a similar character, no valuable timber being seen.

Going east along the south boundary of the Township of Garvey, the country for the first two miles is much the same as that already described; at this point, however, good white pine up to twenty and twenty-five inches in diameter is entered and continues to Donnegana Lake in the south-west angle of the township. The west boundaries of the Townships of Garvey, Londonderry, Brunswick, Togo and Mattagami comprising thirty miles, may be described as rough and rocky, the prevailing timber being Banksian pine, spruce, birch and poplar; this timber runs from eight to fourteen inches in diameter. Along this line various long stretches of spruce and dead tamarac swamp are traversed—the line also passes through several belts of good white pine running up to thirty inches in diameter. Various streams and lakes traverse these several townships, all of which no doubt will be minutely described by those engaged in this portion of the work.

All the country surveyed by me this season is covered with green timber—there being practically no brulé of recent date.

The geological formation of this locality is the Huronian—no mineral of value being seen. I think I am also quite safe in saying that in the eight townships outlined by me this season, there is absolutely no land fit for agriculture.

I found the average magnetic variation about eight degrees west.

Moose, partridge, beaver and otter are fairly plentiful.

With the exception of the intense heat during the early part of July, I found the season very favourable for this work. Owing, however, to the dense smoke caused by the Porcupine and other bush fires, I found it imposible to obtain astronomical observations as often as I wished.

Accompanying this report are plans, field notes and accounts, all of which I trust will be found complete and satisfactory.

I have the honor to be,
Sir,
Your obedient servant,
(Sgd.) J. W. FitzGerald,
O.L.S.

The Honourable the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 27.

Survey of Township Outlines, District of Sudbury.

Guelph, January 18th, 1911.

Sir,—I have the honor to submit the following report on the survey of base and meridian lines south of the National Transcontinental Railway in the District of Sudbury, under instructions from your Department, dated May 11th, 1910.

I commenced this work at the south-west angle of the Township of Machin, being the north-west angle of the Township of Shackleton and from that point ran south nine miles to the south-west corner of Shackleton. I then ran east nine miles to intersect O.L.S. Speight's meridian line of 1905, and came out one chain and seventy-seven and one half links north of the IX mile post on that line.

I then returned to the post at the south-west corner of the township and ran the south boundary of Nansen west nine miles.

I then returned to the Ground Hog River and went down the river to the railway, and from there proceeded to run my second base line. This line forms the south boundaries of the Townships of Fauquier and O'Brien and the north boundaries of Nansen and Swanson. Upon the completion of this line I cut a light line north two miles to find the VII M. post on O.L.S. Niven's meridian line of 1906, and then produced that meridian line south to intersect my base line.

I returned along this base line to the boundary between O'Brien and Fauquier, and ran south nine miles on the line between Nansen and Swanson to intersect my first base line, and then produced that base line westward to the south-west corner of the Township of Swanson and there turned north and ran the west boundary of that township.

All base lines were run as nine mile chords of the parallel of latitude.

On base lines a wooden post was planted at the end of each mile and marked on the east side with the number of the mile.

At township corners a 1⅞ inch iron post was planted beside the wooden post and both posts were marked with the names of the adjacent townships.

On meridian lines wooden posts were planted one and one half miles apart and marked with the mileage on the south sides.

The country included in this survey is almost wholly drained by the Ground Hog and Kapuskasing Rivers, the Townships of Nansen and Shackleton draining into the former and the Township of Swanson into the latter. As a whole the country is undulating and the drainage will be easily accomplished. On part of the west boundary of Swanson the land is broken with numerous ravines and small creeks, while the east boundary of that township is level and swampy.

A few thousand acres in the south-west corner of this township and a small area in the south-east corner of Fauquier had been burnt over some years ago, and some good spruce and jack pine timber destroyed. This burnt land is mostly dry and can easily be cleared, and considering its proximity to the railway, should soon be brought under cultivation.

The soil throughout is clay, which in the swamps is overlaid with black muck of varying depths. Probably about one-half of the land will be found suitable for farming with drainage and as the percentage of rocky land is small, the agricultural possibilities of these townships are fairly good.

The timber is chiefly spruce with here and there some medium sized poplar and some small white birch. The trees as a rule are not large and in many places are of scrubby growth, yet considerable areas of timber suitable for railway ties were passed through.

The Ground Hog River is a good stream with an average width of about six chains and a depth of from four to eight feet, and flows with a good current. There are no rapids on the river within the limits of this survey.

Rock crops out at a number of points along the river and some prospecting has been done. A number of rocky ridges were crossed in the interior but no economic minerals were found.

Large game is not plentiful in this section of the country and no fur-bearing animals were seen. Fish were also scarce in the streams.

Accompanying this report are the field notes and plan of the survey in the usual form.

I have the honor to be,

Sir,

Your obedient servant,

(Sgd.) James Hutcheon,
Ontario Land Surveyor.

The Honourable the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 28.

SURVEY OF TOWNSHIP OUTLINES, DISTRICT OF NIPISSING.

ALMONTE, Dec. 5th, 1911.

SIR,—I beg to submit the following report on the survey of township outlines in the territory east and west of the township of Maisonville in the District of Nipissing, performed under instructions dated May 27th, 1911. I outfitted at Sudbury and North Bay, and on the 22nd of June, commenced the survey at the north-west angle of the Township of Otto, from which point the line between the Townships of Teck and Grenfell was run due north 6 M. 3.65 chains to the southerly limit of the Township of Maisonville; then from the south-east angle of the Township of Maisonville the line between the Townships of Bernhardt and Teck was run east astronomically (six mile chords) to the westerly boundary of the Township of Lebel. Having completed the above two township boundary lines the survey was continued by starting from the south-west angle of the Township of Maisonville, and running west astronomically (six mile chords) a distance of eighteen miles (18 M.). From the sixth and twelfth miles on the above mentioned first base line, meridian lines were run south to the northerly boundary of the Township of Holmes 6 M. 3.47 chains; to the northerly boundary produced westerly of the Township of Holmes, 6 M. 4.15 chains and northerly to the southerly limit of the Townships of Playfair and McCann. A second base line eighteen miles long was run west astronomically (six mile chords) from the north-west angle of the Township of Maisonville; and the last line, viz:—between the Townships of Melba and Bernhardt—was commenced at the north-east angle of the Township of Maisonville and run east astronomically (six mile chords) 5 M. 71.89 chains, to intersection with O.L.S. Newman's meridian line run in 1907.

The above lines were well cleared and the adjacent trees blazed in the usual manner. Wooden posts of the most durable material available properly and distinctly marked, were placed where possible at the even miles (6 in. square) and half miles (4 in. sq.) from the southerly and easterly extremities of the above lines; when these points came in the water the posts were planted on the shore nearest the even mile or half mile as the case might be, with its chainage in miles, chains and decimals, marked on the proper face of the post. The mile posts were marked with Roman numerals and the half-mile posts were marked with Arabic numerals.

Every post was planted firmly and when possible a cairn of stones was built around it to render it more permanent, and bearing trees were marked and noted in the field notes.

Iron bars marked with the names of the adjacent townships were placed alongside the wooden posts at the following points, viz.:

The north-west corner of Teck.
The north-east corner of Teck.
The south-east corner of Dunmore.
The south-west corner of Dunmore.
The north-west corner of Sheba.
The north-west corner of Nordica.
The intersection of Bompas, Dunmore, Lee and Terry.

The intersection of Dunmore, Sheba, Nordica and Terry.
The intersection of Lee, Terry, Black and Tolstoi.
The north-west angle of Black.
The north-west angle of Tolstoi.

on the easterly shore of Wataybeeg Lake in the boundary between Terry and Tolstoi at 5 M, 63.5 chains; on the northerly shore of Wataybeeg Lake in the boundary between McEvay and Tolstoi at 0 miles, 26 chains; on the westerly shore of Clearwater Lake in the boundary between Melba and Bernhardt at 0 miles, 3.24 chains; and at the following points the existing iron bars and wooden posts were marked with the names of the new townships on the proper face, viz.:

The north-west angle of Maisonville.
The north-east angle of Maisonville.
The south-west angle of Maisonville.
The south-east angle of Maisonville, and
The north-west angle of Otto.

At frequent intervals throughout the survey observations on Polaris were taken for azimuth and the magnetic variation which ranges between eight and eleven degrees west of north was read, the results being entered in the field notes.

All triangulations and observations were very carefully checked in the field and noted in the field note books.

Soil.

The country generally is composed of rolling sand plains, spruce, muskeg, and rocky hills, and it is not at all adapted to cultivation, except a few small patches.

In places where the soil is heavier and vegetation better, there are a great many loose boulders.

There are two inhabitants in the area, one an Indian trapper, Basil McDougall by name, who has a cabin on Wataybeeg Lake, and William Biederman, who is both mining and trapping from his cabin on Fall Duck Lake in the Township of Terry.

Rock Formation.

The district generally speaking is composed of ridges of diabase of the post Huronian period, running in a northerly and southerly direction.

Practically no prospecting has been done in that part of the country surveyed, which lies to the west of the T. & N. O. Railway, and there are very few outcrops of mineral bearing rock. In the case of the westerly and northerly boundaries of Teck, and the northerly boundary of Bernhardt, the rock formation is diabase and many high ridges of bald rock with steep ascents were encountered.

Although we saw no surveyed claims and very few staked claims during the progress of the survey, it was quite apparent, on coming out, that prospectors were following up the survey lines, staking claims and doing considerable prospecting.

Timber.

The timber consists almost wholly of second growth Banksian pine, spruce, poplar, and white birch of little or no commercial value. Along the 2nd and 3rd and 4th miles of the northerly boundary of the Township of Nordica, the Banksian pine attains a size varying from 8 inches to 12 or 13 inches in diameter, and in some wet places where it escaped the fire, spruce of a good size was noticed.

Water Powers.

Being on the height of land there are no water powers in the district at all, but quite a number of beautiful lakes suitable for summer tourists, the principal of which is Wataybeeg Lake, 8 miles long and a mile wide. In places it contains numerous islands, some of them having good sand beaches and being fairly well wooded. The lake abounds in fish, principally pike, pickerel and trout.

Game.

The whole district abounds in game, principally moose. Traces of bear were seen on several occasions and a few beaver were noticed. Partridge were very plentiful.

Accompanying this report is a general plan on a scale of one mile to an inch, a timber plan on the same scale, field notes, oaths of chainmen, and all other necessary documents.

I have the honor to be,

Sir,

Your obedient servant,

(Sgd.) Andrew Bell.
Ontario Land Surveyor.

The Honourable, The Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 29.

Survey of the Outlines of Townships, District of Nipissing.

Brantford, November 11th, 1911.

Sir,—I have the honor to submit the following report on the survey of certain base and meridian lines north of Larder Lake in the District of Nipissing:—

Upon receipt of the instructions I immediatetly proceeded to make arrangements for supplies and transportation and on the last day of July left Brantford for Dane Station on the Temiskaming and Northern Ontario Railway accompanied by the men from Brantford and vicinity. I was joined at Haileybury, Ont., by the rest of my party, making a total of fifteen men including myself. This number on the completion of the work had become reduced to twelve, ten of these being of the original fifteen.

In getting on the ground with my supplies from Dane Station I used the Larder Lake stage road to the point where it crosses the White River, in the south-east corner of the township of Gauthier and from this point went north by canoe as far as Kennedy Lake, where I established a main cache. The point of commencement specified in your instructions was reached on August the eighth and the work started the following morning and continued without interruption until completed.

Your instructions were rigidly adhered to throughout the work and well-opened lines cut, particular attention being paid to blazing. The base lines were cut east (or west) astronomically in six mile chords and the meridians astronomically north (or south). During the progress of the survey a very great deal of rainy and unsettled weather was encountered, making it difficult to obtain observations at regular intervals. The greatest amount of line cut between observations was six miles and the greatest departure from the line astronomic course that was discovered was four minutes, this occurring only in two cases.

No great fluctuation of the magnetic variation was noticed, the needle reading from ten to eleven degrees.

The return trip was made in four inches of snow, arriving at the railway on October 25th.

General Features.

The country comprising the twelve new townships outlined presents a considerable variety of topography. Roughly speaking, the westerly six townships are slightly rolling, sand or clay country, with the former predominating and with occasional outcroppings of rock in the form of well-rounded mounds or humps, usually quite steep and sometimes precipitous near the bottom, and varying in height from fifty to one hundred feet. The easterly six townships cover a more rugged formation, rock being in evidence nearly all the time and the line being so rough in many places that it was necessary to make considerable detours in moving camp.

Rock.

All the rock encountered was identical in texture, being a barren Keewatin schist with no indication of any mineral of any kind. No quartz was encountered.

Soil.

Sandy loam and sand largely predominates on the outlines of Morrisette, Arnold, Bisley and Clifford. A few swamps of small extent were encountered in this area and a number of small lakes. On the west limit and the easterly part of the south limit of the township of Elliott, as well as on the east limit of Tannahill a good clay loam predominates, apparently continuing down into Ben Nevis, Pontiac, Katrine and Ossian.

Timber.

In general the timber is poor from a commercial standpoint. Of white or red pine there is practically none. In the sandy soil jack pine occurs in thick groves, but rarely of any size; birch and poplar of course predominate on the hills, being small and thick on the sand and rock hills. In the clay are good areas of spruce which grows to twenty-four and thirty inches and balsam to eighteen and twenty inches. All the tamarac is dead. Very little brulé was met with.

Water.

The whole area seems to be dotted with small lakes and ponds, containing pure, clear water. These are mostly quite small. A feature frequently noticed was that a number of them had no apparent outlet or feeder of any kind. This is particularly true of sandy country where they occur wiith great frequency. No streams of any size were encountered except the Abnageezy River, and on this no water power was in evidence.

GAME.

Moose were frequently seen, and apparently are quite numerous, as many as twelve having been seen by different members of the party in one day. Their trails in the woods were frequently encountered and were often so well travelled that but for the absence of blazes and axe cutting would be mistaken for portages.

No deer or wolves were encountered or indicated, but three bears were seen and their tracks seen quite often. Many of the small lakes were apparently barren of fish, but in others pike and pickerel were readily caught. Rabbits and partridges are plentiful and muskrats particularly so. In Ben Nevis and Pontiac fresh beaver workings were seen, but no evidence of other fur-bearing animals, although evidences of the Indian trapper were seen all over the area travelled.

CANOE ROUTES.

The canoe route from the stage road near Larder City to Verna Lake on O. L. S. Newman's meridian was found to be a full day's trip. This included five flat rapids and three short portages on the White River leading to Beaverhouse Lake, a three-chain portage into Kennedy Lake, a crooked creek, a five-chain portage, another small lake and a fifteen-chain portage into Verna Lake.

From the north-west corner of Verna Lake northward a forty-chain portage leads over the height of land into a series of lakes and ponds opening out into Keeth Lake in O.L.S. Newman's meridian, which lake empties into a navigable branch of the Abnageezy River, crossing the north limit of the township of Clifford at the four mile post.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) JOHN E. JACKSON,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 30.

SURVEY OF OUTLINES OF TOWNSHIPS, DISTRICT OF NIPISSING,

NEW LISKEARD, November 9th, 1911.

SIR,—I beg to submit the following report on the survey of Township outlines in the District of Nipissing, in the Temagami Forest Reserve, west of the surveyed townships of Holmes, Flavelle and Willison, and south of the townships of Cleaver, McNeil and Robertson, performed under instructions dated Toronto, May 17th, 1911.

I commenced my survey at the north-west angle of the township of Shillington and ran north astronomically a distance of thirteen miles, twenty-four chains, eight links to intersection with the south boundary of the Matachewan Indian Reserve. From the sixth and twelfth mile of this line I ran east astronomically to intersection with the south-west angle of the Townships of Flavelle and Holmes respectively. From the sixth mile I ran also west astronomically to intersection with O. L. S. Niven's line near the eighty-fourth mile post on the aforesaid line, being the boundary between the Districts of Sudbury and Nipissing. From the sixth and twelfth miles of this line I ran south astronomically to intersection with the line constituting the north boundary of the Townships of Rankin and Raymond, and also north astronomically to intersection with the line constituting the south boundary of the Townships of McNeil and Robertson.

From the twelfth mile of my first north line I ran west astronomically to intersection with the boundary between the Districts of Sudbury and Nipissing near the ninetieth mile intersecting my second and third north line en-route. I also produced the unfinished portion of the south boundary of the Township of Robertson to intersection with my first north line drawn from the point on the north boundary of the Matachewan Indian Reserve where that line would have intersected if it were drawn through the Reserve. I also ran west astronomically from the north-west angle of the Township of Holmes to intersection with the aforesaid north line.

The aforesaid lines were well cut out and the adjacent trees blazed in the usual manner, while wooden posts of the most durable timber available hewed on four sides and properly carved, were planted where possible at the end of each forty chains from the starting point of the aforesaid lines. When these points came in the water or in an otherwise unsuitable place, the posts were planted at the nearest suitable point with the chainage in miles, chains and decimals carved on the face of the post. Posts were in all cases firmly planted, and where possible were supported with a mound of stones built so as to make its tenancy more secure, and suitable bearing trees were carved and noted for the even mile posts, no bearing trees being placed at the half mile posts.

Iron posts and extra large wooden posts with the chainage and names of the adjacent townships carved thereon, were planted at the following points, viz.:

At the north-east angles of the townships of Hincks, Argyle, Baden, Montrose, Bannockburn, Powell, Cairo, Midlothian, Doon, Yarrow, Kimberly; at the south-west angles of the townships of Hincks, Montrose, Doon; at the intersection of my first north line with the Indian Reserve and at the south-east angle of the Township of Doon and at the north-west angle of the Township of Alma.

At frequent intervals throughout the course of the survey, observations on Polaris were taken for the purpose of obtaining azimuth, and the magnetic variation, which ranges between eight and nine degrees west of north, was noted, the results being entered in the field-book.

The chainbearers were duly instructed, particularly with regard to care in measuring inclined surfaces and in keeping the field notes so that the natural features of the country passed through would be clearly shown.

The natural features I will discuss under the following heads, viz.:

Soil, Rock-Formation, Timber, Game.

Soil.

From an agricultural point of view, this district as a whole is uninviting. The soil is mostly light sandy loam or reddish clay loam, the only good farming areas met with being in the Townships of Hincks and Argyle.

Rock Formation.

For the most part the conglomerate rocks were in evidence between the East and West Branches of the Montreal River, on the east of east branch and south of Fox Rapids, syenite and conglomerate.

The Townships of Doon, Midlothian, Montrose and Bannockburn present massive mounds, cliffs and mountains, which are principally fine close-grained rocks of the Huronian period, in some places having a slate-like appearance. Some small veins of quartz were encountered which appeared to be poorly mineralized, being devoid of sulphides or other indications of the noble metals.

Timber.

Some fine blocks of Yellow Pine were encountered (see plan) and several good belts of the best of white spruce and a number of belts of tie timber being composed of B. Pine and spruce. The district is heavily wooded, except where colored brown on tracing and seems to recover very rapidly from the ravages of bush fires, which have been of frequent occurrence.

Game.

This is a natural game preserve and is well stocked with all kinds of game despite the fact that more than a dozen Indian families eke out an existence with nothing but the fur and fish and moose-meat to draw on. Beaver were seen by us within the confines of the Indian reserve, swimming around in broad daylight quite as freely as muskrats are wont to do. Moose are plentiful as also partridge, mink, muskrat, martin, rabbit, weasel and a few bear and wolves.

The only important water power is the falls about three miles from Fort Matachewan at the Great Northern Bend, which I was informed by M. S. Lafricain, had been surveyed two years ago with a view to estimating the probable power available.

In regard to P.L.S. Duncan Sinclair's exploration line 1867, I may say that it is entirely obliterated and that we noted only one tree marked 111 M—61.84, presumably being on his traverse of the Montreal River.

Accompanying this report is a general plan on linen mounted paper, a tracing of same on scale of one mile to an inch as a timber plan, field notes, accounts, etc.

All of which is respectfully submitted.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) C. H. Fullerton,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto, Ontario.

Appendix No. 31.

SURVEY OF ISLANDS IN THE GEORGIAN BAY, DISTRICT OF PARRY SOUND.

TORONTO, March 28th, 1911.

SIR,—In accordance with instructions from your Department dated April 16th, 1910, to survey certain islands in the Georgian Bay, together with shore line in front of the Townships of McDougall, Carling and part of Shawanaga, I have the honor to submit the following report. The work was commenced by retracing the southerly limit of the line between Lots 30 and 31, Concession 11 and Lot 20, Concession A, Township of McDougall, from its intersection with the westerly limit of Church street in the Town of Parry Sound, through to the shore of Georgian Bay, where a five-inch pine post was planted, one chain from the lake shore, where the traverse of the shore line was started and carried continuously from Sta. 0 here to Sta. 410 on the Concession line between Concessions VIII and IX, Shawanaga.

Posts of the most durable wood obtainable were planted at intervals of one mile or thereabouts at prominent points along the shore in cairn of stones and marked consecutively from W 1 to W 25 in Roman numerals. All the original Township lines were searched for and found and marked whenever possible. In several cases no traces of the original lines were to be found. All islands in front of the above townships were accurately traversed either with transit and micrometer or transit and chain, and in every case, posts of the most durable wood obtainable were planted in a cairn of stones at a prominent point at a safe distance from high water and marked consecutively in Roman numerals from 1C to 405C, and as far as practicable all islands were tied by triangulation to points on the traverse of the main shore.

I found it impracticable in a great many cases to divide up the larger islands into parts containing not more than 10 acres as per your instructions, or to post them so that they might be so divided on the plan. In other cases, the larger islands were not marked with division posts because of information either from plans in my possession or from other sources that they were patented. In the case of Sandy Island, the plan in my possession did not conform very accurately with the present shore line, and islands shown as Ingersoll, Gertrude are now part of Sandy Island, due to the recession of the water of Georgian Bay, some 5 or 6 feet since the survey was made in 1881. The island shown as 243C at the north-east corner of Sandy Island, is now part of Sandy Island, there being no channel between them.

In the case of Franklin Island, traverse was made with triangulation from point to point and sub-traverse of bays made with transit and micrometer.

Posts were planted at prominent points as nearly half a mile apart as possible, and marked successively from F 1 to F XV. The work was carried on with all despatch and speed commensurate with accuracy, although considerably hampered with continual rains until well on in the month of June.

The traverse of the shore line was carried to the northern boundary between Concessions VIII and IX, Shawanaga, on October 21st, 1910, all islands along the main shore being tied by triangulation to the shore traverse on the way north and traversed on the way south.

I found it impracticable to cross the wide stretch of Shawanaga Bay, owing to the rough weather at this season. Thus numerous islands in the area known as Grand Camp Group were left for further operations.

Accompanying this report are plans on mounted paper on scale of 20 chains, in 5 sheets, together with tracings of same, tracings of the whole survey in 5 sheets on scale of 10 chains to show field notes, plans of each island in detail on scale of 2, 3, 4, 5 or 10 chains, copy of diary covering the season's operations, descriptions of islands, showing their acreage, names, numbers, etc., together with accounts in triplicate, which I hope will be found satisfactory.

I have the honor to be,

Sir,

Your obedient servant,

(Signed) J. H. Burd,
Ontario Land Surveyor.

The Honourable, The Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 32.

Survey of Islands in Georgian Bay, in Front of Townships of Harrison and Shawanaga, in the District of Parry Sound.

Barrie, October 31st, 1911.

Sir,—In compliance with your instructions bearing date May 19th, 1910, for the survey of Islands in the Georgian Bay in front of the Townships of Harrison and Shawanaga, I beg to make the following report:

The islands in this district are of this character: Those not immediately next the outer lake have clean cut shores as a rule, although there are many marshy bays. These islands are generally rough in surface, differing from Muskoka in not being so well filled in with soil. The pine clad shores are very pretty, but in many instances fire has destroyed this beauty. The second growth is principally of birch, poplar and oak. When the outer lake is reached we find the islands flat and having marshes in their interiors, when large, and water lies on the surface in pools nearly everywhere. This has the disadvantage of breeding mosquitos late on in the year. There is an outermost belt of shoals, bare of verdure, and then a belt of rocks with scrub cedars and occasionally a pine. Then nearer in the vegetation becomes thicker and the pines increase in number. The islands have been picked over now in this district so that of the smaller islands none remain of any pretentions to beauty, except those of very small acreage or inferior situation. There are a certain number of points on large islands of some value and a larger number which will become more valuable as the district fills up, for the willingness of the public then to buy will depend on the possibility or otherwise of getting anything else. The early sales in this region were of beautiful islands at a nominal figure with no conditions as to improvement, so that there is little

Crown property now of value, and but few houses on the patented islands. It is true that this beauty was not an inalienable part of the property, for the pine was not sold and the destruction of the pine would destroy much of the charm of the neighborhood, as there is no fringe of hemlock along the shores, as in Muskoka, to conserve the wooded appearance.

Many islets have been numbered that would have been omitted in earlier days, for several reasons. Firstly, the instructions were strict as to this and also the fact was sufficiently clear (from my experience) that most people desired to control what they termed rocks, (viz.: islets of very small acreage with a few shrubs or treelets on them), when opposite their property, and further, that property was being acquired already in the neighborhood that was second at least, and to be on the safe side everything that possibly could command any sale in the future was numbered.

In describing the islands, the desirability for residence, when the position is good, will vary with the demand. It is evident that people will now buy and build on property that formerly would not have been looked at for a moment.

In the division of the large islands the length of shore line allotted to each parcel depended firstly on the requisites for residence, viz.: site, harborage, etc., but in many cases the value or desirability of the land was so small that the parcels were made large to avoid the time and expense of divisions which might never be utilized or not needed for an indefinite time. In fact, many divisions were made with the feeling that labour was being lost as no market would be obtainable for a long time and in fact a large proportion of the entire survey was considered as valuable solely for the sake of having an accurate map.

The numbering of the islands was intended to be as consecutive on the ground as possible, of course. It is manifestly impossible to have this in every direction; also, in exceptional cases the numbering is quite irregular on account of previous omission from one cause or another. The islands are painted with Roman numerals in white lead and oil and where trees were not blazed and carved with the number of the island, solid pine posts were used, the upper part squared and carved with the number and the lower part left in the round. The posts were cut on the mainland, out of view, and no destruction of timber on the islands was allowed.

The cost of the survey was possibly greater than it would have been with no previous surveys as the work would have been much more straightforward. Certainly the use of the private survey plans increased the cost of draughting considerably and held back that part of the work very materially in time of accomplishment. A considerable saving of time to the surveyor would also have been effected if there had been no previous patents to deal with.

I have the honor to be,

Sir,

Your obedient servant,

(Signed) A. G. Ardagh.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 33.

SURVEY OF THE SOUTHERN PART OF THE TOWNSHIP OF ALEXANDRA, DISTRICT OF SUDBURY.

DELTA, December 23rd, 1910.

SIR,—Under your instructions dated July 5th, 1910, I have surveyed the southern part of the Township of Alexandra in the District of Sudbury and beg to submit the following report:

The survey was carried out agreeable to instructions. Iron bars were marked and planted as shown on plan and field notes.

In the south-eastern part of the Township there is a large open spruce swamp and a considerable part of the township lying east of Poplar River is swampy with poplar ridges, but approaching the north boundary the country is higher and drier. On the high ground and ridges the soil is more of a clay loam than in the swamp, where it is heavy clay. The land west of Poplar River extending for about two miles is higher than that of the eastern portion of the township and is in places sandy and more suitable for agricultural purposes. Approaching the west boundary the country again becomes swampy with poplar ridges extending east and west. The land in the vicinity of the lakes is generally low and swampy.

The prevailing timber throughout the Township is White Spruce, but in most places too small for merchantable timber, that in the swamps being from two to four inches in diameter, but on parts of the higher ground where it is mixed with poplar, it is from four to ten inches in diameter, and suitable for pulpwood. The poplar ranges from four to ten inches in diameter, but in some places seems to be dying. The timber on the high ground west of Poplar River is larger than elsewhere. Occasionally there are spruce trees twenty inches in diameter. On the point of land extending into the lake on lots 18 and 19, concessions VI and VII there is Norway pine about fourteen inches in diameter. This is the only place where pine was seen in the township.

Along the north boundary there are several outcroppings of rock but without indications of mineral. About one and a half miles south of the north boundary and west of Poplar River a considerable area of surface rock was encountered, but as on the north boundary there were no indications of economic mineral.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) WALTER BEATTY,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 34.

SURVEY OF THE TOWNSHIP OF MACHIN, DISTRICT OF SUDBURY.

GUELPH, ONT., March 29th, 1911.

SIR,—I have the honour to submit the following report on the survey of the Township of Machin in the District of Sudbury, made in accordance with instructions from your Department, dated May 11th, 1910.

This township is on the Ground Hog River and lies north of the National Transcontinental Railway and was reached by means of the contractors' train on that railway from Cochrane.

This township is nine miles square and was laid out in lots of one hundred and fifty acres each under the system of survey approved by Order in Council of April 26th, 1906.

The survey was commenced at the south-east angle of the township, which is about 2¼ miles north of the railway, which point is marked by the six mile post on O. L. S. Speight's meridian line of 1905. The south boundary was run west from that point and was posted at each lot in the regular way and the side-lines projected northward from it.

The railway crosses the south-west corner of the township, cutting lots 28, 29 and 30 in the first concession.

The survey lines were in every case run in the centres of the road allowances. On the concession line a post was planted on the survey line at the end of each lot, also one on the south side of the road allowance and one on the north side. The posts planted on the survey lines were marked with the numbers of the lots on the east and west sides and with the letter "R" on the north and south sides. The posts at the lot corners were marked with the lot numbers on the east and west sides and with the concession numbers on the north or south sides, according to the positions of the posts, and with the letter "R" on the side facing the road allowance. At the side roads a post was planted at the intersection of the survey lines and marked "R" on four sides and a post was placed at each of the four lot corners and marked with the number of the lot and concession and with the letter "R" on the two sides facing the road allowances.

The 1⅞-inch iron posts and the wooden posts at the township corners were marked with the word "Machin" on the side facing the township.

Iron posts 1¼-inch in diameter were planted beside the wooden posts at the following points on the survey lines, viz.: On the north shore of the lake between lots 12 and 13 in the first concession, on the line between concessions VI and VII at the east boundary and at the lots 12 and 13 side road and at the west boundary, on the north boundary at the lots 12 and 13 side road. These posts were marked "R" on four sides and with the numbers of the adjacent lots and concessions.

The Ground Hog River enters the township from the south at lot 24, Con. I, and flowing a little to the north-east leaves it at lot 16, Con XII. It has a width of from six to ten chains, and flows with a good current. In lot 18, Con. VIII there is a short rapids with a fall of about nine feet. There are a number of small lakes in the township.

The land to the west of the river is undulating with a good clay soil and is well timbered with spruce and poplar. In the eastern part of the township the land is more level with a larger percentage of swamp, and the timber somewhat smaller.

There is a small area of burnt land along the river in concessions eight and nine, and another on the west boundary extending from near the south-west corner of the township to the fifth concession.

On the whole the township is a fairly good one, there are some ridges of rock in various parts and some swamps which will require drainage, but more than half of the area can be brought under cultivation without difficulty.

Very little large game was seen and no fur-bearing animals. Fish was also scarce but partridge were plentiful.

Accompanying this report are the field notes and plan of the survey and the timber plan.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) James Hutcheon.
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 35.

Survey of the Residue of the Townships of Benoit and Maisonville, District of Nipissing.

Elk Lake, November 2nd. 1910.

Sir,—I have the honour to report that under instructions from your Department dated July 7th, 1910, I have completed the survey of those parts of the Townships of Benoit and Maisonville not previously subdivided into lots.

In 1908, Mr. C. H. Fullerton, O.L.S., surveyed thirty-two lots in Maisonville and twenty-seven lots in Benoit along the Temiskaming and Northern Ontario Railway. This year I laid out the remaining forty lots in Maisonville and forty-five lots in Benoit, four of the former and eleven of the latter being west of the railway.

Probably about one-half of the country included in these lots is suitable for agricultural purposes, being covered with a rich clay or sandy loam, the remainder consisting of outcrops of native rock, muskeg, water or sand containing many drift boulders. The rocky portion of these townships may prove valuable for mining purposes, a considerable number of claims having been staked and much of the rock apparently not having yet been well prospected. Practically all the hills shown on the plans accompanying this report are native rock, while there is a considerable area of rock not much elevated above the surrounding country.

With the exception of about one thousand acres of recently burned country and possibly two or three times that area of open muskeg and beaver meadow, these lots are all thickly timbered mostly with second growth poplar, white birch, banksian pine and spruce up to eight inches in diameter, but there is besides a large amount of valuable timber and pulp wood. Roughly estimated about half the area surveyed in Maisonville and one-third that in Benoit is covered with valuable timber, spruce, cedar, white birch, and poplar up to eighteen inches in diameter, and some pitch pine large enough to be useful. The best of the timber is in that part of Maisonville north of the height of land. The location of the various kinds of timber and open country is shown on the timber maps and in the field notes accompanying this report.

There are nine lakes, or parts of lakes, in that part of Maisonville which I have surveyed, several of these south of the height of land being deep and clear, and apparently containing many fish, principally pike and pickerel. The largest lake in the township is Wolf Lake, north of the height of land. The lake is muddy and shallow, being probably nowhere more than about six or eight feet deep. The township of Benoit contains no lake except a small corner of Butler Lake on the western boundary. The only considerable body of water in this township is the Black River, which enters the township at the north-easterly angle of lot one, concession one, and flows northerly close to the eastern boundary of the township to the middle of concession five, when it turns westward. In concession four it leaves the township, re-entering it about half a mile farther north. East of the township it is apparently joined by a large creek or branch, as it has a greater body of water after re-entering than before leaving. From its first entrance to the fifth concession it is only a large creek, never much, if any, more than half a chain wide. It has in many places a good fall and swift current, though its flow is impeded by several beaver dams. From about five chains north of the southerly limit of the fifth concession to the junction with it of the White Clay River in lot six, concession five, it is deep and uniformly about one chain wide and has the same canal-like appearance that it has near the railway at the northern boundary of the township. There is at low water, all the way from concession four to the railway, a wide, clear, nearly flat clay bank, providing unobstructed walking for the whole of that distance.

Accompanying this report I am sending plans, timber maps and field notes.

I have the honour to be,

Sir,

Your obedient servant.

(Signed) A. D. Griffin.
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 36.

SURVEY OF THE TOWNSHIP OF LYON ADDITIONAL, DISTRICT OF THUNDER BAY.

LISTOWEL, October 27th, 1911.

SIR,—In pursuance with instructions from the Honourable the Minister of Lands, Forests and Mines, dated June 20th, A.D. 1911, to survey an area west of the Township of Lyon in the Thunder Bay District, I beg leave to report the following:—

I left Listowel on July the 8th, and proceeded to Owen Sound where I took the Canadian Pacific Railway boat *Assiniboia* and arrived in Port Arthur on the morning of July 10th. On July 12th with six men, outfit and provisions I proceeded by Canadian Pacific Railway to Coglin Station, situate about 53 miles east of Port Arthur, from this point there is an old tote road leading through old Lyon Township to farming location A L 671, the distance being about three and a half miles. From this point I commenced work as per instructions by extending the north boundary two miles west, thence running south, etc. Most of the old posts and bearing trees on the old west boundary were gone. The northerly half of the portion subdivided is mostly rolling and hilly with some small rocky ridges, the southerly half is generally level with some large muskegs and good level spruce land. The shore along Black Bay is very indefinite and hard to define, the land along the shore is sandy and very low, the water forming low sand banks; a strip of land along the shore from two to five chains wide is covered with small timber and willows and back of this for about twenty chains the timber is small and there are numerous muskegs and land very wet as it is nearly down to the level of Black Bay.

This township is well watered with spring creeks and in all the larger streams brook trout abound. We found numerous springs of clear water, some of them bubbling out of the ground and very cold. While traversing Black Bay I noticed a tide of about six inches. All the high land with the exception of where it is stony and rocky will be good agricultural land; the timber and underbrush in the north half is very thick and heavy and the land will be hard to clear; the southerly half will not be so hard and with the exception of a strip along Black Bay will be fairly good land, although most of it will need to be drained. A Mr. Bruner, a German, who is the settler on location A L 635 has about eight acres cleared on the north side of the track and has about five acres under cultivation, oats, garden and potatoes, and the potatoes were a splendid crop, he expected to have about 400 bags.

The locations A L 678, R 601 have some of the best timber removed, but none of the land is cleared and I saw none ready for cultivation. A L 764 has about two acres cleared, and the land seems good. Location A L 561 also has a clearing but none under cultivation.

Under the head of minerals I beg leave to report that I found no trace of minerals, there is a high diabase ridge near the north-west corner of Lot 1, Concession XI. This ridge runs almost north-west and south-east; the rock is coarse and compact and upon examination I found no veins or trace of minerals.

Under the head of timber I beg leave to report the following:—The kinds of timber found were spruce, cedar, balsam, tamarac, birch and poplar and a few small jack pine. Lots 1 and 2, Concessions X and XI are covered with mixed timber; along the line between lots 2 and 3, Concesion XI, and between Concessions X and XI, Lots 2, 3 and 4, I found some fine cedar, some going two feet in diameter.

Under the head of soil I beg leave to say that the northerly half with the exception of rocky and stony places, the land seems to be good but not first class; the southerly half is broken by muskegs and low wet swamps, but a great deal of the land will be good for cultivation and all the low land with the exception of a strip along Black Bay can be easily drained.

The weather was very wet and foggy while doing this work; it rained every day on the work with the exception of ten.

The Canadian Northern Railway parallels the Canadian Pacific for most of the way through this territory, and the cutting of the right of way was in progress while making this survey.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) E. D. Bolton,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 37.

Survey of the Town Plot of Redditt, District of Rainy River.

Toronto, March 20th, 1911.

Sir,—I have the honour to report that in accordance with instructions from your Department dated 13th July, 1910, directing me to lay out a townsite at Redditt Station on the National Transcontinental Railway in the township of Redditt into building lots, I proceeded to that place from Sioux Lookout on the evening of the 14th of July, arriving there on the afternoon of the 15th, and after locating my camp on the south side of Basket Lake and Black River commenced the survey as soon as possible thereafter.

I may say that I laid out all the ground on Lot 5 in the 5th and 6th concessions of Redditt that I considered fit for building lots, and also a few lots upon lot 6, concession 6 on the north side of the railway grounds. The lots were laid out 66 feet wide and 150 feet deep as a rule and made to suit the contour of the ground as nearly as possible.

I found a man named Leon Baitly living on the south-east part of lot 5 in concession 6, who had made certain improvements in clearing and building and claimed to be located for the lot. A memo of these improvements has already been sent to your Department.

I also found the offices of the engineers of the Transcontinental Railway located on the central part of lot 5, concession 4, but did not interfere with them in any way beyond cutting a small corner off their clearing, as I did not deem it advisable to extend the Town Plot so far south. The engineers have quite a number of buildings and about 5 acres of clearing fronting on Armstrong Lake to the south of them, and from which a water pipe line has been laid north-westerly to the railway grounds.

In staking out the lots to the south of Basket Lake I paid no attention to this water pipe. but I presume the railway people will have the right of way through the town lots.

The intake pipe at Armstrong Lake is just west of the side line between lots 4 and 5, concession 5, and 1,534 feet south of the original post at Basket Lake.

That portion of lot 5, concession 6, laid out is altogether the most suitable for building lots, having a gradual slope to the south from the high land on the north.

The part of lot 5, concession 5, laid out south of Basket Lake is also fairly well situated, rising to the south from Basket Lake and Black River. These two blocks of lots comprise all that is really suitable for a Townsite, but having half a day at my disposal before moving on to Kenora, I laid out 21 lots on lot 6, concession 6, as shown on plan. These, however, are not likely to be taken up as building sites for some time to come. The flat of land between the railway lands and Black River is covered with water every spring and therefore unsuitable for building purposes.

A number of the posts used were cedar that I brought from Sioux Lookout, and iron posts left over from Sioux Lookout were planted at points indicated on the tracing of plan. The remainder of posts required were made from banksian pine, being the most suitable timber to be found.

All posts were marked similarly to those described in the report of Sioux Lookout.

After our railway experience on the 15th July, being 20 hours on a flat car coming 117 miles, we were pleased to have the privilege of getting to Winnipeg River on the 3rd of August by row boat and canoe via Black River, and the same evening reached Kenora by small steamer, where the survey may be said to have terminated.

Accompanying the report will be found Plan of Survey, with tracing of same showing iron posts, also pay list, statement of transport and travelling expenses with vouchers and account, all in triplicate.

The magnetic variation was found to be 10 degrees 25 minutes East.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) Alexander Niven,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 38.

SURVEY OF THE TOWNSITE OF MATTAWISHQUIA, DISTRICT OF ALGOMA.

NORTH BAY, July 15th, 1911.

SIR,—I beg to report the completion of the survey of the Mattawishguia Townsite at Mileage 232, on the National Transcontinental Railway, performed under instructions from your Department, dated May 22nd, 1911.

Our party left here on the 30th of May, and returned on the 22nd of June. Some inconvenience was experienced by our party at the western end of our trip, both going in and coming out, due to inefficient, irregular service on the construction trains, and to a series of accidents on the line.

According to instuctions, I consulted with Mr. A. J. McDonald of Cochrane, as to the most suitable land to subdivide, and our decision alters somewhat the subdivision as laid out on the projected plan.

North of the right of way no further land has been reserved than has been subdivided, while on the south side all the land has been reserved between the right of way and the river.

The soil is a light loam, free from boulders and rock. The land has a natural and very gradual slope riverwards, giving good drainage. There is no rough or broken land in the Townsite, hence every lot is available for building. The timber is mainly black spruce of small dimensions, while on the higher land are white woods and white birch.

The only buildings on the Townsite are the engineers' camps at the southeast end and a log stable on lot 137. In front of lots 130-110 are a number of buildings on the station yard, comprising a store, stopping place, hospital, contractor's headquarters, etc. This is the most desirable location for building purposes.

Posts were planted at the front angles of every lot, and at rear angles where the same occurred on side streets. The posts were all made of spruce timber, while at certain locations iron bars were driven to preserve the more important points. The outlines of the townsite were run, thoroughly blazed and posted at the various angles.

I am indebted to the engineer in charge of Residency 22, for his notes of a winter traverse of the Mattawishguia River, the obtaining of which rendered a second traverse unnecessary.

Accompanying this report are the plan, and tracing of the Townsite, and triplicate returns of all expenses in connection therewith, all of which is respectfully submitted.

I have the honour to be,

Sir,

Your obedient servant.

(Signed) H. M. ANDERSON.
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 39.

Survey of the Townsite at Low Bush River, District of Nipissing.

North Bay, Ont., September 30th, 1911.

Sir,—I beg to report completion of the survey of the Townsite at Low Bush River on the National Transcontinental Railway, performed under instructions from your Department, dated August 11th, 1911.

The soil is a light loam, free from boulders and rock, and with no rough or broken land, hence every lot is suitable for building purposes. The land is for the most part quite well drained, with a gentle slope riverwards. In some few places, as along the concession line, however, the land is wet and deeply covered with moss, though still capable of being drained. The timber for the most part consists of small black spruce, while on the higher land are poplar and white birch.

The temporary station is located mid-way between the two bridges. This will, in all probability, prove to be the most central location of the Townsite, and the business section will spread out over lots 201-222, etc. The choicest residential section is to be found up around the Residency buildings on the east side of Circle River.

A number of buildings occur on the long tongue between the two rivers and south of the right of way: and a considerable clearance lies adjacent to the right of way on the easterly shore of Circle River.

All lots were posted at both front angles, and at rear angles where the same occurred on an avenue, in every case the posts being firmly driven. The posts were all made of sound spruce, 24 inches long, well faced. The numbers were carved on same with a timber scribe. The posts at street corners were also carved "R." At certain positions iron posts were planted. These were plainly marked with a cold chisel, and alongside of them were planted wooden posts, also marked. The positions of these posts are indicated on the accompanying tracing and recorded in the notes.

Accompanying this report are the usual returns consisting of plan, tracing, field notes, list of lots, etc., all of which are respectfully submitted.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) H. M. Anderson,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 40.

REPORT OF THE SUBDIVISION OF THE VILLAGE PLOT OF WALDHOF, DISTRICT OF KENORA.

KENORA, June 26th, 1911.

SIR,—I left Kenora by morning train for Waldhof Siding, where I arrived about noon. I engaged men for the following morning at $2.50 per day, including board, and a chainman at $2.75 per day. Then I looked up posts and went to the sawmill to order sawn posts. I took the chainbearer with me. We found the trail to the mill very wet and swampy. We took the colonization road back which increased the distance, but was drier and better walking.

On Thursday morning, the 8th, I ran northerly at right angles to the straight part of the north boundary of the Canadian Pacific Railway; on this line at the right distances I ran the boundaries of the streets easterly and westerly, parallel to the straight part of the north boundary of the Canadian Pacific Railway, to comply as nearly as possible, owing to the curve in the C. P. R., with the projected plan accompanying the instructions.

The land ascends gradually from concession 1 towards the north. The soil is sandy from southwest corner of lot 8 but changes to sand and gravel to the north and east.

The timber is small jack pine from 4 inches to 6 inches in diameter, in places scattered and not much underbrush, and if near a town or city would form ideal outing or picnic grounds.

I found no buildings on the lot except one intended for a blacksmith shop, and another with the frame up. They are both south of the Canadian Pacific Railway, and are both on West Street near lots 68 and 40.

The men who were working with me expressed a wish to have some of the lots set out for a park and athletic grounds, and mentioned the block bounded by George and Grey and Edward and Beresford streets as very suitable.

I found the posts at the south-west corner and at the intersection of the west boundary with the north boundary of the Canadian Pacific Railway in position, but those at the south-east corner are all gone, either burnt or removed with material from the borrow pit. The posts at the south-west corner of 7 are also gone, with material from the ballast pit.

The only swampy land on the Town Plot is that mentioned in the township field notes at the southwest corner of eight. Very little of it is on the lots. Robert street takes nearly all of it.

I did not give the subdivision a name. The whole of Waldhof Siding is on lot 9, and no name was mentioned in the instructions.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) EDMUND SEAGER,
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 41.

Survey of the Mattagami River Townsite, District of Sudbury.

North Bay, Ont., October 7th, 1911.

Sir,—Herewith I beg to present my report on the survey of the Townsite at Mattagami River, on the National Transcontinental Railway, performed under instructions from your Department, dated July 26th, 1911, and supplementary instructions dated August 11th, 1911.

The soil is a light loam, free from boulders and rock, and with very little broken land; hence nearly every lot is available for building purposes. The land is for the most part quite well drained. there being at all times a gentle slope riverward. The timber is mostly a general mixture of balsam, birch, spruce and poplar in the order named and of a size ranging from 4 inches to 8 inches. Along the river bank and the ridges the timber is larger, with poplar predominating; while in the lower parts the main timber is black spruce, 3 inches to 5 inches. Satisfactory and pleasing evidences of the soil's possibilities were to be seen in the garden growth at the Residency,—there being a splendid showing of all kinds of garden vegetables and a profusion of domestic flowers. Hay and oats were also seen on the work, of a height and head worthy of note.

The Railway passes through the Townsite at a considerable elevation, more particularly from 3rd Avenue westward. From an inspection of the ground, it would appear that the most suitable and probable site for the business section, would be that portion of the Townsite lying East of the River and preferably North of the Right of Way. The best residential section is in the vicinity of the Residency Buildings on the westerly side of the river.

All lots were posted at both front angles, and at rear angles where the same occurred on an avenue; in every case the posts being firmly driven. The posts were made of clear cedar or pine 24 inches long, well faced and the numbers carved thereon with a timber scribe. The posts at block corners were also carved R in addition to the number of the adjacent lot. At certain prominent positions iron posts were planted; these were suitably carved with a cold chisel and a carved wooden post planted alongside. The locations of these iron posts are indicated on the tracing and recorded in the notes.

Accompanying this report are the customary returns consisting of plan, tracings, list of lots, etc., all of which are respectfully submitted.

I have the honour to be,

Sir,

Your obedient servant,

(Signed) H. M. Anderson.
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto.

Appendix No. 42.

TRAVERSE OF SESEKINIKA AND KENOGAMI LAKES AND SURVEY OF ISLANDS THEREIN, DISTRICT OF NIPISSING.

ELK LAKE, October 23rd, 1911.

SIR,—Under instructions from your Department dated July 31st, and August 21st, I have surveyed those parts of Sesekinika and Kenogami Lakes, lying within the Township of Grenfell, and the islands therein, subdividing the larger islands into parcels suitable for summer resorts. I have also traversed the Blanche River from Kenogami Lake to the Temiskaming and Northern Ontario Railway. Along the shore of Sesekinika Lake at distances averaging about a mile, I have marked suitable trees at prominent points W, W1, W2, etc., and along the shore of Kenogami Lake at like intervals have planted posts marked P1, P2, to P6. I continued these posts along the Blanche River at intervals of about half a mile, marking them P6 to P11.

I found no surveyed mining claims to connect with my survey of either lake or the river, though many unsurveyed claims are staked in the neighborhood of all.

Sesekinika Lake contains twenty-three islands, varying in size from one-tenth of an acre to over two hundred acres. Of the largest island only about fifty-three acres are within the township of Grenfell. The largest island wholly within this township contains about eighty-three acres. With the exception of two or three very small islands all are well timbered with spruce, birch, jack pine, poplar and balsam, the largest island A2, having many spruce, birch and poplar from 18 to 24 inches in diameter.

All the islands consist of an outcrop of schistose rock covered very lightly with soil, there being, except in a few isolated spots, practically no arable land on the islands. Nearly all are suitable for summer resorts, some, as described in schedule accompanying this report, being very desirable.

Along the east shore near the railway I found land suitable for only two lots. As shown on plan and field notes most of the land between the railway and the lake has been recently burned over and consists now along the shore of nearly bare rock covered with fallen timber. Probably in a few years it will be sufficiently grown up with underbrush to hide the present deformity. Otherwise the beauty of the shore and the islands is all that could be desired. The only serious defect to this lake as a summer resort is that the water is not at all clear, being always yellow and at times almost dirty. It is, however, well stocked with pike and pickerel.

The shore of the large islands, while offering many of the most desirable sites for cottages, is totally unfit for a roadway, consisting in many places of precipitous rock or steep incline with little or no earth for grading. The only road allowance I left is between parcels 2 and 3 on island A1, to give access from the water to parcel not bordering on the lake.

In Kenogami Lake the small islands are all well wooded and offer suitable locations for summer resorts. The large island is mostly brulé, small second growth jack pine, spruce, and poplar covering much of it, with several large white and red pine escaped from the fire. There are in both parcels into which

I have divided it several good locations for cottages. Most of the shore of this lake is schistose rock and conglomerate and is largely staked for mining claims, as is also the country along the Blanche River.

I have the honor to be,

Sir,

Your obedient servant.

(Signed) A. D. GRIFFIN.
Ontario Land Surveyor.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 43.

SURVEY OF DOG AND OTHER LAKES AND THE OBA RIVER, IN THE DISTRICT OF ALGOMA.

TORONTO, Ont., Oct., 1910.

SIR,—We have the honour to submit the following report of the survey of Dog and other lakes and the Oba River made by us during the past summer months, under instructions dated June 9th, 1910, the said survey comprising the north shore of Dog Lake, from Missanabie Station on the main line of the Canadian Pacific Railway west of Sudbury, westerly as far as the Steel Girder bridge over the Lochlomond River, at Sudlow Siding. Thence the river and lakes connecting Dog Lake with Lake Wabatongashene, viz.: The Lochlomond River, Lochlomond Lake and MacNamara Lake: thence Lake Wabatongashene, and over the height of land and down Portage Creek into Oba Lake, and from Oba Lake down stream of the Oba River as far as the portage known as Pine Portage, into Kepinagogami Lake.

We left Toronto, with two men, on the evening of June 12th for Sudbury. After ordering supplies and organizing our party, we proceeded on June 15th to Missanabie with a party of nine men, including a timber ranger, Mr. W. B. Thomson of Orillia.

The remainder of the month of June and up to July 15th, we were engaged in the triangulation and traverse of Dog Lake, Lochlomond Lake, MacNamara Lake and the Lochlomond River. From the commencement of the survey until July 6th, we experienced considerable difficulty in sighting on the lakes, owing to the dense smoke of bush fires to the west of us, and at times found it impossible to see our pickets. A heavy rain, however, on July 6th cleared the atmosphere and removed this difficulty. The latter half of July and the month of August was spent in the triangulation and traverse of Lake Wabatongashene and its connection with Oba Lake. Most of the islands in this lake are shown on the accompanying plan as either sketched or as actually touched by the survey. A few, however, may have passed unnoted during the survey. From September 1st to September 15th, we were engaged triangulating and traversing Oba Lake. Most of the islands were also located as those aforesaid. From September 15th to October 8th we were engaged in the traverse of the Oba River as far as Pine Portage, and also down the east branch of the Oba River eight miles, tying on one of O.L.S. T. B. Speight's meridian lines run this season.

Levels were taken at all falls or rapids capable of development and the discharge of the streams determined approximately. Small and long rapids, the fall of water was merely estimated.

October the 10th, 11th and 12th, were spent on the journey out from Pine Portage to Missanabie Station.

The Government equipment, canoes, tents, blankets, cookery, etc., were stored with the Hudson Bay Company at Missanabie, and the receipts collected for the same.

During the months of August and September there was considerable wet weather, and this, together with the many gales on the lakes, hindered, to some extent, the progress of the survey.

The survey was left unfinished owing to the summer season closing. In our opinion, there is sufficient work left for a single party another season.

Wooden posts were planted at prominent points on the lakes and at every mile or thereabout on the river. Where possible, cedar, or the most durable trees available, were cut off from 2 to 3 feet above the ground, squared and bevelled at the top and scored with a marking iron on the side facing the water, with the designated number of the post. Where impossible to square a tree, a post was made, at least 5 inches square and from three to four feet in length, of the most durable wood available, marked in the same manner as aforesaid and planted firmly in the ground and with material convenient. Stone mounds were also built around the post. Bearing trees were also taken at monuments exposed to destruction.

The lakes were first triangulated from chained bases. A five-chain tape was employed in the chaining of the bases. The shore line was filed in with stadia and azimuth readings with transit. On the river magnetic bearings were also taken as a check on azimuth readings. When rapids and waterfalls were encountered, necessary lines were cut and blazed around the river and posts planted. Astronomical observations for time and azimuth were taken as often as opportunity permitted, and the direction of lines are in accordance therewith. Observations with their calculations are recorded in the appendix of this report. The field notes of the survey of the lakes have been plotted to a scale of ten chains to the inch; the Oba River to a scale of twenty chains to the inch, and a general plan to a scale of two miles to the inch. Tracings of the same accompany this report.

General Features.

Judging from the shores of the three lakes, Dog, Wabatongashene and Oba, the land is for the most part useless for agriculture. At the mouth of the Oba River we struck the southerly limit of the clay belt, and from this point down stream to Kepinagogami Lake, good agricultural land was in evidence, From Post A 100 down to Pine Portage A 19, the country is very flat; in no place except at rapids between B 5 and B 6 did the banks of the river exceed three feet above high water mark. A good example of the flatness of the country is found at the big bend of the Oba River B 8, where the water at that point divides, part flowing south-westerly into Kepinagogami Lake, and the other part flowing north-easterly into Missanabie River. Another strange phenomenon, some of the creeks between B 8 and B 17 flow from the river. I presume they unite with the river at some point further down the river. The bed of the river is of hard clay. The shores and bed of the lakes are rocky in most places with occasional sand beaches.

CLIMATE.

The climate last summer was all that could be desired for agricultural pursuits, no frosts of any severity being experienced during July and August. We had several frosts, however, in the latter part of September and October.

TIMBER.

The timber is reported on fully by the timber ranger, Mr. W. B. Thomson of Orillia, and further remarks are unnecessary.

MINERALS.

No economic minerals were discovered, nearly all specimens examined on Wabatongashene and Oba Lakes being granite rocks of the Laurentian formation, with occasional outcrops of green schist.

GAME.

Large game, such as moose, caribou and deer were not as plentiful as would be expected. We saw an occasional moose, but no signs of caribou or deer. Bear were seen in the Oba Lake District. Traces of fur-bearing animals such as mink, beaver and marten were found, but in our opinion, the country is almost hunted out. Small game such as rabbit, partridge and duck are plentiful. Abundance of fish—pickerel and pike—were caught by our party, weighing as much as twenty pounds, although they averaged three to four pounds. It is claimed that the lakes also contain whitefish. Local Indians told us that speckled trout were found in many of the smaller streams and in parts of the Oba River. There is good trout fishing at Trout Rapids at post A 78, at low water.

WATER.

The water in the lakes south of the height of land is fresh, clear and soft. Oba Lake and Oba River have that dark color due to vegetable matter, which most of the rivers have in Northern Ontario.

Water-power is reported on in detail in the field book.

We have the honor to be,

Sir,

Your obedient servants,

(Sgd.) PAULIN & BUSH.

The Honourable, the Minister of Lands, Forests and Mines,
Toronto, Ont.

Appendix No. 44.

ALGONQUIN NATIONAL PARK.

ALGONQUIN PARK P. O. December 24, 1911.

The Honourable The Minister of Lands, Forests and Mines, Toronto, Ont.

HONOURABLE SIR,—I beg to hand you my annual report for the fiscal year ending October 31st, 1911, on the Algonquin National Park of Ontario, of which I have the honour of being in charge.

The Park, as no doubt you are aware, is situated about two hundred miles north of the City of Toronto, in the District of Nipissing. It comprises some thirty-one townships, wholly or in part, containing an area of about one million three hundred and twenty thousand acres, and is timbered with birch, maple, beech, hemlock, cedar, spruce, white birch, tamarac and balsam. There are still large blocks of choice red and white pine, while in some sections black cherry is found reaching a diameter of sixteen inches. There are some 2,000 lakes, large and small. Some of these rank among the larger of the inland lakes of Ontario, such as Cedar, Great Opeongo, Tea Lake and others.

One of the most notable features of the Park is the fact that six important rivers take their rise here, namely, South River, Madawaska, Amable Du Fond, Petewawa, Little Nipissing and the north branch of the Muskoka. The value to the Province of the conservation of these water supplies can scarcely be estimated. The depth of the Park north and south is 56 miles, while its breadth east and west is 48 miles. The average elevation is 1,500 feet above sea level, making it an ideal health resort, and thousands of people from all over Canada and the United States avail themselves of it yearly.

There are two large well-equipped hotels, one built and operated by the Grand Trunk Railway, the other by Mr. L. E. Merrell: the former is situated at Cache Lake, the latter seven miles west. The Park headquarters are also at Cache Lake, Algonquin Park P. O.

The object of the Park, besides conservation of the water supply and the preservation of the timber, is to provide a breeding place and protection to all kinds of game, and a health resort for the people of the Province. That these objects have been attained is evident on all sides. The Park is annually becoming more popular, not only for the excellent speckled salmon trout and bass fishing, but for purposes of rest and health.

Game of all kinds has very much increased. Deer are so abundant that they can be seen from the hotel verandahs in numbers. Beaver, too, are very numerous, and their annual increase must be several thousand. Otter, mink, marten, muskrat and fisher are also here in great numbers; in some sections the fox is very plentiful. Of birds we have the ruffled grouse, the spruce partridge and several smaller game birds. The capercailzie introduced some years ago are also in evidence, several coveys of young birds having been seen during the past year. This being the largest of the grouse family will be an important addition to our game birds. Ducks are becoming much more numerous, and thousands of them could be seen in our large marshes last fall.

A considerable revenue has been derived from fishing licenses, etc., and this will very much increase each year as the Park becomes better known.

The amounts collected here during the past year, not including furs sold, are as follows: For fishing licenses $1,193.12; for rent of cottage and camp sites $305.00 (this does not include rents and license fees paid direct to the Department); fines upon six convictions for illegal trapping $175.00; sale of shelter house at Canoe Lake (no longer required) $100.00; old lumber from camps, $40.00, making a total of $1,813.12.

Our staff consists of a superintendent, twenty-four rangers and a housekeeper. The men travel in pairs, having a given territory to cover, their duties during the hunting and trapping season being to patrol the section under their care for the prevention of illegal hunting and trapping. During the remainder of the year they cut portages, improve streams, build shelter houses, etc. They at all times act as fire rangers.

Regarding fires, I am glad to report that although many fires were started, principally by lightning and the railway trains, we succeeded in getting them under control before much damage was done.

We have built eight new shelter houses, all of which are substantial sided log buildings, with the exception of the one at Joe Lake, which is a well finished clapboard building, fitted with telephone connection with the hotel, the stations at Canoe and Cache Lakes, and headquarters. Joe Lake is an important point, being on the main waterway, and the telephone in cases of bush fires or accident will be a great advantage. At headquarters all the waste land to the west of the building has been cleaned up, also a great deal of the slash left by the Munn Lumber Company, this being absolutely necessary as a fire protection on the limits recently acquired by the Government from this firm.

An ice house and cold storage has also been built at headquarters. For two years past we have taken out a quantity of fur, principally beaver. This has been sold by tender in Toronto, bringing a good price. During the past year, nine live beaver were disposed of, 402 beaver skins, 10 otter, 8 marten, 18 mink, 31 muskrats, 1 fox, and 1 ermine, realizing in all $3,340.00.

Wolves are still numerous in the Park, notwithstanding that our men got fifty, principally females, during the year, and killed at least an equal number that they did not get owing to the snow falls covering them up before found. I attribute the large number of wolves to the fact that they come in from other sections, owing to the abundance of food to be found in the Park. Every possible effort should be made to rid our woods of these pests, which kill deer in hundreds. Several were killed during the past year within a mile of headquarters.

Fishing was good during the past year, and general satisfaction was expressed by all visitors, who do not hesitate to pronounce the Park the best fishing grounds now to be found in America. I would, however, recommend stocking Cache, Cranberry and White Lakes, as these being within easy reach of the hotel provide sport for those who cannot reach more distant waters.

The limits recently purchased by the Government from the Munn Lumber Company are a great acquisition to the Park, being largely covered with fine hardwoods and young pine. The lakes also are excellent for fish, and have an abundance of speckled and salmon trout, as well as small-mouthed bass, the latter having stocked these waters from the Park, where a few years ago they were introduced with great success. A large quantity of salmon fry was put into Source Lake two and three years ago, and last season a few choice specimens of this most gamey fish were taken.

The addition of the Munn Lumber Company's limit to the Park also completes a very important waterway and adds very much to the ease of patrolling this section.

We have in the Park three large summer camps of boys and one of girls, the Long Trail camp for boys on Joe Lake; Prof. Brower's camp for boys on Cache Lake; the Bordentown Military Institute on Lake of Two Rivers, and Miss Case of New York, with a school of fifty girls and teachers on Cache Lake.

Considering the great number of people scattered all over this vast territory in canoeing parties during the summer months, we have very little trouble from bush fires, and the Park laws are with few exceptions well observed, our principal trouble coming from the lumber camps and outside trappers.

I have the honour to be, Sir,

Your obedient servant,

G. W. Bartlett,

Park Superintendent.

Appendix No. 45.

RONDEAU PROVINCIAL PARK.

Morpeth P. O., December 26, 1911.

The Honourable The Minister of Lands, Forests and Mines, Toronto, Ont.

Sir,—I have the honour to submit this my report as caretaker and ranger of the Rondeau Provincial Park for the year 1911.

The marsh grass that we had cut last fall and with which we covered the sandy places around the pavilion (where so much traffic in the picnic season wore the sod off and cut deep into the sand) served an excellent purpose; it seemed to hold the moisture, and the sand remained quite firm or packed under the coarse grass. Wagons and automobiles can run anywhere on this part without cutting into the sand as they formerly did. It was pleasing indeed to note the favorable remarks from the public visitors in regard to this work. It should have a fresh covering of grass each year until a natural top is formed that will seed down with grass.

The Park dock is in good condition and has afforded a great deal of pleasure to visitors, but owing to the extreme lowness of the water this season, it has been diffcult for the small launches to make their way into the lagoon beside the low dock to tie up, as the entrance to same is very shallow, being partially filled up with sand.

The gravel road leading into the Park has been in fine condition and makes a good speedway for automobiles and other vehicles. It will require another light coat of gravel to put it in good condition for next year. The continued wet weather recently has softened it in places and it is cut up some.

As a summer resort this place is becoming more popular every season. The picnic season opened much earlier than usual, and continued longer than ever before. There were very few days throughout the season without a picnic on the Park grounds. The country roads and the Park road being dry and in excellent condition most of the season, encouraged the automobile traffic. Some days they numbered up to 20 and 25 machines. Up the south road through the Park forest seems to be a favorite run for them; the people enjoy seeing the deer (which number up into the hundreds) in their natural haunts, as well as the great variety of timber and shrubbery, the black squirrels in the trees and the cotton-tails jumping through the bushes.

The new bath house built for men on the lake shore of the Park this season has been used a great deal, and is very much appreciated by the people summering in their cottages and also by the picnickers; the bath house built for the ladies two years ago was also kept busier than ever. The Chatham and Blenheim Baden-Powell Boy Scouts, numbering about 50, were in camp on the Park for the greater part of two weeks, and made the place lively. They had drill practice each day and entertained visitors in the pavilion several times: had an afternoon of sports on the water, also foot racing on the green in front of the pavilion. Their stay was enjoyed by those who visited the Park while they were here. This has proven to be one of the best seasons for wild ducks in years on the bay contiguous to the Park.

Old shooters say that the blue bill were never known to be so numerous here before, and that more ducks were killed and taken away than for many years past.

The wild partridge and quail in this forest are not very plentiful; their natural enemies are too numerous for them to thrive well; the hawk, skunk, weasel, etc., are hunting for a living, and make it hard for these little game birds to survive at all.

The wild turkeys that the Government had placed on the Park last spring have not done well. At one time. early in the season, there were three old birds and eighteen young, and through destruction from hawks, eagles, owls, etc., and sickness during the summer, their number has been reduced to one cock and two hens. When the young were able to fly up to a perch a few feet off the ground they were liberated into the forest and picnic grounds, but they seemed to pick up something that causes them to get sick and die. We had the same experience with wild turkeys several years ago on the Park.

The wild geese have increased in number in the enclosure this season.

The red deer in the open Park are becoming so numerous that they are straying off the premises, and are accused of damaging crops. They are also injuring the young pine and cedar on the Park, and I have recommended that some steps be taken to reduce their number.

The deep well of water that was secured a little over a year ago has proven quite satisfactory so far; by pumping (with gasoline engine) two or three hours each day it will supply the picnic grounds as well as the Park headquarters with plenty of pure drinking water, which will add to the attractiveness of the Park. The latest improvement is the building of a new road through the Park forest, beginning on the picnic grounds where the gravel road into the Park ends, and continuing through the forest a distance of over three miles, intersecting the old Lake Shore road (the road to the fisheries) at a point opposite Cull and Shippey's fishery, thus forming a belt-line driveway through the best wooded part of the forest. The new road is underbrushed to a width of two rods, and when completed, all unsightly and leaning trees will have been removed. The road bed along the centre will be cleared of all trees, roots, etc., and levelled, leaving a clear drive road of about 16 feet wide. On the upper or southern end where it crosses over a number of sloughs, it was necessary to use a good many of the trees that had to be cut to make the roadway in laying corduroy, which was then covered with marsh grass to a depth of one foot, and the grass in turn was covered heavily with sand and leaf or vegetable mould. To make a permanent drive road, it was necessary to build up these low places above the high water mark in the spring. We expect to have the whole road in condition for traffic this coming season.

Before closing my report I wish to say that Mr. Orendorf handled the refectory in a satisfactory manner, catering to the wants of the public visitors.

Mr. Weir, who has the privilege of providing boats, etc., for Park visitors, is kept very busy and is giving satisfaction.

I have the honour to be, Sir,

Your obedient servant,

ISAAC GARDINER,

Park Superintendent.

Appendix No. 46.

List of Persons holding Cullers' Licenses, issued under the Ontario Cullers' Act, up to 31st October, 1911.

Name.	P. O. Address.	Name.	P. O. Address.
Anderson, M. M.	Almonte.	Buchanan, Robert	Coldwater.
Allan, James D.	Bracebridge.	Beck, Jacob Frederick	Penetanguishene
Appleton, Erwin B.	Bracebridge.	Bird, Joseph Manly	Muskoka Mills.
Albert, Andrew	Ottawa.	Boyd, John F.	Thessalon.
Adams, J. Q.	Longford Mills.	Brandon, Martin W.	Peterborough.
Anderson, Patrick J.	Campbellford.	Bell, John C.	Peterborough.
Anderson, J. C.	Gravenhurst.	Bartlett, George W.	Warren.
Allan, Alfred	Ottawa.	Brown, Silas	Klock's Mills.
Allen, R. A.	Bannockburn.	Boland, W. G.	Eganville.
Aikins, Geo. M.	French River.	Baulke, George R.	Aylmer, Que.
Appleby, Ridley	Katrine.	Bouchey, Arthur	Massey.
Adams, James M.	Sault Ste. Marie.	Buchanan, Mark	Trout Mills.
Aylward, James	Peterborough.	Barrett, W. J.	Thessalon.
Archibald, John L.	Keewatin.	Bromley, Thomas	Pembroke.
Austin, Wm. G.	Renfrew.	Bremner, John L.	Admaston.
Anderson, Charles	Little Current.	Breen, Bernard	Garden River.
Anderson, John	Cartier.	Buie, Dougal	Providence Bay.
Adair, Thomas Albert	Gananoque.	Baker, Thomas	Blind River.
Anderson, J. G.	Alpena, Mich.	Blais, Felix	Hull, Que.
Alexander, Samuel	Arden.	Balsdon, George	Keewatin.
Adams, Wm.	Westmeath.	Bromley, W. H.	Pembroke.
Arkle, George	Kenora.	Bowers, Isaac	Little Current.
Armstrong, Jas. Theodore	McKellar.	Brown, Thomas	Barrie.
Armstrong, Thomas J.	Arnprior.	Bass, Walter R.	W. Huntingdon.
Acheson, Ira M.	Westmeath.	Bates, Robert	Kenora.
Albert, Alfred E.	Ottawa.	Binnie, Thomas	Port Arthur.
Alma, John E.	Hawkesbury.	Blair, William	Keewatin.
Adams, George A.	Longford.	Bick, Thomas	Bobcaygeon.
Ansley, John Albert	Thessalon.	Burke, John Thomas	Midland.
Ansley, John Jenkins	Thessalon.	Buchan, Sterling	L'Orignal.
Ainslie, Alexander	Spanish.	Brown, Joseph A.	Spanish.
Apleton, E. A.	Kenora.	Baird, P. C.	Rainy River.
Arnill, William	Iron Bridge.	Brill, J. W.	Mine Centre.
Adams, Fred	L'Orignal.	Beattie, Arthur W.	Arnprior.
Alexander, R. Harvey	Spragge.	Brock, H. S.	Ottawa.
Alexander, J. Albert	Spragge.	Benson, John Bird	Midland.
Ainslie, Donald McF.	Whitestone.	Brennan, Rich'd Lawrence	Peterborough.
Ansley, William	Thessalon.	Brown, Hugh Riside	Huntsville.
Argue, W. A.	Kearney.	Bryan, Frank	Keewatin.
Almers, John	Kenora.	Bennett, Edward Clinton	Ahmic Harbour.
Allard, Telesphore Jos.	W. Fort William	Blaine, Harvie Thomas	Orillia.
		Barrett, Thomas	Barrie.
Brophy, Michael Patrick	Massey Station.	Bickell, James Manuel	Sault Ste. Marie.
Boland, Abraham	Cartier.	Buisson, William	Sudbury.
Brown, Singleton	Bracebridge.	Borrett, James A.	Sault Ste. Marie.
Barry, Thomas James	Hastings.	Bliss, C. Lidden	Sudbury.
Blanchet, Paul Fred'k.	Ottawa.	Bray, James	Kinmount.
Bird, W. S.	Parry Sound.	Bremner, George	Arnprior.
Bayley, James T.	Gravenhurst.	Bromley Samuel	Pembroke.
Bell, Henry	Ottawa.	Brown, A. C.	Fitzroy Harbour.
Beach, Herbert Mahlon	Ottawa.	Berlinquet, Julius	Opimicon, Que.
Barry, Thomas	Millbridge.	Blastorah, Fred L.	Harwood.
Beatty, W. R.	Parry Sound.	Burns, Clifton H.	Little Current.
Brooks, Frederick Wm.	Mackay's Station.	Beaumont, Ernest	Parry Sound.
Brown, Robt. D.	Port Sidney.	Beattie, Alex	Whitney.
Breed, Arthur G.	Penetanguishene.	Brennan, Reginald	Gravenhurst..
Barnes, Thomas Geo. Lee	Muskoka Mills.	Boyd, George	Gravenhurst..

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Bissell, Geo. Thomas	Trenton.	Campbell, J. M	Bracebridge.
Baxter, Richard	Deseronto.	Campbell, Robert	Bracebridge.
Breeaugh, Edward	Deseronto.	Clairmont, Joseph	Campbellford.
Boyd, Geo. A	Thessalon.	Clarkson, Robert J	Parry Sound.
Buchan, Frederick	Arnprior.	Carruthers, Aaron	Hintonburg.
Bradbury, Kerwood	Blind River.	Calder, Wm. J	Bark Lake.
Belanger, John B.	Mattawa.	Chew, Joseph	Gravenhurst.
Bird, J. F.	Bracebridge.	Cole, James Colin	Ottawa.
Beddome, W. E.	Dryden.	Cameron, Wm	Collin's Inlet.
Barrett, Patrick	Arnprior.	Cain, Robert	Midland.
Brundage, Alfred W	Pembroke.	Crawford, Stephen W	Thessalon.
Brougham, Thomas	Eganville.	Cochrane, George	Peterboro.
Blair, Robert I	Arnprior.	Coburn, John	Lindsay.
Benson, John W	Sturgeon Bay.	Crowe, Nathaniel	Bobcaygeon.
Beck, Chas. M., Jr	Penetanguishene.	Cameron, Alexander	Norman.
Beatty, W. J	Coldwater.	Chrysler, Frank R. L	Webbwood.
Burns, C. W., Jr	South River.	Callaghan, Thomas, Jr	Campbellford.
Bell, John Henry	Burk's Falls.	Carson, Hugh	Kenora.
Berry, Harold	Labelle, Q.	Calder, George	Woodville.
Black, George	Barwick.	Callaghan, Dennis	Campbellford.
Bettes, John Hiram	Muskoka Mills.	Corrigan, Robt. T.	Emo.
Brady, John	Renfrew.	Cameron, John H	Kenora.
Brown, James	Buckingham, Q.	Carson, Melvin	Little Current.
Brooks, W. J	Blind River.	Cameron, John K	Spanish River.
Bertrand, Allan	Nairn Centre.	Cassidy, William	Little Current.
Brinkman, Alex. B	Sault Ste. Marie.	Coons, Geo. Washington	Peterboro.
Black, Jacob	Barwick.	Chisholm, Geo. Leopold	Sault Ste. Marie.
Beattie, W. J	Arnprior.	Clark, Wm. J	Birkendale.
Bromley, William	Westmeath.	Carr, Herbert E	North Bay.
Bissell, Hartie	Trenton.	Cochrane, Alfred L.	Muldoon, Que.
Brown, Robert	Starrat.	Campbell, George	Fort Frances.
Beaton, Hugh	Waubaushene.	Chalmers, George James	Peterboro.
Bailey, Arthur	Parry Sound.	Caverly, David Charles	Parry Sound.
Burd, James Henry	Parry Sound.	Campbell, Archibald J	Little Current.
Bailey, Samuel James	Orillia.	Close, John L	Arnprior.
Burton, Tinswood	Renfrew.	Carmichael, Donald	Arnprior.
Boyes, James	Huntsville.	Carty, John	Arnprior.
Brown, John	Rockdale.	Cleary, Patrick M	Arnprior.
Brennan, Edward Scott	Sundridge.	Caldwell, James M	Callender.
Bell, John Arguey	Klock's Mills.	Cushing, John J	Davidson, Que.
Bromley Edw. H	Pembroke.	Crebo, William	Thessalon.
Bliss, Lawrence E	Byng Inlet.	Cullen, Michael J	Massey Station.
Buee, Neil	Spanish Station.	Cuthbertson, William	Arnprior.
Brazziel, Leonard	Spanish Station.	Carss, Percy	Thessalon.
Bowie, James	Bryson, Que.	Coghlan, Michael	Chapeau, Que.
Barrie, Nicholas J	Ottawa.	Cameron, Alexr. Gordon	Beauchene, Que.
Burke, J. D	Kenora.	Cassaday, W. W.	Emo.
Bowen, Thomas	Deseronto.	Carter, Robert E	Fesserton.
Brown, James F	Baysville.	Coleman, Jos	Baysville.
Blastorah, Bernard	Harwood.	Cardiff, Geo. McDougall	Sudbury.
Brannan, William H.	Pembroke.	Cameron, W. D	Kenora.
Bromley, Thomas	Webbwood.	Crandall, F	Port Arthur.
Barr, J. C	Fort Frances.	Campbell, James R.	Eganville.
Bradley, J. M	Mine Centre.	Campbell, John A	Galleta.
Burns, Dominick	Webbwood.	Caillier, Hyacinth	Arnprior.
Blaikie, Campbell D.	Fort Frances.	Chamberlain, Thomas	Bobcaygeon.
Bury, Henry J.	Stratton.	Cooper, David Allan	Millbrook.
		Cox, Henry	Ballerica, Que.
Campbell, Robert John	Flinton.	Currie, James	Ottawa.
Carpenter, John A	Arnprior.	Clarkson, A. E	Midland.
Campbell, Alex. J.	Trenton.	Clairmont, E	Gravenhurst.
Carson, James	Bracebridge.	Cameron, W. F.	Sturgeon Bay.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Connolly, David	Gravenhurst.	Durrill, John W.	Ottawa.
Campbell, P. C.	Sault Ste. Marie.	Dickson, John	Sundridge.
Cadenhead, Alexander	Midland.	Dickson, James L.	Michipic'ten H'r.
Carpenter, R. J.	Arnprior.	Dobie, Harry	Sault Ste. Marie.
Christie, William Pringle	Severn Bridge.	Deacon, Charles	Sault Ste. Marie.
Campbell, C. V.	Sault Ste. Marie.	Danter, R. W.	Parry Sound.
Clegg, Samuel	Peterboro.	Doyle, T. J.	Eau Claire.
Clairmont, William L.	Gravenhurst.	Dobie, Alexander R.	Blind River.
Cook, Sydney P. W.	Spanish Station.	Darling, J. M.	Wisawasa.
Corrigan, John	Baysville.	Dillon, John	Calabogie.
Chalmers, Alexander M.	Peterboro.	Durrell, Jos. Nelson	P'rt'ge du F'rt, Q
Charlton, George A.	Collingwood.	Durrell, John	Callender.
Cahill, Thomas	Nosbonsing.	Donally, Richard S.	Sudbury.
Chew, Manley	Midland.	Devine, William	Cook's Mills.
Cooper, James Eddly	Saurin.	Durrill, William	Nosbonsing.
Cook, Reinhardt	South River.	Draper, Patrick	Quyon, Que.
Crowe, Cecil	Bobcaygeon.	Davis, J. P.	Bobcaygeon.
Callaghan, Dennis	Trenton.	Dale, John Alexander	Birkendale.
Collins, James	Barryville.	Dinsmore, Chas. L.	Huntsville.
Claffey, Edward D.	Fort William.	Drum, Patrick	Belleville.
Coyne, Phin	Chelmsford.	Durham, Edgar S.	Rosseau.
Constantine, Eudore	Blind River.	Duquette, Chas.	Webbwood.
Cameron, Ewan	Gordon Lake.	Davis, William Albert	Bobcaygeon.
Campbell, Daniel N.	Buckingh'm, Que.	Dickson, Robt. Alexander	Keene.
Canniff, R. W.	Kenora.	Dawkins, John	Gravenhurst.
Cassidy, S. C.	Dunchurch.	Doxsee, James E.	Gravenhurst.
Charleston, John Baptiste	Ottawa.	Didier, L. P.	Aylmer, Que.
Comer, Billa F.	Tweed.	Devine, Patrick J.	Sheenboro, Que.
Carter, George	Sundridge.	Dinsmore, Richard	Huntsville.
Corrigan, Robt. J.	Emo.	Dunn, Percy E.	Longford Mills.
Caswell, Grant	Coldwater.	Duval, Chas	Halfway.
Caswell, Geo	Coldwater.	Donlevy, James	Calabogie.
Chemir, David A.	Pembroke.	Doris, Patrick	Peterborough.
Clairmont, Philadelp L.	Gravenhurst.	Doris, John	Peterborough.
Crowe, Edgerton	Bobcaygeon.	Donahue, Michael	Erinsville.
Castonquay, A. C.	Chelmsford.	Doran, W.	Belleville.
Clark, Donald Allan	Port Arthur.	Dickson, Robert R.	Kippewa, Que.
Charette, Herbert	Devlin.	Donlevy, Wm. C.	Rockcliffe.
Christie, Uriah W.	Fort Frances.	Duff, Chas. A.	Stewartville.
Clark, Joseph C.	Fort Frances.	Dean, James C.	Kenora.
Crowe, Leslie	Bobcaygeon.	Duff, Peter A.	Claybank.
Campbell, Duncan W.	Stewartville.	Duncan, Downey	Rainy River.
Callahan, Thomas N.	Arnprior.	Dougherty, J. M.	Fort Frances.
Clements, Albert James	Bent River.	Dunn, John F.	Spanish Mills.
Carney, Albert	Sault Ste. Marie.	Dyke, Morris F.	Blind River.
Collins, Arthur	Massey Station.	Devitt, Frank	Dinorwic.
Carter, George	Lavelle, Que.	Dickie, David	Port Arthur.
Chitty, Alfred E.	Kenora.	Dupuis, Alfred	Keewatin.
Cardiff, Richard J.	Arnprior.	Devlin, Samuel	Spanish Mills.
Conway, Thomas	Barry's Bay.	Dougherty, W. H.	McLaren's Bay.
Costello, Thomas M.	Antrim.	Duffy, William A.	Callender.
Cross, R. J.	Silver Islet.		
Clark, R. H.	Port Arthur.	Enlaw, Oliver	Campbellford.
Clark, Wm. R.	Port Arthur.	Ebert, Andrew P.	Pembroke.
Coombs, A. B.	Bracebridge.	Ellis, Alexander	Arnprior.
Cameron, A. F.	Emo.	Ellis, John	Westmeath.
Campbell, J. S.	Fort Frances.	Errington, Joseph	Sundridge.
		Eddington, Henry John	Parry Sound.
Didier, Hector	Mattawa.	Enright, Daniel	Port Arthur.
Doran, Frank	Barryvale.	Eager, James	Parry Sound.
Dunning, E. Percival	Parry Sound.	Elliott, Porter P.	Mine Centre.
Duff, R. J.	Arnprior.	Elliott, William	Cache Bay.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.
Edgar, J. E.	Kenora.
Elliott, George E.	Peterborough.
Edwards, Joseph K.	Gillies' Depot.
Eldridge, Robert	Fort Frances.
Fraser, John A.	Kenora.
Ferguson, Wm. H.	Red Bay.
Forbes, Chris. McKay	McLean's Depot.
Fitzgerald, E. Clair	Parry Sound.
Farrell, W. H.	Ironside, Que.
French, Lewis William	Byng Inlet.
Fraser, William A.	Mattawa.
Finerty, Patrick	Rochfort.
Farnand, Frank	Diamond.
Fulton, Philip S.	Spanish Station.
Fitzgerald, Ullyot C.	Parry Sound.
Fenn, George	Bracebridge.
Fortune, Owen	Trenton.
Fraser, David	Norman.
France, John	Collin's Inlet.
Ferguson, Ernest A.	Baysville.
Ferguson, Alpen	Mattawa.
Ford, John William B.	P'r'tge du F'rt, Q.
Ford, Charles	Wahnapitae.
Findlay, J. H.	Braeside.
Fraser, James	Renfrew.
Fairen, Francis	Peterborough.
Faulkner, Jos.	Fesserton.
Fraser, Alexander, Jr.	Westmeath.
Fairbairn, William	Calabogie.
Fraser, Wm. A.	Pembroke.
Fraser, Foster	Pembroke.
Fraser, Wm.	Little Current.
Fraser, Hugh Alexander	Pembroke.
Flaherty, John	Lindsay.
Fisher, Wm.	Trenton.
Fox, Thomas	Deseronto.
Fallis, James W.	Sturgeon Bay.
Fairbairn, N. H.	Webbwood.
Friel, John	Trenton.
Fox, Charles	Trenton.
Featherstonehaugh, W. H.	Penetanguishene.
Friar, Schuyler	Westmeath.
Farren, Joel	Savanne.
Fraser, Duncan	Big Forks.
Freestone, Walter	Burk's Falls.
Fraser, John	Bancroft.
Fitzgerald, D. C.	Spanish Station.
Foster, Wm. C.	Searchmont.
Frazer, Jas. C.	Spanish Mills.
Fremlin, H. P.	Richards' Land'g.
Foster, Ed. G.	Sault Ste. Marie.
Farrel, Peter M.	Whitefish.
Fairhall, Edward	Whiteside.
Fraser, Levi	Bracebridge.
Fiddes, James	Rainy River.
Frawley, Frank	Orillia.
Fisher, George	Sault Ste. Marie.
Filiatrault, J. A.	Blind River.
Farrier, John William	Chapleau.
Finney, Benjamin B.	Fort Frances.
Follis, Frank C.	Hawkesbury.
Fortune, Percy H.	Blind River.
Fraser, Wm. Foster	Sault Ste. Marie.
Fraser, Allan H.	Thessalon.
Farquharson, James	Tomiko.
Fink, John	Mattawa.
Fletcher, Nicol B.	Parry Sound.
Griffith, Geo. F.	Pembroke.
Graham, John	Arnprior.
Golden, John	Gilmour.
Gunter, Henry M.	Trenton.
Goltz, Ernest	Bardsville.
Green, Forman A.	Gilmour.
Green, Samuel E.	Parry Sound.
Grant, John	Flinton.
Green, Arthur	Ottawa.
Green, Norman McL.	Bancroft.
Gillis, John J.	Whitefish.
George, R. W.	Parry Sound.
Gardiner, John	Parry Sound.
Golden, Frank J.	Trenton.
Garson, Robert	Thessalon.
Gropp, August	Penetanguishene.
Grozelle, Antoine D.	Muskoka Mills.
Goulais, James	Peterborough.
Grayson, Charles	Keewatin.
Gladstone, Harry E.	Cook's Mills.
Guertin, Oliver	Biscotasing.
Gelinas, Frank	Hull, Que.
Gwynne, John	Hawkesbury.
Gray, Frederick M.	Brule Lake.
Graham, Edward G.	Wahnapitae.
Griffin, James	Spanish River.
Gordon, Alexander B.	Pembroke.
Gareau, Noah J.	Pembroke.
Gillies, D. A.	Carleton Place.
Gilligan, Edward	Mattawa.
Gladman, Charles	Parry Sound.
Garrow, John D.	Ottawa.
German, William Burton	Wahnapitae.
Gordon, Robert W.	Pembroke.
Guertin, Nelson	Petawawa.
Gardner, John	Kenora.
Gunter, Peter M.	Gilmour.
Glennie, William	Millbridge.
German, Maurice J.	Fenelon Falls.
Gillies, John A.	Braeside.
Goddin, Edward	Griffith.
Grant, Joseph	Eganville.
Gilmour, James B.	Braeside.
Gorman Joseph P.	Sault Ste. Marie.
Gordon, Thomas A.	Hall's Bridge.
Gray, Albert H.	Biscotasing.
Gadway, John	Parry Sound.
Garrow, Edward	Webbwood.
Golding, William	Dorset.
Gillies, Harry	White Lake.
Gordon, Herbert C.	Nelson.
Gillespie, M. H.	Cook's Mills.
Griffin, William	Huntsville.
Ganton, David	Trout Creek.
Graham, George L.	Arnprior.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Graham, Frederick S.	Arnprior.	Hall, Charles Asa	Penetanguishene.
Gill, Cuthbert	Orillia.	Hearl, John	Callender.
Graham, James Robert	Kenora.	Howe, Isaac	Fort Frances.
Graham, Thomas Jordan	Byng Inlet.	Halliday, James	Springtown.
Gaudaur, Antoine Daniel	Orillia.	Hurdman, J. A.	Ottawa.
Gorman, Patrick	Eganville.	Hawkins, Stonewall J.	Meldrum Bay.
Guy, Charles	Fort Frances.	Hinchcliffe, William	Gunter.
Graham, George H.	Gillies Depot.	Henderson, Arthur	Baysville.
Greer, George P.	Port Arthur.	Hillis, James M.	Sutton West.
Gill, Charles	Fort Frances.	Harris, Wm., Jr.	Day Mills.
Gamey, William H.	Englehart.	Hogg, W. J.	North Bay.
Gorman, Michael J.	Diver.	Hoxie, E. P.	Katrine.
Grier, Roy B.	Kenora.	Hawkins, Walter	Pembroke.
Greer, Samuel H.	Gore Bay.	Howard, James	Eganville.
Gilbert, Sidney N.	Rainy River.	Howard, William	Baysville.
Guilbeault, A. T.	Klock's Mills.	Hogan, Enos W.	Savanne.
		Horne, John T.	Fort William.
Hale, Thomas	Pembroke.	Hamilton, Chas. E.	Kenora.
Hogan, Albert J.	Sault Ste. Marie.	Henderson, Leonard	Baysville.
Hagen, Edmund G.	Little Rapids.	Hunter, Thos.	Callender.
Hagen, Wilson	Thessalon.	Hamilton, Robert J.	Ottawa.
Hurd, Cyrus	Parry Sound.	Hawkins, William A.	Pembroke.
Henderson, Albert E.	Burford.	Herring, Edward C.	Sebright.
Hale, John B.	Sault Ste. Marie	Hatch, J. W.	Dryden.
Hickerson, Melvin T.	Fort Frances,	Hoard, Wm. Paris	Emo.
Howey, George H.	Fort Frances.	Hartman, W. R.	Blind River.
Hartt, James	Gilmour.	Hill, Ernest L.	Hawkesbury.
Hayes, James	Enterprise.	Hall, Samuel S.	Marmora.
Humphrey, T. W.	Gravenhurst.	Hasleton, Constantine	Killaloe.
Huckson, A. H.	French River.	Hamilton, A. J.	Spragge.
Handley, Robert	Douglas.	Heggart, E. C.	Trout Mills.
Howe, Alexander	Queensborough.	Hunt, Ronald E.	Massey.
Hurd, Edwin	Hurdville.	Hurd, Asahel	Parry Sound.
Huff, J. S. Morris	Arnprior.	Howe, Peter	Fort Frances.
Halliday, Robert J.	Lindsay.	Hammond, Samuel H.	Fort Frances.
Hutton, John	Hutton House.	Hunt, Alex. D.	Pearl River.
Hutchinson, Wm. E.	Huntsville.	Home, John F.	Keewatin.
Hogarth, Joseph Rowan	Pembroke.	Hay, Benjamin	Port Arthur.
Humphrey, John	Gravenhurst.	Hogan, John	Savanne.
Hill, Joshua	Midland.	Hargis, Thos.	Port Arthur.
Hall, David	Lovering.		
Hartley, Charles	Peterborough.	Irving, Thos. H.	Parry Sound.
Hawkins, Henry Chas.	Blind River.	Irwin, Eli	Kenora.
Hines, Philip Wallace	Huntsville.	Irving, Edward C.	Kenora.
Hudson, John Lewis	Combermere.		
Hurdman, William H.	Ottawa.	Johnston, Ralph E.	Port Arthur.
Hughes, John	North Bay.	Johns, Frank A.	Toronto.
Howie, R. G.	New Liskeard.	Jackson, Robert	Brechin.
Helferty, Dennis	Eganville.	Johnson, Finlay	Bracebridge.
Hamilton, Robert	Kenora.	Jones, Albert	Victoria Harbor.
Hoppins, Abiram	Kingston.	Johnson, Thomas	Bobcaygeon.
Hoppins, Densmore	Kingston.	Johnston, Archibald M.	Norman.
Haystead, John	Parry Sound.	Julien, Charles	Trenton.
Henderson, John Irwin	Bobcaygeon.	Junkin, Henry	Marmora.
Hartley, William	Millbridge.	Johns, Frank	Nipissing Junct'n.
Higgins, John C.	Peterborough.	Jessup, Edward D.	Cache Bay.
Harrison, John, Jr.	Pembroke.	Johnson, Frank N.	Ottawa.
Hawkins, E.	La Breton Flats.	Johnston, John	Peninsular Lake
Henderson, Charles	Bracebridge.	Johnson, S. M.	Arnprior.
Halliday, Frank	Parry Sound.	Jones, Frederick James	Flinton.
Hammond, W.	Orillia.	Johnston, William A.	Castleford.
		Jervis, Henry	Wisawasa.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Jones, William	Fenelon Falls.	Lochnan, James	Ottawa.
James, Martin	The Flats.	Link, Henry W	Ottawa.
Johnston, James	Fort Frances.	Ladarotte, John	Arnprior.
Johns, Alexander	Callender.	Lochnan, John	Aylmer, Que.
Jackson, John A	Barwick.	Lozo, John	Trenton.
Johnson, Thomas	Fort Frances.	Loughrin, Lawrence	Pembroke.
Johnston, George N	North Bay.	Linton, J. H	Parry Sound.
Kintree Stuart	Little Rapids.	Ludgate, James	Peterborough.
Kerby, John	Belleville.	Lee, Robert	Huntsville.
Kennedy, Robert	Marmora.	Langford, Mark	Baysville.
Kirby, Louis Russell	Ottawa.	Letherby, Edwin	Midland.
Kennedy, Timothy	Enterprise.	Leahy, Francis M	Chapeau, Que.
Kirk, Henry	Trenton.	Langford, Henry	Baysville.
Knox, Milton	Ottawa.	Lessard, Philip	Kenora.
Kinsella, Michael Pierce	Trenton.	Lovering, William James	Coldwater.
Kitchen, D	French River.	Lane, Maurice	Bobcaygeon.
Kelly, Jeremiah	Sudbury.	Lenton, George	Peterborough.
Kelly, Ferdinand	Mattawa.	Lowe, Thomas A	Renfrew.
Kennedy, T. J	Arnprior.	Livingston, Robert M	Huntsville.
Kenning, Henry	Pembroke.	Londry, William E.	Sault Ste. Marie.
Kirby, D. F	Belleville.	Labelle, James	Waltham, Que.
Kirkpatrick, David	Lindsay.	Labelle, Eli	Waltham, Que.
Kean, John F	Orillia.	Ladurante, J. D	Ottawa.
Kellett, Fred	Keewatin.	Ludgate, Theodore	Peterborough.
Kelly, Michael J.	Baysville.	Lucas, Frank	Sault Ste. Marie.
Kirk, William James	Webbwood.	Lunam, Duncan	Collfield, Que.
Kerr, E. G	Thessalon.	Lott, George	Trenton.
King, Napoleon	Mattawa.	Lawrie, John D	Parry Sound.
Kean, B. F	Orillia.	Lovering, George Francis	Coldwater.
Kemp, Orval Wesley	Trenton.	Lucas, R. G	Christina.
Kirk, Charles Barron	Queensborough.	LeBlanc, Edmund C.	Chapleau.
Kingsland, W. P	Ottawa.	Lavigne, John	Aylmer, Que.
Kerr, John B	Arnprior.	Landell, Charles S	Huntsville.
Kennedy, Walter	Arnprior.	Long, Henry Elisha	Mattawa.
Kennedy, John	Pembroke.	Lynch, W. H	Collingwood.
Knox, Wm. M	Fesserton.	Laplante, Francis	Byng Inlet.
Kingston, Robert	Wisawasa.	Lindsay, James	Arnprior.
Kearnan, Edward	Blind River.	Labelle, Michael	Arnprior.
Kearney, Michael John	Buckingham, Qu.	Legree, John	Dacre.
Kendrick, John	Burk's Falls.	Legree, James L	Calabogie.
Kendrick, John L	Burk's Falls.	Leigh, John Chas	Gravenhurst.
Kennedy, John W	Ottawa.	Lloyd, Edward B	King.
Kelly, James F	Trout Creek.	Lemyre, Bruno	Gravenhurst.
Kauffman, Julias	Blind River.	Lavelle, Charles H	Canoe Lake.
Kennedy, Sylvester	Brule Lake.	Lyons, James	Waltham Sta., Q.
Kernahan, George A	Barwick.	Ledwood, Charles	Ottawa.
Kehoe, Martin	Huntsville.	Levelle, Emrey	Waltham Sta., Q.
Kennedy, Daniel J.	Spanish.	Little, Theo	Kenora.
Kay, Arthur	Norman.	Lehman, Joseph	Stratton Station.
Leannoth, Francis	Arnprior.	Lafare, Mark	Cache Bay.
Lee, James	Warren.	Leach, George	Vermilion Bay.
Lloyd, Alfred	Severn Bridge.	Lott, Angus M	Spanish Mills.
Lawrie, Frank A	Parry Sound.	La Belle, Ambrose	Kenora.
Latimer, Jas.	Frank's Bay.	La Breen, Douglas	Kenora.
Lemyre, Middey	Campbellford.	Lavelle, Michael J	Blind River.
Lutz, Jacob	Parry Sound.	Lyleton, J. E	Parry Sound.
Luby, John E	Ottawa.	Lalor, William J.	Aspdin.
Law, Wm. J	Markstay.	Lalonde, Joseph Maxine	Link.
Lummis, Daniel	Glanmire.	Laderoute, Michael	Arnprior.
Lowe, W. C	Port Arthur.	Leroy, Levi H.	Port Arthur.
Londry, S. C	Sault Ste. Marie.	Lusigneau, Arthur	Pembroke.
		Link, John	Link P.O.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.
Malloy, Mark	Baysville.
Martin, Hugh	Sault Ste. Marie.
Miller, R. O.	Gravenhurst.
Morrison, James	Toronto.
Murray, Frederick	Huntsville.
Menzies, Archibald	Burk's Falls.
Manning, James	Trenton.
Martin, Philip	Stoco.
Malone, Wm. Patrick	Ottawa.
Marsh, Esli Terrill	Trenton.
Miller, John W.	Huntsville.
Muchinbacker, Asa	Rosseau Falls.
Morris, Geo. F.	French Bay.
Murray, George, Jr.	Waubaushene.
Maughan, Joseph	Fort William.
Margach, Wm. J.	Port Arthur.
Murray, George, Sr.	Waubaushene.
Manice, Wm	Peterborough.
Murray, Wm	Kenora.
Morgan, Richard J.	Kenora.
Magee, Thomas Arthur	Kenora.
Murdoch, James	Cook's Mills.
Mulvahill, Wm.	Arnprior.
Murphy, Arthur	Ottawa.
Mayhew, Jacob	Northcote.
Molyneaux, George	Parry Sound.
Milway, Joseph	Fort William.
Mackie, Nathan	Port Arthur.
Milne, Archie	Arnprior.
Murray, James	Peterborough.
Moore, James A. E.	Lakefield.
Merkley, William A.	Ottawa.
Murphy, Hugh R.	Ottawa East.
Murphy, W. J.	Arnprior.
Murray, William	Markstay.
Martin, Edgerton	Markstay.
Mathieson, Archie	Fort Frances.
Moore, Henry R.	Lakefield.
Mickle, Chas S.	Gravenhurst.
Mullen, James	Webbwood.
Morley, A. W.	Winnipeg.
Macdonald, James M.	North Bay.
Money, Harry	Haileybury.
Mather, Allen	Keewatin.
Menzies, Alexander	Sault Ste. Marie.
Munro, Peter P.	Commanda.
Mason, Benjamin	Westmeath.
Monaghan, John B.	Arnprior.
Monaghan, M. J.	Arnprior.
Mulvihill, John	Arnprior.
Moran, Andrew	Rockingham, Qu.
Mulvihill, Michael	Arnprior.
Mann, John	Manitowaning.
Marrigan, Richard	Deseronto.
Monaghan, John Dorland	Deseronto.
Matheson, Wm	Chelmsford.
Munro, Alex. G.	Braeside.
Murphy, Oliver A.	Marksville.
Mellor, Charles	Port Arthur.
Millions, Harry	Gillies' Depot.
MacDonell, R. D.	Biscotasing.
Milne, Fred.	Trout Mills.
Milne, William H., Jr.	North Bay.
Murphy, Dennis	Thessalon.
Mackie, Thomas	North Lake.
Miller, P. H.	Blind River.
Munro, Philip	Braeside.
Mangan, Patrick	Arnprior.
Marcil, Peter	Ottawa.
Main, Samuel	Spanish Station.
Morley, Charles	Huntsville.
Moore, David Henry	Peterborough.
Murphy, John	Arnprior.
Mathieson Daniel	Chelmsford.
Milne, Wm.	Ethel.
Mangan, Charles	Burk's Falls.
Mooney, Lincoln	Orillia.
Mangan, John	Arnprior.
Mooney, Thomas	Kingston.
Mason, Robt. T.	Rochesterville.
Moore, Wm. John	Gravenhurst.
Morrison, Donald	Reay.
Moore, Wm.	Bobcaygeon.
Mutchenbacker, Herman	Rosseau Falls.
Moore, Norman	Arnprior.
Morley, John R.	Kenora.
Mackay, J. A.	Big Forks.
Miller, Robt.	Montreal.
Mackey, Levi Ralph	Keewatin.
Morley, Frank W.	Kenora.
Madden, F. M.	Haileybury.
Miller, Walter E.	Owen Sound.
Murray, Robt.	Berriedale.
Mills, W. J.	Cache Bay.
Martin, Oscar	Buckingham, Que.
Margach, Jas. A.	Kenora.
Murray, Peter	Emo.
McCaw, Joseph E.	Tweed.
McLaren, Peter	Kenora.
McGregor, Colin F.	Kenora.
McKenzie, Robert	Kenora.
McFadyen, A. J.	Bracebridge.
McCaulay, Thos. J.	Goulais Bay.
McDonald, John C.	Spanish Mills.
McKenzie, Alex E.	Ansonia.
McIntyre, John	Arnprior.
McDermott, Thos	Orillia.
McDermott, Jas. E.	North Bay.
McCrindle, Jas.	Sudbury.
McGhie, Chas. S.	Whitestone.
McGenigal, John H.	Whitby.
McCart, Patrick	Arnprior.
McGrath, Thos. B.	Peterborough.
McCormick, James J.	Trenton.
McCarthy, Wm.	Fenelon Falls.
McAvoy, Owen	Campbellford.
McConnell, Lewis	Fesserton.
McMullen, George	Spragge.
McNab, Angus	Burnstown.
McColgan, C. H.	Quyon, Que.
McCallum, Webster	Arnprior.
McFarlane, Robert L.	Warren.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
McCagherty, Robert E....	Westmeath.	McConnachie, Roy Stewart	Huntsville.
McNab, Archie..........	Calabogie.	McDonnell, J. K..........	Kenora.
McDonald, Malcolm......	Spragge.	McDonald, Alex. J.......	Vermilion Bay.
McIvor, J. A............	Fort Frances.	McKay, D. A.............	Rainy River.
McCulloch, M............	Kenora.	McMillan, James.........	Kenora.
McDonagh, Rod..........	Callender.	McPhee, Ronald..........	Bracebridge.
McManus, James.........	Arnprior.	McKay, George Donner...	Dorset.
McKinley, J. H..........	Curran.	McWilliams, Maxwell Theodore.............	Peterborough.
McPherson, Jas. S........	Rama.	McLeod, John............	Keewatin.
McKinley, Edward C.....	Toronto.	McPherson, George	Keewatin.
McClelland, John.........	Parry Sound.	McDougall, John D.......	Kenora.
McFarlane, J. W.........	Cache Bay.	McGregor, Duncan........	Burnstown.
McDonald, Roderick......	Pembroke.	McLean, Peter W........	Sand Point.
McCormack, Wm.........	Pembroke.	McNichol, John..........	Sudbury.
McCreary, William.......	Arnprior.	McInnis, D. E............	Cache Bay.
McCuaig, James C........	Bryson.	McLaughlin, Samuel......	Waubaushene.
McColman, Peter.........	North Bay.	McCollam, John..........	North Bay.
McLeod, James D.........	Gravenhurst.	McManus, John C........	Arnprior.
McCrimmon, N. K........	Blind River.	McLean, John............	Blind River.
McCreary, James, Jr......	Arnprior.	McLeod, Norman.........	Garden River.
McPhee, Hugh............	Byng Inlet.	McLean, James...........	Blind River.
McCudden, James........	Arnprior.	McNally, J. A...........	Desbarats.
McLachlin, J. A.........	Arnprior.	McNab, Alexander.......	Arnprior.
Macpherson, John........	Ottawa.	McFarlane, Alexander....	Renfrew.
McEachren, John A......	Gravenhurst W.	McFarlane, J. D.........	Stewartsville.
McLeod, Dugald..........	Gravenhurst.	McFarlane, Duncan.......	Renfrew.
McClelland, R. H........	Parry Sound.	McKendry, Wm. B.......	Arnprior.
McEvoy, Frank..........	Campbellford.	McPhee, Hugh	Renfrew.
McDermott, Peter	Orillia.	McPhee, John............	Arnprior.
McIlroy, John............	Madoc.	McLachlin, Peter.........	Arnprior.
McNab, Robert J.........	Parry Sound.	McLachlin, Alexander....	Arnprior.
McFadden, James........	Ottawa.	Mackey, Edward.........	Arnprior.
McIntosh, James G.......	Carleton Place.	McEwan, Henry..........	Trenton.
McInnis, Hector D........	Bracebridge.	McDonald, Alfred.........	Peterborough.
McKinnon, Malcolm.......	Bracebridge.	McGeary, John J.........	Sundridge.
McLean, Daniel..........	Bracebridge.	McDonald, Archibald W...	Gilmour.
McKinnon, Archie J......	Bracebridge.	McGaw, John Gillen.....	Queensborough.
McKay, D. C............	Baysville.	McCauley, Barney........	Trenton.
McDonald, James........	Parry Sound.	McDougall, James T.	Klock's Mills.
McPherson, Allan	Longford.	McInenly, Thomas........	Quebec, Que.
McDonald, James P.	French River.	McBride, Archibald.......	Arnprior.
McFarlane, Jos. C........	Port Severn.	McFarlane, Robert L....	Arnprior.
McNabb, Alexander.......	Thessalon.	McGowan, Wm...........	Parry Sound.
McGillivray, Archibald....	Port Arthur.	McLachlin, Norman......	Arnprior.
McGrane, Edward........	Lindsay.	McDonald, Laughlin......	Pendleton.
McLeod, Donald, Jr.......	Keewatin.	McIvor, William J.......	Collin's Inlet.
McDonald, Hector R......	Thessalon.	McKee, John P..........	Sturgeon Falls.
McDougall, Duncan.......	Bracebridge.	McGowan, Thomas	Parry Sound.
McNabb, Alexander D....	Warren.	McDermot, Patrick	South River.
McCormack, John C......	Sudbury.	McKay, Angus...........	South River.
McNamara, John........	Byng Inlet.	McDonald, A. J..........	Longford.
McGillivray, Duncan D....	Algoma Mills.	McInnis, Angus D........	Gravenhurst.
McIntyre, Daniel A......	Klock's Mills.	McKendry, Alexander	Waubaushene.
McNamara, Lewis........	Klock's Mills.	McGuire, Timothy........	North Bay.
McDonald, Sydney C......	Mattawa.	McGrath, John...........	Peterborough.
McGurn, John J.........	Buckingham, Qu.	McWilliams, Jno. Bannon.	Peterborough.
McKeown, Jno. Joseph..	Port Arthur.	McCagherty, Patrick	Westmeath.
McNeel, David...........	Sault Ste. Marie.	McKendry, Daniel........	Arnprior.
McEwan, Andrew.........	Thessalon.	MacDonald, D. F........	Parry Sound.
McCool, Christopher L....	Cartier.	McManus, Thomas J.......	Renfrew.
McCollom, Donald........	Arnprior.	Macfarlane, David R.....	Ottawa.
McDowell, Wm...........	Cache Bay.		

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
McColgan, Edward	Quyon, Que.	Nevison, Herbert	Kenora.
McKay, John	Emo.	Nicholson, John	Owen Sound.
McKinnon, William	Kenora.	Newall, John H.	Parry Harbour.
McKittrick, Frank R. F.	Kenora.	Nolan, John	Gravenhurst.
McMichael, Charles	North Seguin.	Newton, Charles W.	Victoria Harbour.
McIlroy, Thomas Davis	Madoc.	Nent, Charles	Vermilion Bay.
McDonald, Wm. Henry	Trenton.	Needham, John G.	Pakenham.
McGaw, Wm. Thomas	Callender.	Netterfield, David	John's Island
McMillan, L.	Callender.	Nault, James	Fort Frances.
McDermott, John L.	Orillia.		
McDonald, Chas. M.	Pembroke.	Oullette, Joseph P.	Cutler.
McPhee, Benjamin	Pembroke.	O'Neil, Thomas	Bancroft.
McGee, John Edward	Parry Sound.	O'Neill, Daniel H. H.	Arnprior.
Macfarlane, Mack	Arnprior.	O'Leary, Patrick J.	Orillia.
MacCallum, Alexander	Braeside.	Oliver, Charles R.	Fesserton.
McRae, Farquhar	Kenora.	Overend, George J.	Longford Mills.
MacCallum, Albert	Arnprior.	O'Brien, Andrew	Ottawa.
McGonigal, John	Arnprior.	O'Brien, Frank G.	Arnprior.
McConachie, John	Huntsville.	Oliver, J. A.	Fort William.
McKay, D. G.	Kenora.	Owen, W. J.	Wabigoon.
McDonald, James	Peterborough.	O'Connor, John	Hintonburg.
McCulloch, John L.	Lonsdale.	Oliver, Darcy	Wahnapitae.
McConnell, James	Mine Centre.	O'Connor, Wm.	Nosbonsing.
McIntyre, William John	Fort Arthur.	O'Neil, James W.	North Bay.
McDonald, Allen	Big Forks.	O'Donnell, Wm.	Penetanguishene.
McLay, Albert	Devlin.	Owens, Richard	Basin Depot.
McQuarrie, Daniel	Fort Frances.	O'Reilly, Patrick	Cartier.
McNaughton, Daniel	Bracebridge.	O'Neill, Mark	Renfrew.
McCagherty, William E.	Westmeath.	Orrill, John	Trenton.
McDonald, John D.	Mattawa.	O'Neill, Patrick	Bancroft.
McCagherty, Joseph T.	Westmeath.	Orde, Francis W.	Kenora.
McAdam, Arch H.	Quyon, Que.	O'Driscoll, Joseph	Sault Ste. Marie.
McMurphy, Dugald, Jr.	Kenora.	O'Gorman, Peter	Blind River.
McCall, Alfred	Kenora.	Ogden, L. M.	Fort Frances.
McRitchie, William	Kenora.		
McRitchie, Malcolm	Kenora.	Pigott, John	Fitzroy Harbour.
McDonald, John Harold	Rydal Bank.	Paul, Charles A.	Sault Ste. Marie.
McAuley, William Davis	Sault Ste. Marie.	Patinson, Thos.	Bracebridge.
McCallum, Thomas	Fort William.	Price, A. E.	Arnprior.
McWhinney, Fred	Kenora.	Presley, J. F.	Ashton.
McNairney, Hugh H.	Sudbury.	Power, James	Bobcaygeon.
McKelvie, William	Otter Lake Sta.	Patzel, Adolph	Arnprior.
McGovern, Frank	Sault Ste. Marie.	Plaunt, William B.	Eganville.
McCallum, Gordon	Fort Frances.	Plaunt, Joseph	Eganville.
McCallum, Henry	Fort Frances.	Porter, Charles C.	Longford.
McLaughlin, Russell	Spanish Mills.	Preston, R. E.	Kenora.
McAdam, Miner S.	Quio, Que.	Petrie, Geo. A.	Fergus.
McDougall, David A.	Nesterville.	Pomeroy, Peter	Trenton.
McLeod, William A.	Manitowaning.	Perry, Pringle K.	Byng Inlet, N'th.
McKee, D. A.	Wylie.	Purcall, W. G.	Ottawa.
McKay, Norman	Fort Frances.	Purvis, John	Parry Sound.
McIntosh, Wm.	Biscotasing.	Porter, James	Uphill.
McMahon, Edwin	Nesto P.O.	Pearson, John James	Lindsay.
McGowan, Thos.	Parry Sound.	Penney, Chas G.	Cache Bay.
McDonald, Norman	Keewatin.	Pennock, James P.	Hardwood Lake.
McLeod, John C.	Port Arthur.	Purdy, John A.	Uxbridge.
		Playfair, R. J.	Blind River.
Nescott, George	Kenora.	Paterson John	Wahnapitae.
Newton, Frank	Gravenhurst.	Paterson, Alexander	Orillia.
Newburn, Wm	Parry Sound.	Parke, James	Gravenhurst.
Niblett, James	Arnprior.	Parquette, Oliver	Webbwood.
Niblett, Robert	Osceola.	Palmateer, Sherman	Gravenhurst.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.
Paget, George	Huntsville.
Pounder, Joseph	Westmeath.
Pell, Richard D	Arnprior.
Perry, Frederick	Port Arthur.
Paget, Charles Edward	Novar.
Porter, Thos. Robt. Mark.	Dorset.
Pountney, E. J.	Arnprior.
Pyburn, David J	Dorset.
Purdy, Geo	Hintonburg.
Playfair, Andrew Wm	Sault Ste Marie.
Pipe, Taylor	Haileybury.
Pipher, George E	Mowat.
Pendee, David	Parry Sound.
Piper, A. J	Blind River.
Paget, Alfred H	Ahmic Harbour.
Powers, John J	Trout Mills.
Pigott, William D	Fitzroy Harbour.
Potts, Cyril	North Lake.
Pilkey, William	La Vallee.
Pointer, Roy R.	Pembroke.
Piper, Roy	Blind River.
Quinn, William	Peterborough.
Quigley, Hugh	Penetang.
Quirk, Thomas J	Petawawa.
Quance, Louis F	Berriedale.
Robertson, D	Kenora.
Richardson, Fred'k George	Trenton.
Richards, Richard	Tamworth.
Riddell, Geo. Alexander	Rochesterville.
Robertson, Lewis McLean.	Dunchurch.
Robinson, Wm. F	Bobcaygeon.
Reamsbottom, Wm.	Mattawa.
Richey, Evan	Brentwood.
Randall, Lewis G	French River.
Richardson, Chas. Marvyn	Trenton.
Rochester, Daniel Baillie.	Ottawa.
Riddell, James	Ottawa.
Rice, Asa S	Hull, Que.
Roberts, T. A	Huntsville.
Ross, Andrew	Longford Mills.
Rose, Donald M	Kenora.
Rawson, Charles Edward.	Coldwater.
Ross, George	Waubaushene.
Roberts, Percy T	Keewatin.
Ritchie, Wm. D	Little Current.
Ramsay, Robert	Arnprior.
Ritchie, J. F	Arnprior.
Ritter, Samuel G	Ahmic Harbour.
Rothera, Charles F	Sturgeon Falls.
Ryan, Alfred	Byng Inlet.
Rogers, Fred	Sault Ste. Marie.
Reid, George William	Fort Frances.
Robertson, John A	Kenora.
Robinson, Wm	Bobcaygeon.
Reid, Joseph B	Lindsay.
Ross, Walter M	Ottawa.
Ruttle, H. A	Carleton Place.
Richards, Benedict	Ottawa.
Regan, John	Orillia.
Russel, Wm	Pembroke.
Ramsay, Charles	Sudbury.
Russell, Corsan L	Pembroke.
Richards, Henry	Dacre.
Ryan, Wm	Killaloe.
Reid, John P	Spanish Mills.
Ridley, Robert	New Liskeard.
Riley, Charles W	Hutton House.
Raymond, Morris T	Spanish Mills.
Rooney, Wm. H	Campbellford.
Revell, J. O	Dryden.
Rankin, Anthony	Cache Bay.
Ross, Angus	Orrville.
Robinson, Albert E	Washago.
Robinson, Edward	Washago.
Robinson, Thomas G.	Washago.
Raycroft, William T	Sarnia.
Roberts, Ivor M	Garden River.
Revell, Lionel Oliver	W. Gravenhurst.
Regan, Judd Patrick	Orillia.
Robins, Etna Rosedale	Orillia.
Regan, John, Jr	Orillia.
Ryan, James	Savanne.
Rusk, Oscar W	Cache Bay.
Robinson, Thos. Geo	Bracebridge.
Rooksby, Wm	Campbellford.
Ramesbottom, Robt	Byng Inlet.
Roy, Lewis	Arnprior.
Riddell, Horace A	Galetta.
Rowan, A. L	Sault Ste. Marie.
Ritchie, James A	Spragge.
Ross, George Joseph	Schrieber.
Rowe, Frank E	Hymers.
Regmibal, J. Hector	Larchwood.
Reid, William T.	Fort Frances.
Ross, Sidney	Fort William.
Smith, M. D	Fort William.
Scanlan, William	Enterprise.
Sutherland, D. H	Gravenhurst.
Spanner, John	Huntsville.
Shier, James D	Bracebridge.
Spooner, W. R	Katrine.
Simpson, Alfred E	Wakefield.
Souliere, John B	Ottawa.
Shields, James A	Carleton Place.
Spargo, George	Ottawa.
Smyth, W. H	Baysville.
Salmon, R. H	Byng Inlet North
Salmon, Alexander C	Baysville.
Stremer, A	Ottawa.
Shields, Frank A	Parry Sound.
Stapleton, John J	Ogidakie.
Sloan, William H	Fort Frances.
Smyth, Job E	Cache Bay.
Sage, Nelson	Muskoka Mills.
Seymour, Edward	Whitefish.
Shaw, Thomas B	Waubaushene.
Swanston, James	Peterborough.
Simpson, William	Hall's Bridge.
Sadler, Thomas	Lindsay.
Smith, Patrick Albert	Norman.
Snaith, William J.	Mattawa.

List of Persons holding Cullers' Licenses.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Sinn, William F.	Arnprior.	Swallow, C. H.	Day Mills.
Sheppard, Wm. Joseph	Waubaushene.	Strave, A. M.	Mine Centre.
Spears, Milton B.	Barry's Bay.	Stewart, John	Fort Frances.
Stevenson, Arthur	Peterborough.	Sullivan, George L.	Rainy River.
Stein, Paul	Sault Ste. Marie.	Short, James	Kenora.
Shaw, Alfred	Thessalon.	Shaw, Fred. Jason	Thessalon.
Sequin, Napoleon	Spanish Station.	Short, Chas. J.	Kenora.
Scrim, Robert	Arnprior.	Smith, David H.	Sudbury.
Sharp, James A.	Sudbury.	St. Hillaire, George	Arnprior.
Shaneay, Harry S.	Cook's Mills.	Souliere, Joseph C.	Cutler.
Smith, Wm.	Ottawa.	Scott, J. C.	Fort Frances.
Stewart, Daniel	Braeside.	Stewart, Frank E.	Crozier.
Sheehan, Michael H.	Waubaushene.	Sanders, Edward	Barwick.
Smith, Sydney H.	Bracebridge.	Spence, William	Arnprior.
Stewart, James A.	Pembroke.	Scott, Allan A.	Norman.
Sproule, Newton H.	Schomberg.	Souliere, Max	Spanish Mills.
Simmons, Alex	Port Arthur.	Stewart, David	Cache Bay.
Scott, Thomas	Parry Sound.	Shaw, Donald	Keewatin.
Smith, Lawrence	W. Saginaw, Mich.	Smyth, C. W.	Fort Frances.
Shea, Stewart	Campbellford.	Stewart, Jas. Max	Winnipeg, Man.
Sullivan, John	Sault. Ste. Marie.	Stewart, Russell C.	Winnipeg, Man.
Sinclair, Finlay	Sudbury.	Sisson, Heber P.	Hymers.
Shiels, Henry F.	Cartier.		
Smith, Gideon Ousley	Burk's Falls.		
Smith, John Wallis	Thedford.		
Smith, Henry G.	Arnprior.	Taylor, Fred. L.	Parry Sound.
Story, John A.	Ottawa.	Thomas, Griff J.	Thessalon.
Sweezy, Benjamin	Massey.	Thomson, R. D.	Biscotasing.
Sheppard, Charles H.	Coldwater.	Tait, Thomas B.	Burk's Falls.
Seabrook, Alex.	Fabre P.O.	Taylor, C. M.	Gravenhurst.
Spreadborough, Newlands	Little Current.	Thornton, W. D.	Longford Mills.
Sheffield, George	Chapleau.	Trussler, Gilbert	Trout Creek.
Sanders, William J.	Sudbury.	Thompson, Geo. S.	Lindsay.
Sinclair, Armon D.	Arnprior.	Thompson, Fred. A. H.	Nosbonsing.
Smith, Sidney E.	Ottawa.	Thompson, Francis Hy.	Nosbonsing.
Sleeman, Wm.	Rapid River.	Train, A. C.	Rowan Mills.
Sheehan, Peter F.	Loring (canc'l'd).	Turgeon, Geo.	Cook's Mills.
Sleeman, Geo.	Rapid River.	Thayer, Wm.	Sault Ste. Marie.
Sims, Wm. K.	Sault Ste. Marie.	Thompson, Alexander W.	Arnprior.
Skahill, Wm.	Blind River.	Taylor, Thos. G.	Gravenhurst.
Shaw, George	Thessalon.	Trowse, A.	Arnprior.
Sarsfield, George Francis	Sault Ste. Marie.	Tucker, Louis A.	Fort Frances.
Standish, Wm. H.	Batchawaning (Bay	Thompson, Daniel	P'rt'ge du F'rt, Q.
Simpson, Wm. A.	Lakefield.	Thompson, Richard	Kenora.
Scollard, Wm.	Young's Point.	Thompson, Joseph H.	Bracebridge.
Shuttleworth, Alma	Trout Creek.	Taylor, Edward A.	Westmeath.
Shanacy, Wm. J.	Spragge.	Tait, Ralph	Arnprior.
Seely, George	Arnprior.	Train, William	Burk's Falls.
Stewart, Alex. W.	Lanark.	Turner, Garvin F.	North Bay.
Soreny, Wm.	Braeside.	Tilson, Joseph	Burk's Falls.
Schneder, Frederick	Cache Bay.	Tuffy, John	Cartier.
Smith, James D.	Kenora.	Thorpe, Thomas	Pembroke.
Sullivan, James	Aylmer.	Taylor, Charles E.	Gravenhurst.
Scully, Cornelius	Whitney.	Tench, Arthur	Hekkla.
Savoy, Eutrope	North Bay.	Tulloch, William A.	Sault Ste. Marie.
Smith, Walter J.	Campbellford.	Taylor, Alex. M.	Burnstown.
Seymour, John J.	Whitefish.	Toner, J. A.	P'rt'ge du F'rt. Q.
Smith, Alex. R. C.	Burk's Falls.	Thrasher, Henry G.	Pembroke.
Stewart, Richard M.	Chelsea, Que.	Tooke, Frank	Bala.
Souliere, John H.	Canoe Lake.	Thorburn, Donald James	Thessalon.
Smith, Abraim G.	Quyon, Que.	Tetreault, Philias	Tomiko.

List of Persons holding Cullers' Licenses.—*Concluded.*

Name.	P. O. Address.
Tibbets, L. R.	Fort Frances.
Tichborne, A. C.	Fort Frances.
Thomson, Donald	Arnprior.
Udy, Dean	French River.
Urquhart, Elias	Gravenhurst.
Urquhart, Andrew	Barrie.
Vigrass, Percy J.	Dufferin Bridge.
Vincent, Joseph	Warren.
Vollin, Samuel	Nosbonsing.
Vannier, Nelson Joseph	Bobcaygeon.
Vincent, James	Fesserton.
Vincent, Henry T.	Port Sidney.
Vanderburg, Norman	Wisawasa.
Valois, Armand	Mattawa.
Villiers, Claude	Parry Sound.
Vanier, John	Sault Ste. Marie.
White, Thomas S.	Bracebridge.
White, A. Thomson	Pembroke.
Watt, R. A.	Spanish.
Wilkins, Hughes	Blind River.
Wallace, T. William	Blind River.
White, Joseph W.	Bracebridge.
Watson, William	Huntsville.
Webb, George W.	Parry Sound.
Wilcox, Thomas	Parry Sound.
Wheeler, J. A. McL.	Tamworth.
Widdifield, C. H.	Pine Orchard.
Whitmore, Edgar	Rosseau Falls.
Wright, L. B.	Sault Ste. Marie.
Ward, Joseph W.	Ottawa.
Wilkinson, W.	French River.
Waldie, John E.	Victoria Harbour.
Wigg, Thomas G.	Thessalon.
Wall, Patrick B.	Cheboygan, Mich.
Wells, John R.	Little Current.
Whiteside, John	Huntsville.
Watt, William	Peterborough.
Wilson, George	Lindsay.
White, Thomas	Parry Sound.
Wood, William D.	Sault Ste. Marie.
Watts, John J.	Fort Frances.
Webster, George F.	Fort Frances.
Wright, Percy	Fort Frances.
Watts, William B.	Fort Frances.
Watson, William	North Bay.
Wagner, Fred	Kenora.
Wainwright, Edward C.	Huntsville.
Wilson, Wm. James	Deseronto.
Weston, Frank R.	Midland.
White, James B.	Manitowaning.
Warren, Robert M.	Cache Bay.
Wilson, George A.	Balsam Hill.
Welch, Harold	Milberta.
Wilson, James A., Jr.	Webbwood.
Woods, John R.	Antrim.
Wardell, Ernest C. S.	Victoria Harbour.
Woods, Joseph F.	Roach's Point.
Whaley, Thomas	Huntsville.
Webster, Wm. Alfred	Bracebridge.
Wornsdorf, Fred. Gutlep	Pembroke.
Warrell, Wm.	Trout Creek.
Wims, Peter	Blessington.
Wickware, Philip Almont.	Cloyne.
Wilson, Edward	Deseronto.
Whelan, P. J.	McDougall.
Whyte, John Thos. Goth.	Ottawa.
Watterworth, J. A.	Sault Ste. Marie.
White, Wm. James	Muskoka Falls.
Warrell, George	Powassan.
Wells, George W.	Little Current.
Wilson, Frederick Gould	Kenora.
Wallace, John Thomas	Thessalon.
Wilkins, George N.	Baysville.
Wylie, Byron M.	Webbwood.
White, Allan	Pembroke.
Warner, Franklin H.	Fort Frances.
Watts, George	Fort Frances.
Wood, Thomas	Parry Sound.
White, William	Peterborough.
Woods, A. L.	Kenora.
White, John B.	Kippewa, Que.
Whelan, Peter M.	Renfrew.
Wilson, David	Kearney.
Weston, Cecil	Dorset.
Wilkins, George E.	Dorset
Woodcock, Edward	Brownhill.
Wilson, Fred.	Callender.
Wilson, Alexander R.	Thessalon.
Webster, Henry R.	North Lake.
Wallace, Fred. R.	Port Arthur.
Wallace, Clayton	Blind River.
Wilson, Russell	Pembroke.
Wheeler, George	Barwick.
Wall, G. L.	La Vallee.
Williams, Edward R.	Port Arthur.
Younge, Harvey D.	Fort Frances.
Young, R. H.	Fort Frances.
Yuill, John Albert	Braeside.
Young, William	Severn Bridge.
Young, A. J.	Cache Bay.
Young, Samuel	Coldwater.
Young, Patrick P.	Young's Point.
Young, Francis G.	Young's Point.
Yuill, Thomas	Arnprior.
Yuill, A. D.	Braeside.
Young, C. T.	Harvey.
Yuill, John Alex.	Arnprior.
Yuill, Archibald	Bracebridge.
Yuill, William	Braeside.
Young, Walter D.	Whitefish.

Total, 1,448.

AUBREY WHITE,
Deputy Minister.

TWENTY-FIRST ANNUAL REPORT

OF THE

BUREAU OF MINES, 1912,

BEING

VOL. XXI., PART I.

CONTENTS:

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY OF ONTARIO

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CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (*continued*).

SKETCH MAPS AND PLANS

SHEET MAPS ACCOMPANYING REPORT

LETTER OF TRANSMISSION

To His Honour Sir John Morison Gibson, Etc., Etc., Etc.,
Lieutenant-Governor of the Province of Ontario.

Sir,—I have the honour to transmit herewith, for presentation to the Legislative Assembly of the Province of Ontario, the Twenty-first Annual Report of the Bureau of Mines.

I have the honour to be, Sir,

Your obedient servant,

W. H. Hearst,
Minister of Lands, Forests and Mines.

Department of Lands, Forests and Mines.
Toronto, 18th March, 1912.

INTRODUCTORY LETTER

To The Honourable William Howard Hearst,
Minister of Lands, Forests and Mines.

Sir,—I beg to hand you herewith, to be presented to His Honour the Lieutenant-Governor in Council, the Twenty-first Annual Report of the Bureau of Mines, in two Parts.

Part I reviews the condition of the mining industry of Ontario for the calendar year 1911, and in a series of statistical tables shows the growth and development of its various branches. The aggregate output of minerals and mineral products is shown to have been larger in value than in any previous year, exceeding that of 1910, previously the largest, by $2,662,902. Several years ago Ontario assumed the first place among the confederated Provinces in the value of metallic products, and this position is still easily maintained. The principal metals of production are silver, nickel, pig iron and copper. Out of every seven ounces of silver raised from the mines of the world, one comes from Cobalt. Sixty-five or seventy per cent. of the world's consumption of nickel is derived from the mattes of Sudbury. In minor products, cobalt oxide made from the Cobalt ores now practically supplies the whole of the European and American trade. Arsenic from the same source; mica from Eastern Ontario (and Quebec), and corundum from Hastings and Renfrew counties, contribute largely to the trade in these respective substances on this continent. There are indications that gold will also soon move up from a subordinate position on the list of Ontario's metals to a more important one. In other departments of the industry the changes going on are noted in the Report. Petroleum continues to decline in yield, and natural gas to increase. The production of iron pyrites is greater than formerly, and the potential output is large. The same is true of feldspar, and the marbles of the Bancroft area are by their beauty and variety of colour, and the large sizes which can be obtained from the quarries, rapidly winning favour in decorative construction work. The revenue obtained by the Government from mining sources is analyzed in some detail, and other departments of administrative work are dealt with.

Mining Accidents form the subject of a report by Mr. E. T. Corkill, Chief Inspector of Mines, who also describes the working mines and quarries under the title "Mines of Ontario."

According as new discoveries are made and new mineral fields opened up, public interest is concentrated now upon one mineral, now upon another. At one time it is nickel, at another iron, and again it is silver. The finds of gold at Porcupine have called attention to this metal and to other portions of the Province where it is known to exist. The present Report deals with a number of these districts.

Mr. Arthur L. Parsons, who reported in the Twentieth Annual volume on the Gold Fields of Lake of the Woods, Dryden and Manitou, was in the same field during the summer of 1911, and makes a second report under the above title.

The geology and mineralogy of the Porcupine Gold Area were described by Mr. A. G. Burrows in Part II of the Twentieth Report (1911). This area was again visited by Mr. Burrows last year, and his report is republished in the present volume, considerably enlarged, and accompanied by a more extended and detailed geological map.

Mr. W. R. Rogers describes at greater length the Water Powers in the Porcupine Area which were mentioned more briefly in last year's volume. The Swastika Gold Area, and the Cripple Creek Gold Area, are briefly described by Mr. E. L. Bruce and Mr. W. R. Rogers respectively; Mr. R. B. Stewart makes a preliminary report upon the West Shining Tree Gold District, and a few notes are given by Mr. Percy E. Hopkins on the Gold finds in McArthur Township. The volume concludes with Notes on the Geology of the Detroit River Area by Rev. Thos. Nattress of Amherstburg.

Part II brings together all available information, derived mainly from the Annual Reports of the Geological Survey of Canada, on the District of Patricia, newly added to the Province of Ontario. The resources of this District are dealt with under appropriate headings, and there is an Introduction and Summary of Contents by Professor Willet G. Miller, Provincial Geologist, who compiled the contents of this Part. A map of the District of Patricia accompanies the Report.

I have the honour to be, Sir,

Your obedient servant,

Thos. W. Gibson,

Deputy Minister of Mines.

Department of Lands, Forests and Mines.
Toronto, 18th March, 1912.

REPORT OF THE BUREAU OF MINES 1912

VOL. XXI PART I

STATISTICAL REVIEW

By Thos. W. Gibson, Deputy Minister of Mines

The Mining Act of Ontario (section 170) requires the owners or operators of all mines and mineral works in the Province to make returns to the Bureau of Mines, showing the quantity and value of the minerals produced during the year, and to give such particulars, as to number of employees, wages paid, etc., as are necessary for statistical purposes. Returns made in pursuance of this provision show that the mineral production for the year 1911 had a value of $41,976,797, which is an increase, as compared with the previous year, of 6.7 per cent. During the six years, ending with 1911, the annual production increased by 87 per cent.

Much the larger proportion of the output is now of metallic substances; last year, 70 per cent. of the value was of this character, 30 per cent. being non-metallic. Taken as a whole, the metallic list shows a small increase over 1910, about 3 per cent. There was a falling off in nickel of $341,487, in copper of $92,985, in iron ore of $67,791, and in gold of $25,861; but these decreases were more than offset by an enlarged production of silver by $472,573, and of pig iron of $740,896.

In the non-metallic products, petroleum declined by $14,580, lime by $72,191, mica by $42,236, calcium carbide by $99,886, and corundum by $24,836. On the other hand, natural gas increased in value by $695,523, iron pyrites by $20,104, gypsum by $14,710, Portland cement by $496,299, common brick by $427,684, and stone by $131,501. With the exception of lime, all construction materials were produced in larger quantity and greater value. The same is true with regard to all clay products used for other purposes, save pottery. Seven substances contributed 88.1 per cent. of the total value, as follows: Silver, 38 per cent.; pig iron, 18 per cent.; nickel 8.7 per cent.; Portland cement, 8.6 per cent.; common brick, 6.6 per cent.; natural gas, 5.2 per cent.; and copper, 3 per cent. The remaining 11.9 per cent. was divided as follows: Other metals, 1.6 per cent., clay products (other than common brick) 3.5 per cent., miscellaneous non-metallic materials 6.8 per cent.

While the past year was not one of sensational discoveries or the opening up of new and important mineral fields, it was one of steady progress and active production. The silver mines of Cobalt touched high-water mark, the nickel-copper deposits of Sudbury were but little behind in their output that of 1910 (the largest yet), the natural gas fields yielded nearly 50 per cent. more than last year, the blast-furnaces turned out more pig-iron, the brick and tile yards more brick and tile, the quarries more stone, and the long list of lesser industries concerned in the production of other materials were, in general, more busily employed. At least one promising mineral area has been revealed by the untiring prospector—that at West Shining Tree Lake—where free gold has been found in some large bodies of quartz. It should also be mentioned that two metals, one of them hitherto quite unknown in Ontario, and the other practically so, were added to the list of minerals. For the first time in the Province mercury was recognized, being found at the Nipissing mine associated with some of the richer silver ores. The other was tungsten, which, in the form of scheelite, was identified by Mr. A. G. Burrows, of the Bureau of Mines geological staff, in vein matter at the Jupiter gold mine, Porcupine. The only previous mention of this metal in the Province was by the late Prof. Chapman, who detected wolframite in a boulder on Lake Couchiching many years ago.

The following table gives the mineral production for the year, and, in addition, the number of employees and the amount of wages paid in the several branches of the industry.

Table I.—Mineral Production of Ontario, 1911

Product.	Quantity.	Value.	Employees.	Wages.
Metallic:		$		$
Gold ... ounces	2,185	42,637	597	442,519
Silver ... "	31,507,880	15,953.895	3.555	2,977,721
Cobalt ... tons	853	170,890	(a)	(a)
Nickel ... "	17,441	3,664,474	2,439	1,830,526
Copper ... "	8,966	1,281,118		
Iron ore ... "	175,631	445,930	685	348,062
Pig iron ... "	526,610	7 716,314	3,633	2,927,573
		29,275,258	10,909	8.526.401
Less Ontario iron ore (67,631 tons) smelted into pig iron ...	...	172.391		
		29,102,867		
Non-metallic:				
Arsenic ... tons	3,806	74.609	(a)	(a)
Brick, common ... No.	354,546,000	2,801,971	3,149	1,320,677
Tile, drain ... "	21,630,000	349,545		
Brick, paving ... "	4,522,400	86,685	505	271,343
" pressed ... "	52,763,914	564,630		
Building and crushed stone ...	...	892,627	1,152	516.643
Calcium carbide ... tons	1,383	84,437	50	18 497
Cement, Portland ... bbl.	3.010,849	3,640,642	1,471	898,256
Corundum, ... Tons	1,471	147,158	199	124,491
Feldspar ... "	17,697	51,610	76	26.580
Fluorspar ... "	30	200	...	...
Graphite, refined ... "	894	36,492	55	33,774
Gypsum ... "	20.335	32,535	100	10.000
Iron pyrites ... "	43,629	118,457	172	114,655
Lime ... bush.	2,469,773	402,340	343	148,078
Mica ... tons	322	43.058	60	24,782
Natural gas ...	...	2,186,762	287	183,663
Peat ... tons	1,180	2,830	21	2,964
Petroleum ... Imp. gal.	10.102,081	353,573	511(b)	314,851(b)
Phosphate of lime ... tons	20	240	1	262
Pottery ...	...	50,500	38	16,752
Quartz ... tons	56,723	64,405	110	40,459
Salt ... "	88.689	430,835	216	121,477
Sewer pipe ...	...	410.064	250	126,099
Talc, ground ... tons	5,404	47,725	38	17,530
		12,873.930	8,804	4,331,833
Add metallic production ...	...	29,102,867	10.909	8,526.401
Total production ...	...	41,976,797	19,713	12,858,234

(a) Included in statistics for silver. (b) Refining works only.

The fluctuations of production among the several items, as compared with 1910, are shown in the following table:—

Table II.——Comparative Value Mineral Production, 1910 and 1911

Product.	1910.	1911.	Change. (I) Increase. (D) Decrease.	
Metallic:	$	$		$
Gold	68,498	42,637	D	25.861
Silver	15,481,322	15.953,895	I	472,573
Cobalt	54,699	170.890	I	116.191
Nickel	4,005.961	3,664,474	D	341,487
Copper	1.374,103	1,281,118	D	92,985
Iron ore	513,721	445,930	D	67,791
Pig iron	6,975.418	7,716,314	I	740,896
Zinc ore	5,760	....	D	5,760
Non-metallic:				
Actinolite	320	....	D	320
Arsenic	70,709	74,609	I	3,900
Brick, common	2.374,287	2,801,971	I	427,684
" paving	70.648	86,685	I	16,037
" pressed	458,596	564,630	I	106,034
Building and crushed stone	761.126	892,627	I	131,501
Calcium carbide	184.323	84,437	I	99.886
Cement, Portland	3,144.343	3,640.642	I	496.299
Corundum	171,994	147.158	D	24,836
Feldspar	47.518	51,610	I	4,092
Fluorspar	15	200	I	185
Graphite	55,637	36,492	D	19,145
Gypsum	17,825	32,535	I	14,710
Iron pyrites	98,353	118,457	I	20,104
Lime	474,531	402,340	D	72.191
Mica	85,294	43,058	D	42,236
Natural gas	1,491,239	2,186.762	I	695,523
Peat	1,284	2.830	I	1,546
Petroleum	368,153	353,573	D	14,580
Phosphate of lime	....	240	I	240
Pottery	51,485	50.500	D	985
Quartz	87,424	64,405	D	23,019
Salt	414,978	430,835	I	15,857
Sewer pipe	357.087	410,064	I	52,977
Talc	46,592	47,725	I	1,133

The figures presented in Table III., which follows, reflect the advance which the mining industry of the Province has been making during the past five years, both in the gross and in its various branches. It will be seen that the output of metals has increased by 100 per cent., and of the total production by about 68 per cent. Silver, nickel and pig iron have risen rapidly; so have natural gas and Portland cement. Copper, clay products generally, stone, arsenic, iron pyrites and talc, also show substantial progress. Gold and iron ore, judging from the table only, exhibit a tendency to diminish rather than increase, but there are grounds for believing that this tendency is not likely to persist. Lime and petroleum are declining, and apparently quartz also. A few substances, such as mica, pottery and salt vary little from year to year. One or two others, such as corundum and carbide of calcium, show sudden and sharp fluctuations. On the whole, however, the record is one of steady and satisfactory growth. Many of the products, it may be added, exist in large quantity, and are capable of responding readily to any increase in demand.

Table III.—Mineral Production, 1907 to 1911.

Product.	1907.	1908.	1909.	1910.	1911.
Metallic:	$	$	$	$	$
Gold	66,399	60,337	32,445	68,498	42,637
Silver	6,157,871	9,136,830	12,464,722	15,481,322	15,953,895
Cobalt	92,751	111,118	94,965	54,699	170,890
Copper	1,045,511	1,071,140	1.127,015	1,374,103	1,281.118
Nickel	2.271,616	1,866,059	2,790,798	4,005,961	3,664.474
Iron ore	482,532	574,839	645,622	513,721	445,930
Pig iron	4,716,857	4,390,839	6,301,528	6,975,418	7,716,314
Zinc ore	....	....	8,950	5,760	....
	14,833,537	17,211,162	23,466,045	28,479,482	29,285,258
Less value Ontario iron ore smelted into pig iron	282,702	456,176	537,549	317,804	172,391
Net metallic production	14,550,835	16,754,986	22,928,496	28,161,678	29,102,867

Table III.—Continued

Product.	1907.	1908.	1909.	1910.	1911.
Non-metallic:	$	$	$	$	$
Actinolite	....	....	....	320	....
Arsenic	40,104	40,373	61,039	70,709	74,609
Brick, common	2,109,978	1,575,875	1,916,147	2,374,287	2,801,971
" paving	73,270	61,554	73,700	70,648	86,685
" pressed	648,683	485,819	490,571	458,596	564,630
Building and crushed stone	675,000	530,041	660,000	761,126	892,627
Carbide of calcium	173,763	147,150	151,676	184,323	84,437
Cement, natural rock	5,097	....	....	....	....
" Portland	2,777,478	2,417,769	2,897,348	3,144,343	3,640,642
Corundum	242,608	11,437	140,817	171,994	147,158
Feldspar	30,375	20,300	36,204	47,518	51,610
Fluorspar	....	....	....	15	200
Graphite	20,000	1,600	37,624	55,637	36,492
Gypsum	19,652	20,778	23,604	17,825	32,535
Iron pyrites	51,842	69,980	78,170	98,353	118,457
Lime	418,700	448,596	470,858	474,531	402,340
Mica	82,929	73,586	73,124	85,294	43,058
Natural gas	746,499	988,616	1,188,179	1,491,239	2,186,762
Peat fuel	1,040	900	240	1,284	2,830
Petroleum (crude)	1,049,631	703,773	559,478	368,153	353,573
Phosphate of lime	....	7,048	1,904	....	240
Pottery	54,585	50,310	43,214	51,485	50,500
Quartz	124,148	52,830	75,329	87,424	64,405
Salt	432,936	488,330	389,573	414,978	430,835
Sewer pipe	435,088	344,260	311,830	357,087	410,064
Sodalite	....	....	....	....	....
Talc	5,010	3,048	8,700	46,592	47,725
Tile, drain	250,122	338,658	363,550	318,456	349,545
Total non-metallic production	10,468,538	8,882,631	10,052,879	11,152,217	12,873,930
Add metallic production	14,550,835	16,754,986	22,928,496	28,161,678	29,102,867
Total production	25,019,373	25,637,617	32,981,375	39,313,895	41,976,797

The history of mining in this Province begins with the days of the early settlers, who made shift to smelt the bog iron ores and outcroppings of magnetite into stoves and potash kettles, and an interesting narrative could be written showing how the industry has developed step by step as one useful mineral or rich mining field after another has been discovered, often by accident, sometimes after careful and patient search. The records of actual mining operations carried on before systematic collection of statistics of production was begun, are not now full or complete enough to afford exact information as to results. In a previous volume[1] the best available figures were presented, showing the output of metals and metallic ores since mining began in Ontario, and in Table IV., given below, these figures are brought down to the end of 1911.

Table IV.—Total Production of Metals in Ontario

Product.		Quantity.	Value.
			$
Gold	oz.	165.521	2,620,627
Silver	"	130,371,791	79,504,371
Platinum and Palladium	"	3,364	62,784
Cobalt	tons	6,068	756,360
Nickel	"	136,114	36,276,303
Copper	"	108,064	15,655,221
Iron ore	"	3,356,287	6,485,501
Pig iron	"	3,182,715	49,191,732
Lead ore	"	3,351	20,000
Pig lead	"	1,143	96,000
Zinc ore	"	7,704	92,410
Total		....	190,761,309

The total as given above is subject to a slight deduction, due to its including not only iron ore but also pig iron, into which some portion of it was doubtless smelted; but, after making allowances of this sort, the aggregate value cannot be less than one hundred and eighty million dollars.

[1] 19th Rep. B.M., 1910, Part I., p. 9.

Gold

Bullion was produced at fourteen properties last year, from none of them in large quantity. The principal contributor was The Canadian Exploration Company at Long lake. At Porcupine the Hollinger and Vipond mines operated small test mills previous to the fire, and the Dome recovered considerable gold in the laboratory. Other producers were the Kenora (formerly Mikado) and Olympia, both at Shoal lake; St. Anthony (Sturgeon lake); American Eagle and Detroit Syndicate, in Munro township; Gold Pyramid, in Guibord township; Swastika; Havilah (formerly Ophir); Dr. Reddick (Larder lake), and the Tingley prospect (Pelican lake). The number of men employed at the foregoing mines was 597, to whom wages were paid amounting to $442,519. It is evident from these figures that most of the labour was employed in development and construction work.

The revival of interest in gold mining caused by the discoveries at Porcupine and the developments now under way there has put new life into a number of the older fields, which for years have lain dormant.

In eastern Ontario the Belmont or Cordova mine, situated in the county of Peterborough, near the border line of Hastings county, is being unwatered and put in shape for a resumption of operations. There are a number of quartz veins on this property, some of them of large size, and the mill is equipped with thirty stamps.

The Elizabeth mine, on locations F M 171 and 172, Steep Rock lake, has been leased from Mr. W. H. Nelson, of Port Arthur, by the Elizabeth Gold Mining Company. Operations began on 1st May, 1911, consisting of pumping out the old shaft, and erecting a boiler house and 10-stamp mill. It was expected that the latter would be at work about 1st May, 1912.

The St. Anthony mine at Sturgeon lake was operated during the year by the Sturgeon Lake Development Company. Much work was done in the way of refitting the mine and stamping plant, which had lain idle for several years, and in thoroughly testing the ore bodies at various points. Only a small quantity of ore was actually treated, but the new owners are looking forward to a period of active gold production. The construction of the Transcontinental railway has greatly facilitated the conveyance of freight into Sturgeon lake, and to this extent has benefitted the mining industry there.

The gold area at Swastika, on the Temiskaming and Northern Ontario railway, near the northern boundary of Otto township, is being tested by the operations at the mine of the same name. Here a stamp mill has been put up, and fairly extensive underground workings made. There are other prospects in the same locality now also being opened up.

In Munro and Guibord townships the work in progress at the American Eagle, Detroit Syndicate and other properties will tend to show what may be expected from the auriferous veins of that neighbourhood. The low-grade bodies at Larder lake have not yet produced much gold, but there are prospects that some of the properties being exploited here may eventually prove to be mines.

It is, however, unnecessary here to discuss at further length the various camps where gold is being obtained or sought after, including Porcupine itself, since they are fully described in the report of Mr. E. T. Corkill, Chief Inspector of Mines, in this volume. The newest field of all is West Shining Tree lake, in the Temagami Forest reserve, where free gold was found last summer in bodies and under conditions resembling those at Porcupine. This area forms the subject of a report by Mr. R. B. Stewart, which will be found in this volume, accompanied by a map illustrative of the geology.

Silver

The quantity of silver produced last year was 31,507,880 fine ounces, for which the mine-owners received a total of $15,953,895. This compares with an output for 1910 of 30,651,417 ounces, worth $15,481,322, being an increase in quantity of 856,463 ounces, and in value of $472,573. The entire production was from the mines of Cobalt and its subsidiary camps, South Lorrain and Gowganda, with the exception of 89 ounces recovered from the bullion of gold mines. From the time of their opening in 1904, the Cobalt mines have had a total output of almost 126 millions of ounces, worth over 64 millions of dollars.

The Producing Mines

The number of producing mines was 34, counting as one mine all the properties owned by the same company or firm. The largest producers were the following:—

	Ounces shipped.
Nipissing	4,678,074
La Rose	4,092,709
Crown Reserve	3,430,902
Coniagas	3,273,464
McKinley-Darragh-Savage	2,569,654
Kerr Lake	2,238,353
Buffalo	1,644,245
O'Brien	1,397,546
Temiskaming	1,213,754
Hudson Bay	1,067,667
Wettlaufer-Lorrain	925,017
Beaver	888,875
Cobalt Townsite	834,948
Trethewey	770,838
Cobalt Lake	626,044
Miller Lake-O'Brien	338,000
Right of Way	289,718

The remaining mines on the producing list were City of Cobalt, Colonial, Nova Scotia, Peterson Lake, Hargrave, Drummond, Millerett, Cobalt Provincial, Casey Cobalt, Chambers-Ferland, Silver Cliff, Standard Cobalt, Green-Meehan, Belellen, Nancy-Helen, Wyandoh, King Edward.

Two mines in South Lorrain, namely, Wettlaufer-Lorrain and Belellen, produced 933,912 ounces, and two in Gowganda, Miller Lake-O'Brien and Millerett, 468,687 ounces. The total production was thus distributed between Cobalt and the smaller camps:—

	Ounces.
Cobalt proper	30,105,192
South Lorrain	933,912
Gowganda	468,687
Total	31,507,791

Progress in Concentration and Treatment

The shipments from Cobalt for the year comprised 17,278 tons of ore, 9,393 tons of concentrates, and 3,141,976 ounces of bullion, compared with 27,485 tons of ore, 6,874 tons of concentrates, and 980,633 ounces of bullion, in 1910. The tonnage shipments, however, have ceased to be an index to the activity or production of the mines, since concentration of low-grade ores and the adoption of refining processes on the spot have become marked features in camp practice. The result of these is to lessen the gross weight of the material requiring to be shipped away.

The natural evolution of the industry at Cobalt, as the high-grade ores tend to diminish in quantity or at any rate in proportion to the whole output, is bringing the low-grade material year by year into a position of greater importance. There are still shipments made of the leaner ores, and such will doubtless continue to be made during the life of the camp, but they are due to special circumstances in the mines from which they come, such as the absence of a concentration plant, or to the offer of a remunerative price by smelters looking for silicious ores to mix with more basic material. It is inevitable that economic causes will year by year diminish the proportion of ore shipped away, and increase the proportion of concentrates and refined bullion. The fourteen concentration plants which were at work in 1910 increased to seventeen by the end of 1911, and two others, at the Beaver and Nipissing Mines respectively, were in course of construction on 31st December. A further illustration of the tendency to carry treatment processes to the farthest possible point within the limits of the camp itself was provided by the management of the Nipissing mine, where a mill was installed last year for the treatment of the high-grade ores of that mine. After fine grinding the ore is subjected to an ingenious combination of cyaniding and amalgamation, which has proven both efficient and economical.

The concentrating plants at the end of 1911 had a total capacity of about 1,730 tons of ore per day. During the year the quantity of ore subjected to concentration was 387,782 tons, which produced 9,443 tons of concentrates. Shipments amounted to 9,393 tons. The bulk of the ore was treated in the works of the mines from which it was raised, but a considerable tonnage was manipulated at the custom plants of the Northern Concentrators, Nova Scotia, and Nipissing Reduction Companies, Dividing the quantity of silver recovered by the number of tons of ore put through the concentrators would give 21.6 ounces of silver recovered per ton of ore. On the assumption that the average recovery was about 85 per cent., it would seem that the average contents of the ore, as it was sent to the mills, was about 25.4 ounces per ton.

Refining Cobalt Silver Ores

In the table showing the production of silver from the mines of Cobalt, the several forms in which the silver leaves the camp are classified as ore, concentrates and bullion. The actual shipments out of the province of ore and concentrates, are, however, much smaller, and the shipments of bullion much larger, than the figures would indicate There were four refineries in Ontario running on ore from Cobalt in 1911, namely, the Canadian Copper Company, whose works are at Copper Cliff, the Coniagas Reduction Company, Limited, at Thorold (head office, St. Catharines), the Deloro Mining and Reduction Company, Limited, at Deloro, in the county of Hastings and the Canada Refining and Smelting Company, Limited, Orillia, the last-named of which began operations during the year. At these works, there were treated, in 1911, 9,330 tons of ore and concentrates, the silver product of which was 17,756,651 fine ounces. Adding to this, the bullion produced in the Cobalt camp itself, the proportion of the entire silver yield for last year refined in Ontario amounted to 66 per cent., leaving only 34 per cent. to be extracted in other countries. As in former years, low-grade ores formed the bulk of shipments to points outside. A quantity of very high grade material, however, was exported for refining in Germany.

It may be a source of surprise that the silver refineries so far established have chosen locations at a considerable distance from the mines. This has been due to a variety of reasons. The great nickel-copper smelting works already in existence at Copper Cliff provided the Canadian Copper Company with skilled management and labor for a silver refinery at that point; at Deloro, the plant formerly operated by the Goldfields, Limited, on the auriferous mispickel of that locality, with its equipment of furnaces for the recovery of arsenic, etc., acquired on favorable terms by the new company served as a nucleus for the silver refining works; while at Thorold and Orillia, hydraulically developed electrical power was available at low rates. These advantages were deemed to be more than sufficient to offset proximity to sources of ore supply and the minimizing of railway freight charges.

In the following figures are summarized the operations of the Ontario silver refineries for 1911:—

Ore received, tons	9,142
Ore treated, tons	9,330
Silver recovered, fine ounces	17,756,651
Value of ditto	$9,248,829
White arsenic recovered, lb.	4,234,945
White arsenic shipped, lb.	4,341,078
Value of ditto	$74,609
Cobalt oxide shipped, lb.	62,859
Value of ditto	$42,979
Mixed oxides, cobalt and nickel shipped, lb.	388,139
Value of ditto	$67,600
Workmen employed, number	398
Wages paid	$283,134

The various products, other than silver, obtainable in the refining of the Cobalt ores, namely, cobalt, nickel and arsenic, are dealt with under their respective headings.

Ore Markets during the year

The objections made by the buyers of silver ore to the ores of the Cobalt mines when they were first placed on the market, owing to their unique character, have disappeared, and there is now no difficulty in disposing of the product, whether as ore or as concentrates. Outside of the four Ontario refining companies above mentioned, the chief ore purchaser was the American Smelting and Refining Company, which took consignments for its works at Denver, Col., and Perth Amboy, N.J. Beer, Soudheimer & Company, of Frankfort-on-the-Main, Germany, and the Government of Saxony, both took a quantity of high-grade ore. Other purchasers were the Pennsylvania Smelting Company, Pittsburgh, Pa., whose plant is at Carnegie, Pa.; the United States Metals Refining Company, of New York (works at Chrome, N.J.), and Balbach Smelting and Refining Company, Newark, N.J.

There is no agreement or common plan among the ore purchasing companies, as to prices or terms. The Canadian Copper Company, for example, pays for 84 per cent. of the silver contents for ore assaying from 200 to 500 ounces per ton, 85 per cent. for ore assaying from 500 to 600 ounces, and so on, up to 96½ per cent. for ore running 5,000 ounces and upwards. Payment for 70 per cent. of the silver is made thirty days after completion of sampling, and 30 per cent. thirty days later. The Coniagas Reduction Company pays for 55 per cent. of the silver contents for ores assaying 50 ounces per ton, and up to 91.5 per cent., 92.5 per cent., 93.5 per cent., and 95 per cent., respectively, for 1,000-ounce, 1,500-ounce, 2,000-ounce, and 3,000-ounce material. The American Smelting and Refining Company's terms vary with the quantity of ore contracted for, etc., but it pays for 95 per cent. of the silver, and makes a treatment charge of $7.00 per ton, dry weight, also an additional charge of 25 cents per ton for each per cent. of arsenic in excess of 5 per cent. The Saxon Government buys only ore that will assay 4,500 ounces per ton or over, and pays for 96 per cent. of the silver contents. Other ore-buying concerns show similar variations in their purchasing tariffs. The New York price of silver governs transactions on this Continent, and Hamburg quotations rule those with Germany.

Silver Prices

Silver prices remained steady during the first nine months of the year, but speculation in India and China, and the rebellion against the Manchu dynasty in the latter country raised them to a somewhat higher level for the months of November and December. The New York average for January was 53.795 cents per ounce; this fell to 52.222 in February, recovered to 53.325 in April, fell again to 52.630 in July, and to 52.440 in September, rose in October to 53.340, and in November to 55.719, closing in December at 54.905. The lowest point, 52.171 cents, was touched in August, and the highest in

November; the average for the year being 53.304 cents per ounce, as against 53.486 in 1910. Two features of the world's silver situation remain constant; the great mart is London, the great consumer is the East. To the old-established brokers in London go the merchantable bars, not only from Canada, but from the United States and Mexico, whose united production is equal to 83 per cent. of the entire yield of the world; and from London a large proportion, varying according to crop prospects and conditions of trade and politics, is exported to the bazaars of India and the commercial centres of China. India is the chief buyer, but a considerable share of her imports is coined into British dollars at the Bombay mint and re-exported for use in Hong Kong. Taking India and China together, their imports of silver bars from London amounted to £9,835,000 in 1911, being an increase of £1,165,000 over 1910. In addition, China received £1,900,000 from San Francisco. Russia and Germany were also important purchasers of silver, the former taking £1,752,647 from London, and the latter £1,725,335. France also took £940,283, and Brazil £216,136.

The course of silver prices for the future is impossible of prediction. The cheapening of the metal has of late years greatly favored its employment in the arts, for plate, etc., and the requirements of commerce in the trading nations of the world will ensure a steady demand for coinage purposes. The reforms in the currency system of China, which were undertaken by the Imperial Government before its overthrow by the Republican forces, will, it is expected, be hastened by the new rulers of that country, and this will necessitate the use of a very large quantity of silver. It is proposed to substitute for the "tael," which varies in weight and value in the various Provinces of China, a standard dollar, having a weight of 414.5 grains, and a fineness of 900. Some of these coins have already been issued. On the other hand, there are those who allege that the popularity of silver, which for centuries has been the favorite medium for hoarding there, has begun to wane in India. They point to the fact that, after deducting amounts re-exported from amounts imported, the home consumption for the year ending 31st October, 1911, was only 44,000,000 ounces, as against 56,100,000 ounces in 1910, and 60,843,000 ounces in 1909. Everyone who has paid any attention whatever to Asiatic affairs during the past few years is aware that a tremendous awakening is taking place in almost every department of life in the East, and this awakening is not confined to Japan or China, but extends to India, Siam, Persia, and to practically all the nations of the Orient. A very decided feature of the movement is the tendency to adopt Western methods in education, politics, and finance. It is alleged that the diminishing use of silver for investment is accompanied by larger purchases of gold, especially by the wealthier classes, who find gold more convenient and less subject to fluctuations in value. Whether this preference will eventually work a change in the deep-rooted custom of putting their savings into ornaments and objects of silver, which has characterized the people of India from time immemorial, remains to be seen. The East is no longer "the unchangeable," and no one can prophesy what will happen.

Production of silver will continue at Cobalt regardless of whether the price of silver falls or rises, since the ores are so rich as to leave a wide margin over the cost of operating. Nevertheless the fluctuations of the market, in view of the largeness of the output, are of great consequence to the camp. An increase of one cent per ounce on the production of 1911 would have brought the mine-owners $314,998 more than they actually received, while three cents an ounce would have given them an additional return of nearly a million dollars.

Tables V. and VI., which follow, give respectively the annual production of silver from the Cobalt mines, and the total annual value of all constituents in the ore. In Table VI., the values allotted to cobalt and arsenic are those realized by the refining companies:—

Table V.—Silver Production, Cobalt Mines, 1904 to 1911

Year.	Producing Mines.	Shipments.			Silver Contents.			Ave'ge Silver Contents per Ton.		Value of Silver Shipments.			Total Value.
		Ore,	Con-cen-trates	Bullion,	Ore,	Concen-trates,	Bullion,	Ore.	Con-cen-trates,	Ore,	Concen-trates,	Bullion,	
	No.	Tons.	Tons.	oz.	oz.	oz.	oz.	oz.	oz.	$	$	$	$
1904	4	158	....	....	206,875	....	....	1,309	....	111,887	....	....	111,887
1905	16	2,144	....	....	2,451,356	....	....	1,143	....	1,360,503	....	....	1,360,503
1906	17	5,335	....	....	5,401,766	....	....	1,013	....	3,667,551	....	....	3,667,551
1907	28	14,788	....	....	10,023,311	....	....	677	....	6,155,391	....	....	6,155,391
1908	30	24,487	1,137	....	18,022,480	1,415,395	....	736	1,244	8,468,293	665,085	....	9,133,378
1909	31	27,729	2,948	....	22,436,355	3,461,470	....	809	1,174	10,809,872	1,651,704	....	12,461,576
1910	41	27,437	6,845	980,633	22,581,714	7,082,834	980,633	821	1,030	11,360,489	3,590 098	527,460	15,478,047
1911	34	17,278	9,375	3,141,976	20,318.626	8,056,189	3,132,976	1,176	858	10,250,991	4,017,241	1,685,615	15,953,847
Tl..	..	119,356	20,305	4,122,609	101,442,483	20,006,888	4,113,609	850	985	52,184,977	9,924,128	2,213,075	64,322,180

Table VI.—Total Production, Cobalt Mines, 1904 to 1911.

Year.	Shipments, ore and concentrates.	Nickel.		Cobalt.		Arsenic.		Silver.		Total Value.
	Tons.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Ounces.	Value.	
			$		$		$		$	$
1904.....	158	14	3,467	16	19,960	72	903	206,875	111,887	136,217
1905.....	2,144	75	10,000	118	100,000	549	2,693	2,451,356	1,360,503	1,473,196
1906.....	5,335	160	....	321	80,704	1,440	15,858	5,401,766	3,667,551	3,764,113
1907.....	14,788	370	1,174	739	104,426	2,958	40,104	10,023,311	6,155,391	6,301,095
1908......	25,624	612	....	1,224	111,118	3,672	40,373	19,437,875	9,133,378	9,284,869
1909.....	30,677	766	....	1,533	94,965	4,294	61,039	25,897,825	12,461,576	12,617,580
1910.....	34,282	504	....	1,098	54,699	4,897	70,709	30,645,181	15,478.047	15,603,455
1911......	26,653	392	....	852	170,890	3,806	74,609	31,507,791	15,953,847	16,199,34 6
Total ..	139 661	2,893	14,641	5,901	736.762	21,697	306,288	125,971,971	64,322,180	65,379,871

Labour

In the operating silver mines, there were 3,097 men employed, on the average, throughout the year, receiving $2,638,617 in wages. These figures take no account of the very considerable quantity of labour expended on non-producing mines, or in the performance of assessment work on mining claims, statistics regarding which it is impossible to obtain. The cobalt silver-refining works gave employment, in addition, to 398 workmen, to whom were paid in wages $283,134. In producing and treating the silver ores raised in 1911, 3,555 employees were engaged, earning an aggregate of $2,977,721 in wages. Boys are not largely employed in Ontario mines, only 57 being noted on the returns, all of them working above ground. No female labor whatever is permitted either in mines or mining works, except in a clerical capacity, an exception being made of mica-splitting plants, the work in which is light and of a kind requiring dexterity of manipulation.

There were no serious labour difficulties during the year. The demand for skilled miners was good, but not in excess of the supply. Wages at Cobalt, Porcupine, and in the north-west part of the Province were about as follows:—Miners, hoistmen, mechanics, $3.50 per day, firemen, $3.00, muckers and labourers, $2.50 to $2.75. A large proportion of the unskilled labour and a smaller percentage of the skilled labour is performed by workmen of foreign extraction. Many of these are imperfectly acquainted with the English language, and do not mix readily with the English-speaking population. Superintendents vary in their estimates of the efficiency of foreign labour, but all agree that for the heavier manual work, they can get scarcely any other. The manager of a gold mine, west of Lake Superior, who has had his difficulties with mine labour, stated that, at the date of his letter, the following nationalities were represented on his pay-roll:—Canadian, 8; Americans, 5; Finlanders, 4; Croatians, 2; Indian, 1; Irish, 1; Scotch, 2; Swede, 1; German, 1; Norwegian, 5; Bohemian, 1.

Dividends

The statement given of dividends declared or paid by silver-mining companies at Cobalt shows that last year they divided the sum of $8,733,958.16 among their shareholders. Up to 31 December, 1911, the total amount paid out in dividends was $30,198,004.44. This is exclusive of profits earned by privately owned mines or close corporations, such as the O'Brien and Drummond. If these were added, the total dividend return would approximate 35 million dollars, or equal to more than half the gross value of the silver recovered. The following mines have now returned to their shareholders dividends exceeding in amount the par value of their share capital: Buffalo, Crown Reserve, Kerr Lake, Nipissing, Temiskaming and Hudson Bay. It should be pointed out, however, that, in the case of the Kerr Lake, Nipissing and Temiskaming and Hudson Bay mines, the original company has been practically succeeded by a subsequently formed corporation with a much larger nominal capitalization.

It is natural to compare Cobalt with others of the world's famous mining districts. Rich as it undoubtedly is, it has been surpassed in gross returns by other bonanzas. For instance, in 1911, thirty-five South African gold mines, mainly on the Rand, paid out dividends aggregating $35,000,000. One company alone, the Crown Mines, Limited, paid out $5,493,978; another, the Robinson, $4,017,750. Even these were surpassed by the Goldfield Consolidated in the State of Nevada, the largest producing gold-mine in the world, whose dividends in 1911 amounted to $7,118,296. The total of the dividends paid by this Company to date is $22,771,322. The Homestake gold mine, South Dakota, has paid $28,522,040; the Alaska Treadwell, $12,510,000; the Portland, Colorado, $9,097,080; Camp Bird, Colorado, $8,383,562; Standard Consolidated, California, $5,229,809. There are a number of silver-producing mines whose total payments have equalled or exceeded those of any of the Cobalt mines, but all of them realized on some other element or elements in addition to silver, mainly lead, gold or copper. Thus the Bunker Hill and Sullivan mine, in the State of Idaho, which produces lead and silver, has paid out $13,715,550 in dividends; the Tonopah, of Nevada, silver and gold, $9,250,000; El Oro, Mexico, gold and silver, $10,835,127. Of all the metals, however, copper has been the most fruitful in bonanza deposits. The Nevada Consolidated mine has paid in dividends up to the present time $8,977,870; North Butte, Montana, $10,248,000; Utah, $15,057,453; Calumet and Arizona, $15,478,118; United Verde, Arizona, $30,997,000. In the native copper region of Michigan, the Osceola mine has paid out $10,593,200; the Copper Range Consolidated, $12,709,988; the Quincy, $20,363,000. These, however, pale before the record of the Anaconda mine in Montana, which has returned to its shareholders $65,171,250, and the Calumet and Hecla, whose dividends have reached the colossal sum of $118,850,000.

All the foregoing mines, however, are distinguished from those of Cobalt in two particulars. For the most part they are situated on deposits of great size, and their tenor in metallic contents is low. For example, the Calumet and Hecla ore contains on an average less than 2 per cent. copper, and much of the rock treated carries less than 1 per cent. This is true of the native copper mines of Michigan generally. On the other hand, the quantity of material treated is very great. At the Calumet and Hecla 8,500 tons of ore are put through the stamp mills daily. The ore of the Anaconda mine contains less than 3 per cent. copper, and less than 2 ounces of silver per ton. Yet in one year 1,110,000 tons of ore were treated, yielding 31,500 tons copper, 2,001,000 ounces silver and 8,290 ounces of gold.

The mines of Cobalt present an entire antithesis. The veins are narrow, mostly quite limited in length, and some of them fail to carry their values to a great depth or through a change in the rock formations. But they are remarkably high in grade, running up to 8,000, 9,000 and even 10,000 ounces of silver per ton for carload lots. Their operation requires a minimum of labour and capital, and the consequence is that of the whole output up to date, one-half the gross value has been distributed as dividends and profits. In this respect it is doubtful if a parallel can be found in the annals of mining anywhere.

Following is statement of dividends:—

Table VII—Dividends Declared and Paid by Silver-Cobalt Mining Companies to end of 1911.

Name of Company.	Date of Incorporation.	Authorized Capital.	Capital Stock issued.	Par value per share.	Amount of Dividends and Bonuses declared to end of 1910.	Amount of Dividends and Bonuses declared during 1911.	Total of Dividends and Bonuses declared to Dec. 31, 1911.	Last Dividend or Bonus. Date declared.	Last Dividend or Bonus. Rate per cent.
		$	$	$	$ c.	$ c.	$ c.		
Beaver Consolidated Mines, Limited	Mar. 5, 1907	2,000,000	2,000,000	1.00	....	69,912 25	169,912 25	Sept. 9, 1911	3
Buffalo Mines, Limited	April 27, 1906	1,000,000	1,000,000	1.00	1,007,000 00	370,000 00	1,377,000 00	Dec. 1, 1911	13
City of Cobalt Mining Company, Limited	Oct. 5, 1906 Jan. 7, 1909	500,000 1,500,000	1,500,000	1.00	139,312 42	....	139,312 42	April 15, 1909	3
Cobalt Central Mines Company	Dec. 13, 1906	5,000,000	5,000,000	1.00	192,845 00	....	192,845 00	Aug. 25, 1909	1
Cobalt Silver Queen, Limited	April 1, 1906	1,500,000	1,500,000	1.00	315,000 00	....	315,000 00	Dec. 31, 1908	3
Coniagas Mines, Limited	Nov. 21, 1906	4,000,000	4,000,000	5.00	1,400,000 00	1,440,000 00	2,840,000 00	Oct. 31, 1911	9
Crown Reserve Mining Company, Limited	Jan. 16, 1907	2,000,000	1,999,957	1.00	2,653,221 00	1,061,288 40	3,714,509 40	Dec. 15, 1911	5
Foster Cobalt Mining Company, Limited	Feb. 14, 1906	1,000,000	915,588	1.00	45,000 00	....	45,000 00	Jan. 1, 1907	5
Kerr Lake Mining Company, Limited	Aug. 9, 1905	40,000	40,000	100.00	2,958,000 00	982,000 00	3,940,000 00	Oct. 10, 1911	350
La Rose Mines, Limited	Feb. 21, 1907	6,000,000	6,000,000	5.00	2,045,000 00	635,000 00	*2,680,000 00	Dec. 20, 1911	2.6166
McKinley-Darragh-Savage Mines of Cobalt, Limited	April 9, 1906	2,500,000	2,247,692	1.00	†808,176 18	1,123,846 00	1,932,022 18	Nov. 13, 1911	10
Nipissing Mining Company, Limited	Dec. 16, 1904	250,000	250,000	100.00	6,482,500 00	1,843,297 25	8,325,797 25	Dec. 11, 1911	....
Right of Way Mining Company, Limited	July 13, 1906	500,000	500,000	1.00	321,643 93	....	321,643 93	....	....
The Right of Way Mines, Limited	Sept. 11, 1909	2,000,000	1,685,500	1.00	168,550 00	33,710 00	202,260 00	Dec. 2, 1911	2
Temiskaming and Hudson Bay Mining Company, Limited	July 29, 1903	25,000	7,761	1.00	1,334,892 00	186,264 00	1,521,156 00	Nov. 27, 1911	300
The Hudson Bay Mines, Limited	July 16, 1909	3,500,000	3,200,051	5.00	143,751 00	251,151 76	394,902 76	Dec. 22, 1911	2
Temiskaming Mining Company, Limited	Nov. 16, 1906 Jan. 1, 1908	2,500,000	2,500,000	1.00	784,156 25	225,000 00	1,009,156 25	Sept. 30, 1911	3
Trethewey Silver Cobalt Mine, Limited	May 30, 1906 June 1, 1911	1,000,000 2,000,000	1,000,000	1.00	661,998 50	200,000 00	861,998 50	June 16, 1911	10
Wettlaufer-Lorrain Silver Mines, Limited	Nov. 30, 1908	1,500,000	1,116,590	1.00	....	212,488 50	212,488 50	Nov. 27, 1911	5
Total	....	....	....	....	....	8,733,958 16	30,198,004 44	....	....

*In addition to profits to owners previous to May 31, 1908, amounting to $1,204,862.72.
†In the 20th Report, p. 20, the amount is given as $1,145,309.48; this, however included the first dividend paid in 1911.

It may be of interest to summarize the annual reports of several of the leading Cobalt companies published for the information of their shareholders, so that a closer view may be had of the operation of these important concerns, which will bear comparison in point of efficiency with well managed companies anywhere. The companies selected are the Nipissing, Crown Reserve, Kerr Lake, Coniagas, La Rose, McKinley-Darragh-Savage.

Nipissing

The report is for the calendar year 1911. There were shipped 4,678,074 ounces of silver, having a value of $2,506,608, the average price received being 53.582 cents per ounce. The production was from the following sources:—

	Tons.	Ounces.
High-grade ore	735.94	1,761,536
Low-grade silicious ore	1,859.01	507,895
Concentrates	243.38	243,519
Silver bullion	76.29	2,165,124
Total	2,914.62	4,678,074

The gross quantity of silver produced was 5,197,042 ounces, there remaining on hand at the close of the year 744,116 ounces in ore, etc., not shipped. The gross cost of production based on this quantity was $725,015.77, or 13.95 cents per ounce. Individual items of cost were: Mine operation, $464,015.67; high-grade mill, $59,403.48; custom milling, $52,598.24; depreciation, $38,401.12; marketing product, $138,247.18; corporation, U. S. taxes, New York office and travelling expenses, $19,518.38; total, $772,184.07. Deducting rents and interest, $47,168.30, left the net cost $725,015.77. Under the head of mine operation the largest items were trenching, $8,831.58; development and exploration, $187,873.45, and stoping, $72,967.25, or a total for actually working the ground of $269,672.28; insurance and Canadian taxes were $74,943.23; administration and office, $24,190.06; ore sorting and loading, $23,791.68; boarding-house and camp maintenance, $19,576.87; general and legal expense, $19,524.42, etc. The net value received from sales was $2,381,712.54, and the net income $2,095,241.23.

The total shipments of silver from the opening of the mines in 1904 amounted to 23,023,313 ounces, and the gross value of the silver contents, plus cobalt, nickel and arsenic paid for was $12,939,395.18, the net value received from smelters being $11,820,620.84. Dividends paid during the year were $1,843,297.25. The ore reserves are figured as follows:—

	Tons.	Ounces.
High-grade ore	3,454	6,126,838
Mill rock on dump	80,036	1,756,954
Total	83,490	7,883,792

A year ago the reserves were placed at 6,552,880 ounces. A new mill for treating the high-grade ore was devised by Mr. Charles Butters, consulting engineer, and has proved highly satisfactory in its operation. The process consists essentially of amalgamation in cyanide solution in a tube mill, where more than 97 per cent. of the silver in the ore is recovered as amalgam. The residue then undergoes the regular cyanide treatment, whereby an additional extraction is made. During the summer a refinery was erected, since which time the whole product of the mill has been shipped as fine bullion. A mill for the treatment of the low-grade ore is in course of construction which will have a capacity of 200 tons of ore per day.

Crown Reserve

During 1911 there was produced and shipped from the Crown Reserve mine 3,430,902 ounces of silver, of a gross value of $1,833,516.80, derived as follows:—

	Tons.	Ounces.
High-grade ore	644.561	2,991,404
Low-grade ore	390.256	64,284
Bullion	7.952	221,792
	1,042.769	3,277,480
Milled ore (shipped as bullion)	5.820	153,422
Total	1,048.589	3,430,902

The cost of mining and all other expenses at the Crown Reserve mine, including development, depreciation, etc., amounted to $299,668.10, smelter charges and deductions to $82,216.59, bonus to employees to $9,147.45, and royalty to Ontario Government, accrued and accruing, at the rate of 10 per cent. on the value of the ore at the pit's mouth, to $162,744.87, leaving a profit for the year of $1,279,739.79, out of which $123,-903.64 was paid for prospecting, exploring and working the Silver Leaf ground adjoining the Crown Reserve mine leased by the company, and similar operations in the McEnaney gold mining claim at Porcupine on which the company holds an option; also dividends at the rate of 60 per cent., amounting to $1,061,288.40. The total production of the mine, beginning with 1908, was 12,512,377 gross ounces of silver, having a net value of $6,135,290.68. The average cost of the silver produced in 1911 is given as 10.671 cents per ounce. Dividends paid to date amounted to $3,714,509.40. No estimate is made of the amount or value of the ore left in the mine, but the report states that the quantity in sight is greater than it was a year ago.

Kerr Lake

The fiscal year of the Kerr Lake Mining Company ends 31st August, so that the last annual report covers the year terminating on that day, 1911. Shipments from the mine were as follows:

	Tons.	Ounces.
First-grade ore	481.376	1,722,092
Second-grade ore	1,270.572	460,121
Jig concentrates	30.501	28,300
Bullion from metallics	......	12,964
Sluices	153.930	11,669
Dump	......	34,534
Total		2,269,680

There were on hand silver contents of ore not shipped 31st August amounting to 118,740 ounces, bringing the total production up to 2,388,420 ounces. Proceeds of ore sales and interest brought in $1,231,245.82, against which there were charged cost of production and development, $232,082.88; shipment, treatment and other charges, $52,449.26; administration and general expenses, $9,334.42, leaving a net profit of $937,379.26. The balance on hand at the beginning of the company's year was $1,110,437.72, making a total available for distribution of $2,047,816.98, out of which were paid dividends amounting to $1,338,000, leaving a balance to be carried forward of $709,816.98, of which $240,000 was ear-marked for dividend to be paid 15th September, 1911. Cost of production of silver is placed at 14.69 cents per ounce. In all $3,330,000 has been paid in dividends since the opening of the mine in 1906. Manager John Seward concludes his report as follows: "On account of the great irregularity which he finds in the ore deposits, your manager does not feel warranted in making an estimate either of the total ore in sight in the mine, or of the value of the probable ore. Recent developments have shown that portions of the mine formerly regarded as ore-bearing have been practically barren, whereas other areas from which nothing was expected produced a large amount of silver. It is safe to say that we can continue at the present rate of production for from one to two years longer without taking into consideration other undeveloped portions of the property."

Coniagas

The report of the Coniagas Mines, Limited, is very full and copiously illustrated with plans and sections, showing the surface plant and underground workings. It covers 12 months, ending 31st October, 1911. During the year there were mined and shipped 3,789,274 ounces of silver at the remarkably low cost of 8.8 cents per ounce, including mining, concentrating, freight to smelter, sampling, assaying and treatment charges, and all head office expenses and royalties, as compared with a corresponding cost for the previous year of 13.285 cents per ounce. The output of the mine was as follows:—

	Tons.	Ounces.
Ore	619.1	2,142,536
Concentrates	1,418.4	1,643,616
Total	2,037.5	3,789,274

The total shipments to 31st October, 1911, from the opening of the property in 1905 amounted to 4,243.2 tons of ore, containing 5,928,304 ounces of silver and 2,489.9 tons of concentrates, containing 3,193,492 ounces—a total of 7,360.6 tons shipped, with aggregate contents of 10,582,128 ounces of silver. The working account shows receipts from ore, $1,914,320.22; miscellaneous, $33,245.85; in all, $1,947,566.07. Against this, mining expenses footed up to $149,501.80; milling ditto, to $57,715.75; sale of ore to $35,054.73; taxes and royalties to $17,279.21, and other charges of necessary expenditure, the whole amounting to $333,463.92, and leaving at credit of Loss and Gain, $1,614,102.15. Out of this $1,440,000 was appropriated to meet four quarterly dividends and bonuses at the rate of 36 per cent. for the year, making 71 per cent. of the capital stock to date returned to shareholders in dividends and bonuses. Ore in reserve is estimated as containing 12,516,000 ounces of silver, about the same quantity as two years ago, after shipping since that time 5,718,805 ounces.

La Rose Consolidated

For the calendar year 1911 shipments from La Rose Consolidated Mines were as follows:—

	Tons.	Ounces.
Silver-cobalt-nickel ore	1,770.995	3,066,490
Low-grade silicious ore	603.204	112,066
Nuggets	12.262	274,599
Concentrates	1,174.951	639,554
Total	3,561.412	4,092,709

The actual production was considerably less, being 3,429.514 tons, containing 3,691.797 ounces. Of this 1,214.683 tons, containing 1,439,113 ounces were obtained from La Rose mine; 659.921 tons, containing 1,221,130 ounces from the Lawson; 408.743 tons, containing 429.014 ounces from the Princess; the remainder consisted of 1,146.166 tons of concentrates, mainly from La Rose mine, carrying 602,540 ounces. The report figures profits on the production of the year, not the shipments. Receipts thus based were $1,977,764.67, from which the cost of production, amounting to $708,678.90 in all, fell to be deducted, thus leaving a net surplus of $1,269,085.77, or 64 per cent. of the gross value of the silver produced. The chief items of expense were development and exploration, $125,474.78; stoping, $59,408.01; tramming, $54,325.59; ore sorting and loading,

$48,016.91; insurance and taxes, $30,298.52; administration and office, $28,560.17. From the profits dividends amounting to $627,000 were declared, plant account was increased by $1,266.27, and the balance, $640,819.50, was added to the net current surplus, making the latter $1,444,385.61.

The report states the company's decision to be "not to distribute this surplus in the form of largely increased dividends or bonuses," but, after providing for payment of 10 per cent. on the company's capital, and in view of the fact that it "has still a large undeveloped area, to continue the vigorous policy of development which has produced such satisfactory results during the past two years, and, as opportunity presents, acquire interests in other mining enterprises which after thorough examination and reports of the most competent and reliable engineers, are considered proper investments for the company's funds." La Rose Consolidated includes La Rose proper, La Rose Extension, Princess, Fisher-Eplett, Violet, University and Lawson mines, but only La Rose, Lawson and Princess produced silver last year. The report notes with satisfaction that the Lawson made a good record for the year, and that a small shoot of ore recently found in No. 8 vein produced 15.2 tons of ore assaying 9,656 ounces of silver per ton.

McKinley-Darragh-Savage

In 1911 there were recovered from the two properties worked by this company 2,654,177 ounces of silver—2,043,578 ounces from McKinley-Darragh and 610,599 ounces from Savage. The sources of the silver are classified in the report as follows:—

	Tons.	Ounces.
Nuggets	2.526	50,166
No. 1 ore	469.279	822,571
No. 2 ore	17.158	7,479
No. 1 picking belt	96.711	153,591
No. 2 picking belt	85.141	35,758
Jig concentrates	581.971	714,566
Sands	751.086	545,312
Sluices and fines	1,222.155	324,734
Total	3,226.027	2,654,177

Of this quantity, 2,569,654 ounces were marketed, realizing $1,368,216.86. The cost of marketing amounted to $135,912.76, and, after deducting ore remaining on hand, the net value was $1,299,777.55. Cost of production footed up to $350,287.81, plus administration, $13,710.20; taxes, $21,430.89; insurance, $2,885.85; and stock and dividend expenses, $5,519.85—in all, $393,834.60. This left a net profit on the operations of $905,942.65, or, adding interest received, of $916,864.73. Dividends amounting to $1,011,461.40 were paid out. To date shipments from these two mines have yielded 7,930,114 ounces of silver, and the estimate of reserves is 126.410 tons of ore, containing 5,561,780 ounces of silver. This includes only "ore actually blocked out," and makes no allowance for probable ore which may be developed hereafter adjacent to that now actually in sight. The cost of production is put at 17.52 cents per ounce for McKinley-Darragh and 20.39 cents for Savage; combining the two, it is found to be 18.78 cents.

Putting in tabular form the leading particulars respecting this group of Cobalt mines, we have the following results:—

Mine.	Silver produced last Company year. Ounces.	Gross Income. $	Gross Expenditure. $	Net Income. $	Cost of producing silver per ounce. cents.	Total silver produced to date. Ounces.	Estimated reserve of silver. Ounces.
Nipissing.........	5,197,042	2,867,425	772,184	2,095.211	13.95	23,023,313	7,883,792
Crown Reserve...	3,430,902	1,833,516	553,777	1,279,740	10.67	12,512,377	....
Kerr Lake........	2,388,420	1,231,246	293,866	937,379	14.69	....	....
Coniagas..........	3,789,274	1,947,566	333,464	1,614 102	8.80	10,582,128	12,516,000
La Rose Con......	3,691,797	2,008,127	739,041	1,269,086	19.20	14,902,595	4,250,861
McKinley-Darragh-Savage	2,654,177	1,446,612	529,747	916,865	18.78	8,052,793	5,561,780
Total.........	21,151,612	11,334,492	3,222,079	8,112,413	Av. 15.23	....	....

Steam Displaced by Water Power

For the operation of the Cobalt mines and works, steam power has been almost wholly displaced by hydraulic power delivered either by the electric current or in the form of compressed air. Most of the mines formerly using steam retain their plants for use in case of emergency, but the regular employment of steam is now confined to small and isolated properties. An amalgamation took place between the companies producing power on the Montreal river, the Cobalt Power Company and the Cobalt Hydraulic Power Company uniting to form the Northern Ontario Light and Power Company, Limited. This arrangement enables the plant at Hound chute to confine its supply to electrical energy only, while the Taylor compressed air system installed at Ragged chute fills the contracts for compressed air. Mines Power, Limited, whose development on the Matabitchewan was first in point of time to put electric power into Cobalt, has changed its name to the British Canadian Power Company, Limited.

On both the Montreal and Matabitchewan rivers, though the shortage of water was not so marked during the winter of 1911-12 as it was in the previous year, experience has shown the present means of conserving the freshet flows to be insufficient for the steady delivery all the year round of the maximum quantity of power. The watersheds of the Matabitchewan and the Montreal have both their peculiarities. The former is not extensive, being restricted on th north by that of the Montreal, and being still further narrowed by the tendency of the river to approach the Montreal as it nears its mouth, the actual entrance of the two rivers into Lake Temiskaming being only a few yards apart. For this reason, strict economy must be practised in the use of water, and the company has found it necessary, in addition to the reservoirs already in existence, to erect dams at the outlet of Bear, Cross and Macdonald lakes. When these are completed, practically all the natural storage grounds on the stream will be under control.

The Montreal is a longer and larger river than the Matabitchewan, but the area which it drains is lessened by the doubling, tortuous course which it pursues, especially in its southern branches. It receives a portion of the overflow of Lake Temagami through the northern outlet of that lake, the main discharge of which is to the south by the Temagami river, a feeder of the Sturgeon. Being thus situated on the height of land, the waters of this large and important lake, if conserved, are capable of considerably augmenting the water power of either or both the streams into which it empties. It is also evident that by adjusting the height of the dams at the northern and southern outlets, a larger or smaller proportion of the total discharge from the lake could at will be diverted into either system. There are important hydraulic developments on both streams, on the former for power used mainly in the mines of Cobalt, and on the latter for the operation of pulp and paper mills at the town of Sturgeon Falls.

Lumbermen and Water Power Users

This situation is indicative of the classes of questions to which the rapidly increasing use of water power derived from the rivers of Northern Ontario is giving rise. But there is yet another, and very important, element in the situation. For many years, these rivers have been used by lumbermen to float their logs to market, and their right to employ them for such purposes has been repeatedly confirmed by the Legislature of the Province. Indeed, notwithstanding the extension of railways into the northern forests, and the increasing use which is made of them to transport logs, pulp-wood and other forest products to the place of consumption or manufacture, it is not easy to see how the great lumbering industry of Ontario could be carried on without the free use of these waterways.

There is nothing incompatible between the employment of flowing water for the carriage of sawlogs and its utilization for the development of power. But it is quite apparent that the presence of two distinct interests, each requiring the use of the water, but for a different purpose, is likely to be productive of friction. When the spring thaws and rains melt the snow and ice, and let loose the floods, the lumberman seizes the opportunity to get his "drive" to market. His logs in the water, he lifts the "stop-logs" from the dams and gives rein to the torrent that it may hurry his logs to their destination. Every consideration must yield to this—the logs must come down, for to be "hung up" means in most cases that another year will elapse before the logs will reach the saws, and also a loss in interest and the sinking of water-logged timber. The main body past, the rear-guard of his army "sweeps" the "tail of the drive," in other words, gathers up those logs which have stranded in shallow places, or have been caught by the rocks or other obstructions. This demands a fresh draft on the dammed-up lakes, in order to carry the "tail" down stream, and the freshet season may well be past or nearly so, before the lumbermen's use of the river is over for the time.

It is obvious that the owner of a water power on such a stream will find it difficult to obtain a maximum of power. The water is hurried away, which might have turned his turbines during the dry season, and his chances of equalizing the flow to the best advantage are correspondingly reduced. The situation is one which suitable legislation may be required to meet. Much may be accomplished by co-operation between water power owners and lumbermen, by improved log-slides requiring a minimum of water to operate them, by deepening river channels, and removing obstructions, etc., but it may also be necessary to provide some means of adjusting the relations between the lumbermen and water power owners, so far as the use of the water is concerned, and also between the various users of power on the same stream, whose interests may conceivably come at times into conflict.

Cobalt

The market for cobalt oxide continues depressed, and there is little relief in sight. The cobalt contents of their ores have ceased to be of value to the mine owners, but as they cannot produce silver without also producing cobalt, they continue to raise the latter, which is accumulating in the hands of the refiners. There is, however, a certain demand for refined oxide in the United States and Canada, and also from England and the continent of Europe. From the Canadian refineries were shipped 62,859 pounds of cobalt oxide, and 388,139 pounds of mixed cobalt and nickel oxides. In these mixed oxides, the proportion of (metallic) cobalt may be taken as varying from 40 to 50 per cent., and of nickel from 10 to 23 per cent. There was a further production of crude cobalt material or residues of 860,132 pounds, estimated to contain, say, 29 per cent. cobalt and 32 per cent. nickel. The mixed oxides go principally to the manufacturers of cobalt oxide on the continent of Europe, who seperate the cobalt oxide and market it under their own established brands. Reference was made in last year's Report to the alloy of cobalt and chromium, called "stellite," which displayed possibilities as a material for the manufacture of cutlery, but no important developments have yet taken place in this respect. There is room in the cobalt situation for a new use for this element which will absorb large quantities, and so widen the market.

The Metal Refining Bounty Act, 7 Edward VII., chapter 14, provides for the payment of a bounty of 6 cents per pound on the metallic cobalt contents of refined cobalt oxide produced in Ontario. The regulations framed under this Act restrict the bounty to actual shipments of the oxide from the works in which it has been refined. Claims for bounty were made by two of the refining companies on cobalt oxide shipped during the year as follows:—

Table VIII.—Statement showing Bounty paid Cobalt Oxide in 1911

Name of Company.	Cobalt Oxide. pounds.	Bounty. $
Deloro Mining and Reduction Company	35,083	1,432 20
Coniagas Reduction Company	19,410	1,164 60
Total	54,493	2,596 80

The Act was passed by the Legislature of 1907, and made provision for payment of bounties on refined copper, nickel, nickel oxide, cobalt, cobalt oxide, and arsenic produced from mispickel only. The bounties were to run for a period of five years from the date of the Acts, which would bring them to a close on April 1912, but during the session of 1912, the Legislature extended the bounty period for five years longer.

Nickel

From the mines of the Sudbury district there were raised, in 1911, 612,511 tons of nickel-copper ore, and at the blast furnaces of the mining companies there were smelted 610,788 tons of ore. The product was 32,607 tons of Bessemer matte, the nickel contents of which were estimated at 17,049 tons, valued at $3,664,474, or at the rate of 10.75 cents per pound. As compared with 1910, the production fell off somewhat, the output of matte being less by 2,626 tons, and of nickel contents by 1,587 tons. The production, however, was larger than in any previous year, with the exception of 1910, and towards the close of the twelve months, the mines were very active, and production was going on at full capacity rate. The number of employees at the mines and works was 2,439, of whom 35 were boys, all working above ground.

The producing companies were the same as in former years—the Canadian Copper Company, and the Mond Nickel Company. The former was the pioneer in the Ontario nickel mining industry and remains the largest producer. Its works are at Copper Cliff, and are maintained at a high level of efficiency. During the year 1911, ten acid converters for bessemerizing the low-grade matte produced in the blast furnaces were replaced by five basic converters, and two reverberatory furnaces were installed to treat about 50,000 tons of flue dust, the accumulation of years from the blast furnace dust chambers, also a similar accumulation of green ore fines from the mines, too small for use in the blast furnaces.

Of the 449,159 tons of ore mined by the Canadian Copper Company last year, 351,311 tons were taken from the Creighton mine, 66,023 tons from Crean Hill, and 34,825 tons from No. 2.

The Mond Nickel Company has hitherto had its smelting plant at Victoria Mines, west of Sudbury, in proximity to its mine of the same name. Recently, however, a new site has been selected at Coniston, near the crossing of the Canadian Pacific and Canadian Northern Railways, and new smelters there are well advanced towards completion. One advantage will be nearness to the Company's mine, in the township of Garson, from which the bulk of its ore is now obtained. In 1911, out of 163,352 tons of ore raised by the Mond Company, 116,932 tons came from the Garson mine, and 46,370 tons from Victoria No. 1.

Considerable diamond drilling was done on its properties, in the northern nickel range by the Dominion Nickel-Copper Company, but the mines have not yet reached the productive stage.

Owing to the absence of assay records, it is impossible to say, with accuracy, how many tons of nickel were contained in the ore taken from the silver mines of Cobalt in 1911. But, assuming that the percentage of nickel adopted in the Bureau's Report of last year for the ores and concentrates shipped from Cobalt, namely, 1.47, is approximately correct, this would give 392 tons of nickel produced by the mines of that camp. There can be no doubt that at least that portion of the nickel which is contained in the mixed oxides exported from the refineries finds its way into some industrial use. Adding, therefore, the 392 tons of nickel from Cobalt to the product of the Sudbury mines, a total of 17,441 tons of nickel is obtained as the output for the year.

Nickel Alloys

A third source of nickel is found in the township of Dundonald. Here, the Alexo deposit was discovered by Alex Kelso in 1908. The extent of the deposit has not yet been fully revealed, since the rock outcropping is of small area, but there seems reason to believe that ore may be present in some quantity. It much resembles the Sudbury ore, being pyrrhotite, but the copper contents are low. In nickel, the assays run up to 11 per cent., but there is considerable ore of much lower grade.

The study of nickel-iron alloys has not yet been exhausted. In the "Iron Age," for January 4, 1912, Sir Robert Hadfield refers to a series of experiments conducted by Dr. H. C. H. Carpenter, Mr. Percy Longmuir and himself, upon nickel steels containing varying percentages of nickel. Tests for tensile strength taken at the temperature of liquid air, – 182 degrees centigrade, showed that, as compared with 42 tons per square inch for pure (Swedish) iron, specimen F, containing 6.42 per cent. nickel showed 142.2 tons per square inch; specimen J, with 15.98 per cent. nickel, 144.2 tons, and specimen K, with 19.91 per cent. nickel, 157.2 tons per square inch. Apart from steel, in the form of wire, probably no such high tensile strength has ever before been obtained. The last specimen also exhibited an elongation on 2 inches of 15.5 per cent. At normal temperature, its tensile strength was 43.9 tons per square inch. Sir Robert makes this comment: "These results show that, if, in the future, such a material is required, then, in some artificial manner, such high tenacity will be obtainable. The results are remarkable, seeing that the tensile strength of an alloy composed chiefly of the metal iron can be raised about 3½ times above its original strength." Iron, in its pure state, has a tenacity of only 18 to 21 tons per square inch.

In the same issue of "Iron Age," the Pennsylvania and Maryland Steel Companies describe a new chrome-nickel steel, made by them from ore mined from the Mayari deposits on the Island of Cuba, estimated to contain 1,000,000,000 tons of ore. "Mayari" steel is made with any percentage of carbon from 0.03 to 1.50. Sulphur and phosphorus are below 0.04 per cent., the phosphorus, however, seldom being found as high as 0.02 per cent. The manganese may be as desired. The nickel varies from 1 to 1.25 per cent. The chromium content divides the steel into two classes; one contains from 0.20 to 0.40 per cent. chromium, and the other has a range of 0.40 to 0.70 per cent." A greater tensile strength of 8,000 to 10,000 lb. per square inch, and a higher elastic limit, is claimed for this steel in the rolled or forged condition, as compared with a carbon steel of the same carbon content. Compared with 3½ per cent., nickel steel, containing 0.40 per cent. carbon, Mayari steel, of like carbon content, is said to show a tensile strength and elastic limit from 10,000 to 15,000 lb. per square inch higher than the nickel steel, "except where the drawing temperature approaches the quenching temperature. Here the nickel steel is slightly superior, as in the case of annealed pieces. In the latter condition, Mayari steel lies about mid-way between the carbon steel and the nickel steel."

The great development of the automobile industry has afforded an outlet for large quantities of nickel steel, possessing, as it does, the union of strength and lightness essential for successful high-speed machines.

Nickel in Foreign Lands

A number of years ago, the nickel mines of Norway made not inconsiderable contributions to the world's output of this metal. These deposits are again being worked, notwithstanding their low grade. In 1911, the Evje Company raised about 25,200 metric tons of ore. The smeltery treated 24,000 tons from the mines at Slaa, 2,480 tons from the mines at Faœ, a separate company; 2,070 tons of ore imported from Greece, and about 120 tons of matte from France. The metal content of the matte produced was 418.5 tons of nickel, and 185 tons of copper. The old mines at Ringerike are being re-opened, and the ore will be smelted at the mines to matte, which will be refined at the Christiansand nickel refinery. The latter, in 1911, produced 285 tons of electrolytic nickel, and 80 tons of copper. Its capacity is being extended to produce 600 tons of nickel, and 300 tons of copper per annum.[3]

Apart from Ontario, New Caledonia mines supply the greater part of the world's requirements of nickel. At present Ontario's contribution is about 70 per cent. of the whole. The annual report of the French Colonial Minister[4] shows that preparations are on foot to increase the output from New Caledonia, and that reduction of the ores to matte on the spot will henceforth be a prominent feature of the local practice. Speaking of the year 1910, the report states that there were in force 1,625 mineral concessions, covering an area of 770 square miles, though only 34 are being exploited. The chief metals extracted, in the order of their importance, are nickel, cobalt, chromic-iron and copper. Of the number of the concessions, 60 per cent. are worked for nickel, 17 for cobalt and 17 for chrome. Notwithstanding the large aréa granted for mining purposes, scarcely 4 per cent. are utilized. The *Echo des Mines* points out that a great advance has been effected by the erection of smelters for the reduction of the ores to mattes or metal, so as to economize transport charges. At Doniambo the furnaces were blown in last July for the fusion of hydrosilicate ores into mattes containing 45 per cent. of nickel. The minimum value of the ores thus treated is fixed at 5½ per cent., and each of the six furnaces passes about 15 tons per twenty-four hours. Two others are in course of construction, and the works will then attain a capacity of 35,000 tons of matte annually. At Tao the smelters are run by hydro-electric energy, and it is proposed to harness the whole hydraulic power of the river Tao, which it is calculated will aggregate 10,000 h.p. At Thio the Nickel Company are erecting a large smelting establishment to reduce their ores to matte and send them to their works in Europe for refining. The Chrome Company intend to capture the waters of the river Yate, estimated to furnish 25,000 h.p., with the object of reducing their ores to ferro-nickel and ferro-chrome. These works will involve an outlay of over £200,000; this company produced 40,000 tons [4]of 6.30 per cent. nickel ore in 1910.

Nickel ores of the Sudbury type are reported from Cape Colony, South Africa. The deposits are thus described by the *Mining Magazine* (London, Eng.) for May, 1912:—

The *South African Mining Journal* for March 9 contains an account by A. L. Du Toit, extracted from government reports, of the copper-nickel deposits at Mount Ayliff, in the Insizwa range, East Griqualand. This district is about 100 miles south-west of Pietermaritzburg in Natal, and 50 miles from the east coast of the Cape province. The occurrence of copper ore in this district has been known for twenty years, and a limited amount of prospecting has been done, but without any satisfactory results. The examination of the district by the Cape Geological Survey has given a new impetus, and the account of the geology and ore deposits is of considerable interest. The strata are bluish shales, flagstones, and thin sandstones, belonging to the Beaufort series of the Karroo system, and lying nearly horizontal. These beds have been penetrated by numerous intrusions of igneous rocks in the shape of sheets and dikes. Most of the igneous rocks may be classed as dolerite, but the great sheet of the Insizwa range and of the adjoining peaks and ridges partakes more of the nature of gabbro. The metamorphism of the strata caused by the igneous rocks is more pronounced than in the Karroo and Stormberg districts further west. The copper-nickel ores are found mostly at the contact of the gabbro and the altered sedimentaries. They are also found to a small extent as impregnations of the sedimentaries, but are more abundant in, and sometimes restricted to, the igneous rocks, of which they appear to have been an original constituent. The mode of occurrence is somewhat similar to that of the copper-nickel deposits at Sudbury, Ontario, and in Norway. Owing to the infrequent exposure

[3] Echo des Mines, April 18, 1912, quoted in Eng. and Mg. Journal, New York, May 4, 1912.
[4] See the Mining Journal (London, Eng.), December 23, 1911.

of the base of the gabbro, the evidence of the presence of ore can only be obtained by sinking, and this has been undertaken when the rocks are stained with carbonate of copper or with silicate of nickel, in the presence of limonite. The three chief minerals found in the lodes are pyrrhotite, chalcopyrite and pentlandite, that is, a sulphide of nickel and copper of variable composition. The ores can be generally separated into two groups, one consisting chiefly of chalcopyrite, and the other richer in pyrrhotite and pentlandite, but the character of the ore varies so much, and the minerals are so finely divided, that it is doubtful whether the minerals preponderating in nickel and copper respectively could be separated mechanically in ordinary ore-dressing practice. Bornite is also found in thin layers along joints in altered sandstone close to the contact. Niccolite, the arsenide of nickel, has been found in thin veins, in the foot-wall in one of the workings. Platinum has been detected in varying amounts, and is considered to be in the form of sperrylite, the arsenide of platinum. In one case it has been found in a sample of ilmenite. The assays of a large number of samples have shown the copper to average 4 per cent., the nickel, 3.8 per cent., and the platinum, 2½ dwt. per ton. The Cape government is affording every facility for further prospecting of this deposit.

The last five years of the nickel-copper mining industry are summarized in the following table:—

Table No IX.—Nickel-Copper Mining, 1907 to 1911

Schedule.		1907	1908	1909	1910	1911
Ore raised	tons	351,916	409,551	451,892	652,392	612,511
Ore smelted	"	359,076	360,180	462,336	628,947	610,788
Bessemer matte produced	"	22,041	21,197	25,845	35,033	32,607
Nickel contents	"	10,602	9,563	13,141	18,636	17,049
Copper contents	"	7,003	7,501	7,873	9,630	8,966
Value of Nickel	$	2,270,442	1,866,059	2,790,798	4,005,961	3,664,474
Value of Copper	$	1,020,913	1,062,680	1,122,219	1,374,103	1,281,118
Wages paid	$	1,278,694	1,286,265	1,234,904	1,698,184	1,830,526
Men employed	No.	1,660	1,680	1,796	2,156	2,439

International Nickel Company

The following information is extracted from the ninth annual report of the International Nickel Company, being for the twelve months ending March 31, 1911. The company's capital stock issued and outstanding was as follows:—common stock, $11,-582,606; preferred stock, 6 per cent. non-cumulative, $8,912,626; total, $20,495,252. The net bonded debt was $8,475,153. Earnings of constituent companies, after charging manufacturing and selling expenses and repairs, amounted to $5,256,938. Deducting administrative and head office expenses, $228,064, the net income was $5,028,873. After making provision for the following: Depreciation of Plants, $454,319; Mineral Exhaustion, $151,603; Bond Sinking Fund, $192,000, and Interest on Bonded Debt, the profits for the year were shown to be $3,775,600, out of which were paid dividends on preferred stock of $534,748, and on common stock, $808,778, the remainder, $2,432,073, being transferred to the balance sheet. Common stock amounting to $2,670,000 was issued at par to both preferred and common stockholders to the extent of 15 per cent. of their then holdings. The rate of dividend on the preferred stock was 6 per cent., and on the common 7 per cent., plus 25 per cent., or 32 per cent. in all. President A. Monell remarks:—

The demands for the company's products for the fiscal year just closed was the largest in the company's history, indicating that the increase of 1909 over previous years was well grounded. The growth of the motor vehicle business, both for pleasure and transportation, and the wise policy of the makers to use a superior grade of steel, has an important bearing on these results. A study of this transportation business leads us to believe that it has a vast field for further expansion. Experience has proved that the best available material is the cheapest type of construction for efficient and continuous service. We are still developing the Movel Metal business. During the year satisfactory arrangements have been made to supply the trade with castings, rods and sheets. We are still continuing our policy of plant improvement and development at Copper Cliff upon every possible opportunity.

Copper

The whole of the copper produced in 1911, with a trifling exception, came from the nickel-copper mines of the Sudbury district. This exception consisted of some 50 tons of ore raised from a prospect in the township of Lebel, east of the T. & N. O. railway, owned by Messrs. Ogilvie and McKinnon, now the Dane Mining Company. The ore was shipped to the American Smelting and Refining Company, Perth Amboy, N.J. The deposit carries small values in gold and silver.

None of the sulphide mines on the north shore of lake Huron were in operation. Bruce Mines, owned by Messrs. Leonard and Longwell, has been shut down, and the machinery is offered for sale. The silicious nature of the gangue makes the ore undesirable for smelting, and the copper contents are low. A discovery of chalcopyrite of good quality was reported from the township of Gould on the Mississaga river.

Iron Ore

Iron ore to the amount of 175,631 tons was shipped in 1911 from four mines, Helen, Atikokan, Moose Mountain and Belmont, the last-named sending out a few tons only. Of the consignments, 137,377 tons were hematite, and 38,254 tons magnetite. From the Moose Mountain mine 5,294 tons were shipped to Ashland, Kentucky, and Buffalo, N.Y., and from the Cordova mine 126 tons to the Buffalo Union Furnace Company, Buffalo, N.Y. The remainder of the shipments went to blast furnaces in the Province. The number of men employed in the mines was 685, and the amount of wages paid $348,062. The Wilbur mine, owned by the Hawthorne Silver and Iron Mines, raised a quantity of ore, but made no shipments.

At the Magpie mine, Michipicoten district, the property of the Lake Superior Corporation, a plant is being installed to prepare the sideritic ore for smelting. The process consists in roasting, with the view of eliminating the sulphur and carbonic acid contents. A Gröndal magnetic concentration plant is well advanced towards completion at Moose Mountain, where portions of the ore body are too low in metallic iron contents to be suitable for smelting in their natural condition.

Iron ore is reported from the township of Miscampbell, Rainy River district, but nothing definite is yet known as to the extent or value of the deposits.

Pig Iron and Steel

There are now nine blast furnaces in Ontario for the production of pig iron. The Algoma Steel Company at Sault Ste. Marie has three, the Canada Iron Corporation, Midland, two; the Steel Company of Canada, Hamilton, two, and the Atikokan Iron Company, Port Arthur, and the Standard Chemical Company, Deseronto, one each. In all, these plants turned out 526,610 tons of pig iron, valued at $7,716,314, an average of $14.65 per ton. In 1910 eight furnaces produced 447,351 tons of pig iron, worth $6,975,-418. At Sault Ste. Marie the whole, and at Hamilton a part, of the pig iron product is converted into steel, the former making Bessemer and open-hearth steel, and the latter basic open-hearth. Much the greater part of the steel output of the Algoma Steel Company is rolled into "standard tee" rails, of which the production last year was 243,703 tons, the remainder, 24,617 tons, being in the form of merchant bars, tie plates, angle splice bars, light rails, bolts and nuts.

The supplies of ore for the use of blast furnaces in Ontario continue to come mainly from the United States. The product of the Helen and Atikokan mines went to the smelters at Sault Ste. Marie and Port Arthur respectively, and part of the output at Moose Mountain was shipped to Hamilton; but the entire quantity of Ontario ore actually charged into the furnaces was only 67,631 tons, out of a total of 916,445 tons smelted, or a trifle over 7 per cent.

The figures in the following table cover the sixteen years which have elapsed since the iron smelting industry of Ontario awoke from its long sleep in 1896, and they show that the proportion of iron ore supplied to the furnaces from mines situated within the boundaries of the Province is not increasing. Only once—in 1901—did it amount to more than one-half, and for the whole period did not reach one-quarter, declining to 7.3 per cent. in 1911. Of the whole quantity of iron ore raised from the mines of Ontario during this time, 2,462,807 tons, a little over one-half went to furnaces in the Province, and the remainder was exported. This fact goes to show that even if iron ore of domestic origin were being produced more freely than it is, a considerable proportion would probably find its way to the other side of the border. Blast furnaces require a mixture of ores for the proper regulation of the charge, or to produce iron of a particular quality, hence part of the ore exported from Ontario to the United States may be regarded as in reality exchanged for ores of composition better suited to the purpose in hand. In the tremendous deposits of Minnesota and Michigan, with their highly developed system of water transportation, iron-masters in the lake and other regions of the east have a variety of choice and an assured continuity of supplies which the mines of Ontario do not as yet afford. So far, the extensive iron formation rocks which characterize many parts of northern and northwestern Ontario have provided a few large bodies of workable ores, among them the Helen, Moose Mountain, Atikokan and Magpie, and in many other localities there is reason to believe that further exploration will be similarly rewarded. There are numerous deposits of banded magnetite and other types of silicious ore which at some future time will undoubtedly be utilized by suitable processes of concentration, but which under present conditions must remain dormant.

In the fact that the raising of iron ore has lagged behind the making of pig iron and steel, Ontario is typical of the Dominion of Canada as a whole. Out of a total Canadian production of pig iron in 1911 of 917,535 tons, no less than 875,349 tons, or 95 per cent., was smelted from imported ore.

Table X.—Iron Ore Produced and Smelted in Ontario

Year.	Produced in Ontario.	Ore smelted in Ontario.			Proportion Ontario ore smelted
		Ontario Ore.	Foreign Ore.	Total.	
	Tons	Tons.	Tons.	Tons.	Per cent.
1896	....	15,270	35,868	51,138	29.8
1897	2,770	2,770	34,722	37,492	7.3
1898	27,409	20,958	56,055	77,013	27.2
1899	16,911	24,494	85,542	110,036	22.2
1900	90,302	22,887	77,805	100,692	22.7
1901	273,538	109,109	85,401	194,510	56.0
1902	359,288	92,883	94,079	186,962	49.6
1903	208,154	48,092	103,137	151,229	31.7
1904	53,253	50,423	173,182	223,605	22.5
1905	211,597	91,960	383,459	475,419	19.3
1906	128,049	101,569	396,463	498,032	20
1907	205,295	120,156	388,727	508,883	23.6
1908	216,177	170,215	342,747	512,962	33.1
1909	263,777	220,307	543,544	763,851	28.7
1910	230,656	143,284	679,890	823,174	17.4
1911	175,631	67,631	848,814	916,445	7.3
Total	2,462,807	1,302,008	4,329,435	5,631,443	Av. 23.1

The figures show the business of iron ore smelting to have experienced a steady growth during the period covered by the Table. The blast furnace established at Hamilton in 1896 began the production. Deseronto followed suit in 1898, Midland in 1900 Sault Ste. Marie in 1904, and Port Arthur in 1907. The Hamilton, Midland and Sault Ste. Marie plants have all increased their capacity since their establishment, there being now a total of nine furnaces in operation. Shipments from the Helen mine began in 1900, and this property has furnished the greater part of the production of ore since that time.

For the year 1911 the extent of the blast furnace and steel making operations is shown by the following figures:—

Ontario ore smelted	tons	67,631
Foreign ore smelted	tons	848,814
Scale and mill cinder	tons	18,476
Limestone for flux	tons	275,628
Coke for fuel	tons	577,388

Value of ditto	$2,367,704
Charcoal for fuel . ...bush.	1,666,897
Value of ditto	$158,354
Pig iron product . ...tons	526,610
Value of ditto	$7,716,314
Steel product . ...tons	361,581
Value of ditto	$9,505,013
Workmen employed . ...No.	3,633
Wages paid	$2,927,573

The Electro Metals, Limited, Welland, have developed a considerable business in the manufacture of ferro-silicon produced in electric furnaces, of which there are seven. The silica is supplied by flint, sandstone and sand of suitable composition, and is fused with iron ore. The ferro-silicon contains about 50 per cent. silicon. Experimental quantities of ferro-titanium (10 per cent. titanium) were also made.

Table XII., which follows, gives particulars of the manufacture of pig iron and steel in Ontario during the five year period beginning with 1907:—

Table XI.—Production Iron and Steel, 1907 to 1911

Schedule.	1907.	1908.	1909.	1910.	1911.
Ontario ore smelted....................................tons	120,156	170,215	220,307	143,284	67,631
Foreign ore smelted ... . "	388,727	342,747	543,544	678,890	848,814
Limestone for flux.................................. "	171,037	179,741	226,991	248,750	275,628
Coke .... "	326,937	322,817	436,707	471,493	577,388
Charcoal.......................................bush.	1,849	....	973,413	1,133,419	1,666,897
Pig iron.......... ....tons	286,216	271,656	407,013	447,351	526,610
Value of pig iron .... $	4,716,857	4,390,839	6,301,528	6,975,418	7,716,314
Steel ....tons	237,855	172,108	296,031	331,321	361,581
Valne of steel .... $	4,168,127	4,397,082	6,759,960	7,855,407	9,505,013

Construction Materials

Building or construction materials, including bricks of all kinds, lime, stone and cement, were produced to a greater value in 1911 than in the previous year by upwards of a million dollars. The only article in the list showing a decrease was lime, of which the returns showed $72,191 worth less to have been made than in 1910. The building trade was active last year, particularly in the cities and larger towns, and the demand for bricks, stone and cement was good. It is even probable that in some cases building operations were curtailed because of the difficulty in procuring the necessary materials.

Brick

Common brick to the number of 354,546 M. were made in 1911, having a value of $2,801,971, as compared with 304,988 M. in the year previous, valued at $2,374,287. The average price per M. works out at $7.90, as against $7.78 in 1910. For many years the cost of brick as reported by the brickmakers to the Bureau of Mines has been advancing. In 1901 the average price per M. was $5.73, and it rose successively to $6.41 in 1902, $6.78 in 1903, $7.15 in 1904, and $7.75 in 1905. Here a check was interposed, and the price fell back in 1906 to $7.19, but regained in 1907 almost all the lost ground, advancing to $7.70. It receded in 1908 to $7.09, but went up again in 1909 to $7.78, maintained that figure for 1910, and in 1911 reached the highest point yet at $7.90. Beyond doubt the increase has been largely due to the higher wages paid for labor, which is the chief element in the cost, but partly also, it may be, to the greater demand, the annual manufacture having risen from 259,265 M. in 1901 to 354,546 M. in 1911. Builders say that of late years better methods have been in use for manipulating the clay and burning the brick, with the result that the quality of tne product has been considerably improved. There is also a greater variety to be had, in color and form, enabling effects to be obtained in house-building which were previously impossible.

Of pressed brick, the number made last year was 52,763,91½, an increase over 1910 of 8,559,619. The value rose from $458,596 to $564,630, the average value being $10.70 per M., as compared with $10.37 in 1910. Shale from the Hudson River and Medina formations is used as raw material for pressed, or rather re-pressed, brick.

The number of brickyards is large, and they are to be found in practically all parts of the Province, especially in the older districts. In the newer settlements, where timber is plentiful, wooden buildings are the rule, as being the cheapest, but in the hot summers, and even at other seasons of the year, villages or towns built of wood are subjected to the constant menace of destruction by fire. The newer towns of the north, Cobalt, Haileybury, Elk Lake, Gowganda, Cochrane, Porcupine, and the like, have all been visited by conflagrations, sometimes due to burning forests and sometimes to causes within the towns themselves; and heavy loss of property, and occasionally loss of life, has been the result. In the absence of any other available material, re-building operations have again made use of wood, so that until suitable deposits of clay can be located and brickyards opened, it is difficult for these frontier communities to ensure themselves against the recurring ravages of fire. In some parts of the Province stone is abundant and is preferred to brick, but in general the latter is the material of which not only the dwellings, but also the business places and factories of older Ontario are built. The clay in certain localities and of deposits of a particular kind burns white, but the great bulk of the brick used for construction purposes are of some shade of red.

Paving brick for street-making was manufactured in 1911 to the number of 4,522,400, valued at $86,685. This compares with 3,799,025 made in 1910, worth $70,648. The price per M. rose from $18.59 in 1910 to $19.16 last year.

Of all classes of brick—common, pressed and paving—the manufacture last year had a total value of $3,453,286, as against $2,903,531 in 1910. Including drain tile, dealt with below, which are usually made in the same yards as brick, the number of men employed in the industry was 3,654, to whom were paid wages amounting to $1,592,020. The average earnings per man employed were, therefore, $435, as compared with $400 in 1910 and $303 for 1909, clearly pointing to increased remuneration and a longer working season.

Lime and Stone

The quantity of lime turned out by the kilns of Ontario last year, according to returns made to the Bureau, was less than in 1910, being 2,469,773 bushels, worth $402,340, as against 2,889,235 bushels, valued at $474,531 in the previous year. The average price per bushel in 1911 was 16.2 cents, as against 16.4 cents in 1910. Limestone is abundant, and lime is consequently easily procurable in older Ontario, but less easily so in the northern districts, where the geological formations are largely of a different character. A feature of the new Central Prison at Guelph is the employment of convict labor in quarrying stone and burning lime, the hydrated variety of which is also made.

Building and crushed stone, which are grouped together for statistical purposes, had a production last year valued at $892,627, or an increase of $131,501 over 1910. The uses to which this material are put are many and varied. Of the large-sized stone, much of it goes into buildings, the cut or dressed stone for facings or outside walls, the commoner kinds into inside walls and foundations; and part is used for bridge abutments, piers, break-waters and other large and heavy works. The crushed product is used largely for roads and pavements, and when of suitable composition, for blast furnace flux. There was a considerable production of granite in 1911 by Messrs. David J. Gordon and Sons, Gananoque.

The marble quarries near Bancroft, in the county of Hastings, are producing material which in color, beauty and variety of markings, and size of slabs, compares favorably with almost any other marble on the market. Among the buildings in which it has been used for interior decorations is the new Standard Bank building on King Street West, Toronto. The veinings and shades of color are striking, yet pleasing in effect. A marble deposit is also being opened up at Marble Bluff, in the Township of Darling, Lanark county, by the North Lanark Marble and Granite Quarries, Limited, of St. Catharines. The material is serpentine, of a handsome green color.

It may not be out of place to note here that while investigating the Pre-Cambrian geology of southeastern Ontario, Prof. W. G. Miller, Provincial Geologist, and his assistant, Mr. C. W. Knight, located an area of trap rock near Havelock Station on the Canadian Pacific Railway. Trap is an ideal material for road-making, being hard and very tough. The engineer for the system of good roads under construction in the neighborhood of Toronto, Mr. E. A. James, being on the outlook for a quarry within convenient distance of Toronto from which to obtain stone for use on these roads, had his attention directed by Mr. Knight to this particular locality. It is understood that on examination, Mr. James found that this occurrence of trap practically solved the problem of providing suitable material. The quarry will be within 100 miles of Toronto, and could supply rock not only for that city, but also for other cities and towns within an economical shipping radius. The city of Cleveland, Ohio, whose boulevards are famous among American cities, has for years been drawing supplies of similar trap rock from near Bruce Mines, Ontario. The foregoing is an instance of how "practical" results are not infrequently the outcome of work undertaken primarily for "scientific" purposes.

Portland Cement

The manufacture of Portland cement in Ontario is now largely in the hands of the Canada Cement Company, Limited, whose plants at Belleville (2), Marlbank, Lakefield, Port Colborne and Shallow Lake produced two-thirds of the entire quantity made last year. The other plants are those of the National Portland Cement Company, Durham; the Imperial Cement Company, Owen Sound; the Ontario Portland Cement Company, Blue Lake; the Maple Leaf Portland Cement Company, Atwood; the Superior Portland Cement Company, Orangeville; the Hanover Portland Cement Company, Hanover; the Kirkfield Portland Cement Company, Raven Lake; the Sun Portland Cement Company, Owen Sound, and the Crown Portland Cement Company, Wiarton. The production in all was 3,010,849 barrels, valued at the works at $3,640,642, or $1.209 per barrel. In 1910 the output was 2,471,837 barrels, worth $3,144,343, or $1.273 per barrel.

The constantly growing use of Portland cement for a great variety of purposes has naturally stimulated the production in Ontario, where the raw materials are abundant. The tendency noted in previous reports to employ limestone rock instead of marl for the necessary carbonate of lime continues to be manifested. The largest producers are those plants which use rock; in fact, not far from one-half of the total out-put last year was made from limestone. Beds of marl, large though they may occasionally be, are of small cubical contents compared with strata of rock, scores, perhaps hundreds, of feet in thickness, and extending over many acres in area. Economy in transportation and handling of material are therefore possible, of which ordinary marl deposits do not permit. The product in the one case seems to be as good as in the other, but naturally that process which can produce the article more cheaply will in the end obtain mastery of the field.

The quantity of cement in stock at the beginning of the year was 581,033 barrels, and at the close 543,611 barrels. The number of men employed in the factories was 1,471, who earned in wages $898,256.

At one time a considerable business was done in the manufacture of so-called "natural rock" cement, which was made by crushing and grinding limestone of suitable composition without the addition of clay. It sold for a smaller price per barrel than the Portland variety, but for a variety of reasons it waned in the popular esteem as Portland cement was introduced and began to be made in quantity, and its manufacture in this Province has now entirely ceased.

The following table shows how rapidly the production of Portland cement has increased in this Province since 1891, when it first began:—

Table XII.—Production of Portland Cement, 1891 to 1911.

Year.	Barrels.	Value.
		$
1891	2,033	5,082
1892	20,247	47,417
1893	31,924	63,848
1894	30,580	61,060
1895	58,699	114,332
1896	77,760	138,230
1897	96,825	170,302
1898	153,348	302,096
1899	222,550	441,228
1900	306,726	598 021
1901	350,660	563,255
1902	522,899	916,221
1903	695,260	1,182,799
1904	880,871	1,239,971
1905	1,254,360	1.783.451
1906	1.598,815	2,381,014
1907	1,853,692	2.777,478
1908	2,022,877	2,417,769
1909	2,303,263	2.897.348
1910	2,471,837	3.144,343
1911	3,010,849	3,640,642
Total	17,966,075	24,888,907

It will be seen from the table that every successive year has seen a larger output than the year before, and that the tendency towards increase is still strong. Concurrently, there has been a steady decrease in the price per barrel at which the output is valued. Thus, in 1891, the average was $2.499 per barrel. In 1896 it had fallen to $1.777; in 1901 to $1.606; in 1906 to $1.495, and in 1911 to $1.209.

Other Clay Products

The practice of tile draining is now recognized as a constituent of good farming, and assistance is provided by the Government of Ontario both to township municipalities who may wish to borrow money for loaning to farmers for putting in tile drains, and to the individual farmers themselves. In the former case money is advanced at four per cent. interest to the township councils, who collect the principal and interest along with the ordinary taxes from those to whom the money is advanced. In the latter, experts are sent out by the Ontario Agricultural College, who lay out plans of farm drainage and give instruction in the proper methods of installing the tiles. The expense of this work to the farmer benefited is nominal, but of course the cost of the tiles and of laying them in the ground is borne by him. The manufacture of tile is carried on along with brick-making in a number of the yards situated in the agricultural districts. Last year the number of tile made was 21,630,000, worth $349,545, as compared with 21,028,000, valued at $318,456 in 1910.

Sewer pipe of good quality is made in three factories, belonging respectively to the Dominion Sewer Pipe Company, Swansea, the Ontario Sewer Pipe Company, Mimico, and the Hamilton and Toronto Sewer Pipe Company, Hamilton. The united output of these plants for 1911 had a value of $410,064, as against $357,087 in 1910.

Arsenic

The proportion of arsenic contained in the ore and concentrates shipped from the mines of the Cobalt district is assumed for statistical purposes to be 14.28 per cent.,[5] and on this basis the arsenic contents of the shipments for 1911 was 3,806 tons. There were recovered from the product of Cobalt mines by the several refining works in Ontario 2,117 tons of white arsenic, the actual shipments being somewhat greater, namely, 2,170 tons. This is equivalent to 1,605 tons metallic arsenic. This leaves 2,201 tons unaccounted for, so far as the statistics of this Bureau are concerned. The bulk of it went to the smelting works in the United States and elsewhere along with the ore and concentrates in which it was contained. A portion was no doubt saved in these works

[5] See 20th Rep. B.M., 1911, page 17 et. seq.

during the process of recovering the silver, but it is impossible to say how much. Another, perhaps the greater portion—that contained in the ores of lower grade—went to waste. There are other sources of arsenic in Ontario, notably the mispickel deposits of Hastings county, some of which carry gold as well, but none of these are being worked at the present time.

The value accredited to the arsenic output, $74,609, is that received by the refining companies for their shipments of white arsenic during the year, nothing being allowed for the contents of exported ores.

Iron Pyrites

Of iron pyrites there were mined and shipped (or used) last year 43,629 tons, valued at $118,457, or at the rate of $2.71 per ton. The production in 1910 was 33,812 tons of ore, worth $98,353. Four mines contributed to the output, those of the Northern Pyrites Company, near Lake Minnietakie, the Nichols Chemical Company at Sulphide in Hastings county, the Lake Superior Power Company (Helen iron mine) and the Canadian Sulphur Ore Company, also in the county of Hastings. A little was also shipped by the Buffalo-Brockville Mining Company from a deposit near the town of Brockville.

The iron pyrites resources of this Province are of considerable extent and value. Some of the largest deposits have not yet been worked in a commercial way, notably those at Goudreau lake, in the district of Michipicoten. The chief use of iron pyrites is in the manufacture of sulphuric acid, for which purpose the sulphur contents are recovered by roasting. The residues are now in some cases utilized as iron ore, provided a sufficiently complete elimination of the sulphur is obtained.

An acid-making plant is operated by the Nichols Chemical Company in connection with their mine at Sulphide, and the ore raised by that company was used for the production of acid. The company also buys the ore mined by the owners of other deposits in the neighborhood.

The Northern Pyrites Company began shipping from the Vermilion mine on Lake Minnietakie last year, and owing to the construction of the Grand Trunk Pacific railway, are now in a position to market a large output.

The growth of the iron pyrites industry during the last five years is shown in the following table:—

Table XIII—Production of Iron Pyrites, 1907 to 1911

Schedule.	1907.	1908.	1909.	1910.	1911
Pyrites shipped .... tons	15,755	20,970	28,946	33,812	43,629
Value of do .... $	51,842	69,980	78,170	98 353	118,457
Workmen employed .... No.	137	132	132	227	172(a)
Wages paid .... $	75,365	95,740	104,687	117,191	114,655(a)

(a) Does not include Helen mine, the statistics for which are comprised in those for Iron Ore.

Mica

The producers of mica last year were few in number, being the Loughborough Mining Company, Sydenham, the Dominion Improvement and Development Company, Perth, W. L. McLaren, Perth, and Kent Bros., Kingston. The total output of rough-cobbed mica was 322 tons, valued at $43,058, as compared with 543 tons, worth $85,294 in 1910. One or two other individuals and firms were prospecting their properties, but made no shipments.

The amber mica (phlogopite) of Ontario and Quebec is recognized as being the best on the market, equalling the white mica (muscovite) of India and elsewhere in its power of resistance to the electrical current, and being superior in flexibility and capacity for thin-splitting. Its value per pound depends upon the sizes which can be obtained from the product, the larger pieces being worth many times per pound those of inferior size. The smaller pieces can, however, be built up by the use of shellac into "micanite," which answers the purpose served by the larger sizes. Black mica (biotite) is sometimes mixed in small proportions with the amber variety in making micanite.

Salt

The brine wells of the south-western peninsula last year yielded 88,689 tons of salt, the value of which was $430,835. In 1910 the output was 84,071 tons, worth $414,978. The industry gave employment to 216 workmen, whose wages amounted to $121,477. There is, of course, a steady demand for this staple article, mainly for preservative purposes connected with food products, etc., but this demand is easily satisfied and does not seem to be increasing. Its requirements are small in comparison with the abundant supplies of raw material, which is present in enormous quantities. Salt constitutes the basis of a number of products of great importance in the industrial arts, connected with one or other of the elements composing it. From chlorine may be built up hydrochloric acid, bleaching powder and a variety of other articles, while the compounds of sodium, such as carbonate and bi-carbonate of soda, sodium nitrate, etc., play perhaps even a larger part in manufactures. A plant for the manufacture of caustic soda and bleaching powder from salt was established at Sandwich by the Canadian Salt Company and began operations during the last week of 1911. Some inquiry has also been made on behalf of a European firm of explosives manufacturers as to the availability of salt supplies required for the sodium nitrate used in making their product, which is finding a market in the mines at Cobalt.

About one-half of the salt made in Ontario is produced by the Canadian Salt Company, whose plants are at Windsor and Sandwich. Other makers are the Dominion Salt Company, Sarnia; Western Canada Flour Mills Company, Goderich; John Ransford, Stapleton; Ontario People's Salt and Soda Company, Kincardine; Gray, Young and Sparling, Wingham; the Western Salt Company, Mooretown; Parkhill Salt Company, Parkhill; the Elarton Salt Works Company, Warwick; Exeter Salt Works Company, Exeter. The following firms were not working in 1911: Carter and Kittermaster, Mooretown; George McEwen, Hensall; John Ransford, Brussels.

The workmen employed at the salt wells and works numbered 216, and their wages amounted to $121,477.

Petroleum

The production of petroleum in Ontario continues to decline. The quantity of crude oil yielded by the wells of Lambton and Kent counties and those in the smaller outlying pools amounted to 10,102,081 imperial gallons, as compared with 11,004,357 gallons in 1910. These figures are supplied by the Department of Trade and Commerce, Ottawa, and are compiled from the returns made by the claimants for the bounty of 1½ cents per imperial gallon paid by the Government of Canada on crude petroleum produced in Canada. Statistics of production by districts are kindly furnished by Mr. W. J. Harvey, Supervisor of Crude Petroleum Bounties, Petrolia, as follows:—

	Bbl	Gal.
Lambton	184,450	..
Tilbury	48,707	3
Bothwell	35,243	28
Dutton	6,731	26
Onondaga	13,501	4
Total	288,633	26

There was only one change in price during the year, namely, an advance on September 15th from $1.22 to $1.24 per barrel. Adding to this the bounty of 52½ cents per barrel, the average return for the year to the producer was $1.75 per barrel. In computing the value for the statistical tables of this report the bounty is of course not included.

The following table shows the output of the several fields or pools for the five years ending 31st December, 1911:—

Table XIV.—Petroleum Production by Districts, 1907 to 1911

Field.	1907.	1908.	1909.	1910.	1911.
	bbl.	bbl.	bbl.	bbl.	bbl.
Lambton	304,212	265,368	243,123	205,456	184,450
Tilbury and Romney	411,588	20[illegible],283	124,003	63,058	48,707
Bothwell	42,727	39,228	38,092	36,999	35,243
Leamington	6,133	9,334	5,929	141	....
Dutton	14,977	13,743	9,513	7,752	6,731
Thamesville	237	....	....	....	....
Onondaga (Brant Co.)	....	....	....	1,005	13,501
Total	779,876	528,959	420,660	314,410	288,633

The falling-off in the old fields is apparent from the table. Had it not been for the production from Onondaga, in the county of Brant, a pool which came in in 1910, the decrease would have been still more noticeable. It is apparent that the future of petroleum production in Ontario very largely depends upon the discovery of new oil-bearing territory, and there is ground for believing that fields yet unknown await the "wild-catter." In March, 1912, petroleum was struck at Milton, in the county of Halton. Mr. C. W. Knight, Assistant Provincial Geologist, furnishes the following note after visiting the spot.

On March 28th, 1912, the writer visited the plant of Brandon's Pressed Brick and Oil Company, which lies on the outskirts of the town of Milton. About three weeks previous to this date oil had been struck in a well on this property, a hole having been drilled about 75 yards from the pit in which the Medina shale is being dug for the brick works.

In the absence from town of Mr. Brandon, the President of the Company, the drill-man refused to give me details of the log of the well. He stated, however, in a general way, that it had been drilled about 1,500 feet, and that Medina, Hudson River, Utica and Trenton had been met with, the well having gone about 300 feet into the Trenton.

In his report on clays, Mr. M. B. Baker states that the red shales exposed on the surface at Milton belong to the Medina formation.

One Mr. Martin, interested in the brick company and oil well, stated that about 40 barrels had been obtained from the well, all of which was pumped, and he thought it would average about four or five barrels a day. The drill-man states that the oil has a specific gravity of about 39 B. I obtained a large and a small bottle of the oil for sample.

After firing, the flow of the oil was said to have greatly diminished, but the company has decided to continue sinking, and also to drill another well some 50 yards or more from the present one. About $3,000 have already been expended on the work.

More crude petroleum was treated at the refining works than in any previous year. There are two refineries, one owned by the Imperial Oil Company, Sarnia, and the other by the Canadian Oil Companies, Limited, Petrolea. Much of the larger part was, as for many years it has been, imported from the United States. The total quantity distilled was 38,632,504 imperial gallons, of which 28,244,913 gallons was American, and 10,387,591 gallons Ontario crude. The table which follows exhibits the course of the petroleum refining industry in Ontario for the last five years:—

Table XV.—Petroleum and Petroleum Products, 1907 to 1911

Schedule.		1907.	1908.	1909.	1910.	1911.
Crude produced	Imp. gal.	27,621,851	18,479,547	14,723,105	11,004,357	10,102,081
Crude distilled	"	34,961,706	34,675,120	35,530,918	36,171,032	38,632,504
Value crude produced	$	1,049,631	703,773	559,478	368,153	353,573
Value distilled products	"	2,568,464	2,347,680	2,501,384	2,511,368	2,294,396
Illuminating oil	Imp. gal.	18,319,233	17,604,920	17,902,254	18,983,357	20,240,523
Lubricating oil	"	3,931,767	3,384,940	3,856,778	4,469,038	4,729,257
Benzine and naphtha	"	4,132,239	3,667,997	3,930,691	4,297,615	4,179,575
Gas and fuel oils and tar	"	5,632,608	4,461,186	4,687,588	5,876,498	4,847,124
Paraffin wax and candles	lb.	5,132,394	5,400,003	7,092,278	5,179,391	5,267,485
Workmen employed	No.	435	430	436	428	511
Wages paid	$	265,316	247,829	261,014	280,485	314,851

Below is reproduced a letter from Mr. Charles Jenkins, of Petrolea, regarding the petroleum situation in this Province. As Mr. Jenkins is one of the oldest and most experienced oil operators in Ontario, his views are entitled to much weight.

At the end of the year 1911, the future of the petroleum producing business in the Province of Ontario is somewhat problematical. For some years the production has been declining. It is noteworthy that the oldest producing districts, Oil Springs and Petrolea, in the county of Lambton, and Bothwell, in the county of Kent, still remain at the head of the producing districts, although after an average of forty years continued pumping, the volume of their production is reduced.

To estimate the possibilities we have to consider the conditions. The Oil Springs and Bothwell crudes are a little lighter in gravity than the Petrolea crude, although similar in other respects. They are all produced from the Corniferous rock, Lower Devonian division of the Upper Paleozoic period. The rock is porous, and has been a great storehouse for crude petroleum. The crude in the Tilbury and Leamington regions comes from the Guelph strata, immediately below the Onondaga in the Lower Paleozoic period. So far it has come only in veins, and closely allied with it is the region of the natural gas production. A sample of the rock from which it is taken as compared with that of Bothwell is like the ordinary limestone for building compared with a piece of maple sugar. This accounts for the rapid decline of these later discovered territories. The Onondaga field has so far failed to make a large contribution to the production. Its oil is found in the White Medina strata, an earlier formation than the Guelph, contiguous to gas-producing area.

The oldest rock known to be oil producing is the Trenton limestone, also in the Lower Paleozoic, but so far drilling has failed to discover any paying production in this rock in Ontario. The Cincinnati anticlinal in this formation, runs up through Ohio, where it is 1,000 to 2,000 feet deep, and finally gets to the surface at the Manitoulin islands. Oil shows in the rock there have several times stimulated efforts to prospect, but without success as paying propositions.

A variety of small fields have been discovered and pumped in the past. The largest of them at present is in Dutton, another is in Euphemia township, and there is yet another in Dawn township, and shows have been seen in many places, but the conditions for paying workings were not there. For a permanent field a certain thickness of porous or oil rock is required which must be overlaid with impervious strata, usually shale.

The discovery of an oil field is very often a matter of accident. It was drilling for water that led to the discovery of the Ohio field.

The Petrolea district is the largest in area in Ontario, so far extending about ten miles, north-west to south-east, by an average of three miles north to south, but the other fields have been of small area, and who can say where other fields may be discovered ? We have from the Trenton to the Corniferous to explore in, and a discovery of a new field may be made at any time.

All the oil produced in Ontario is paraffin base. These geological limits appear to preclude the discovery of any asphaltic base oil in Ontario, as from the results of drilling it would appear that asphaltic base crude is not produced anywhere below the Carboniferous period, but in or above it, and Ontario as far as explored geologically, shows older formations. The most of the large production in the United States recently has been of this kind of oil.

The outlook for increased production, therefore, entirely depends upon the chances of finding new fields with the proper conditions. In the old fields, the rate of decline is not so great as it was, and the extent of the probable area in western Ontario in which petroleum may be found forbids us to consider that petroleum production in Ontario is an exhausted industry.

Mr. Jenkins adds the following note to make clear the distinction between oils having a paraffin and those having an asphalt base.

The difference between them is that the molecule of the paraffin has two atoms of hydrogen in it more than the asphaltic, thus:—

Paraffin .... C_6H_{14}
Asphaltic .... C_6H_{12}

paraffin are more valuable than those of the asphaltic, the chief uses of the latter so far

In the early stages of the process of distillation, their behavior is not greatly different, but becomes markedly so after the burning oil stage. The heavier products of being for pavements, coverings for underground electric wires, fuel, etc.

As to extensions of the oil territory, Mr. Jenkins states, under date of 23rd November, 1911, that there were then two small groups of wells pumping oil in the township of Brooke, but the wells were small, and inducements to extend were therefore absent. Some years ago in the northern part of the peninsula attempts were made to see what there might be in the Trenton. Shows were got, but no volume of production was struck. There was at the time of writing a little flurry about Delaware. What shows were got were in the Corniferous, which rises as it goes east, and volume at Delaware is not yet proved.

Mr. John Scott, Petrolea, Inspector of gas and oil wells under 7 Edward VII., chapter 47, reports that 397 wells were abandoned during 1911 in the Lambton county and adjacent oil fields. There were also 687 wells from which the pumps had been removed, about half of which were being baled.

Natural Gas

The situation with regard to natural gas is the opposite of that as respects petroleum. While the yield of petroleum is lessening, the yield of natural gas is rapidly increasing. In 1909 the output had a value of $1,188,179, in 1910, $1,491,239, and in 1911, $2,186,762.

The natural gas territory borders on the east and north shores of lake Erie, and the gaps between the areas at present productive are steadily being obliterated, and in such a way as to make it not improbable that practically the whole shore will in time be found to be underlaid by gas-bearing strata. It has already been shown by wells drilled in the land under the water of lake Erie in front of the township of Rainham that the gas field includes portions of the bed of that lake. The outlines of the gas field in Kent county, and the large yield of wells on the shore line, strongly suggest that there is an extension of the field, probably one of considerable size, beneath the waters of the lake in that district also.

The largest single producer is the Dominion Natural Gas Company, whose head office is at Pittsburgh, Pennsylvania. The Volcanic Oil and Gas Company, Chatham; the Leamington Oil Company, Detroit; the United Fuel Supply Company, Sarnia; and the Provincial Natural Gas and Fuel Company, Niagara Falls, also produce and market large quantities of gas.

Mr. Donald Sharpe, of Welland, is also an inspector for the purpose of enforcing the provisions of the above-mentioned Act, which requires all abandoned gas and oil wells to be properly plugged. In his report for the year 1911, Mr. Sharpe, whose territory covers the counties of Welland, Haldimand, Brant, Norfolk, Wentworth, and Elgin, in which the gas is much more important than oil, states that the producing wells drilled during the year were 254 in number, distributed by counties as follows—Welland 26, Haldimand 124, Brant 60, Norfolk 19, Wentworth 9, and Elgin 16. The dry holes put down number 44. From the new gas and oil field in the township of Onondaga, county of Brant, the output of gas was about 350,000 cubic feet per day, and of oil about 2,500 barrels per month. There are now 25 gas and 32 oil wells in that field. A good gas field has been developed at Vienna, Elgin county, and mains have been laid to supply Tillsonburg and Aylmer with gas. The larger companies are doing their best to keep the wells free from water, while some small companies and private individuals, on account of not having proper machinery, do not care for their wells as they should. By reason of the great quantity of gas being used for manufacturing purposes, and the freezing up of many of the small pipes during the cold weather, many people were much inconvenienced as a result of the shortage of gas. Mr. Sharpe adds:—"If gas were available for domestic purposes only, the companies would be enabled to give the public a better service, and natural gas would last for many years."

To Mr. Sharp's report is appended a list of the producers of natural gas in Welland, Haldimand, Norfolk, Elgin, Brant, Oxford and Wentworth, as follows:—

Producers of Natural Gas in Welland-Haldimand Field

Name of Company	P.O. Address	No. of Wells
Aldrich Oil & Gas Company	Selkirk, Ont.	10
Bertie Natural Gas Company	Ridgeway, Ont.	6
Beck & Aikens	Cayuga, Ont.	12
Canfield Natural Gas Company	Canfield, Ont.	3
Cheapside Natural Gas Company	Cheapside, Ont.	3
Canboro Natural Gas Company	Canboro, Ont.	3
Coleman, J. A.	Wellandport, Ont.	3
Dominion Gas Company	Bank Hamilton Chambers, Hamilton, Ont.	299
D. Kindry & Sons	Selkirk, Ont.	6
Danskin, D.	Onondaga, Ont.	2
Empire Limestone Company	Sherkston, Ont.	17
Enterprise Gas Company	Delhi, Ont.	6
Holmes Gas Company	Selkirk, Ont.	33
Home Natural Gas Company	C/o Robt. Foster, Hamilton, Ont.	5
Hoover, Jas. E.	Selkirk, Ont.	4
Hoover, D. E.	Selkirk, Ont.	2
Humberstone Natural Gas & Fuel Co.	Humberstone, Ont.	3
Industrial Natural Gas Co.	Port Robinson, Ont.	17
Kohler & Aikens	Cayuga, Ont.	15
Lint & Emerson	Attercliff, Ont.	3
Lamb, Alfred	Selkirk, Ont.	16
Lamb, Walter	Nanticoke, Ont.	7
Lalor, F. R.	Dunnville, Ont.	5
Lawson, J. J.	Stromness, Ont.	3
Marshall, James	Lime Works, Hamilton, Ont.	17
Melick & Moote	Dunnville, Ont.	4
Midfield Natural Gas Company	32 Stinson Street, Hamilton, Ont.	7
Moore & Ricker	Canboro, Ont.	2
Miller, R. F.	Rainham Centre, Ont.	16
Medina Natural Gas Company	Chatham, Ont.	8
North Western Gas Company	Reed Block, Erie, Pa.	5
North Shore Natural Gas Company	C/o S. C. McDonald, Hamilton, Ont.	12
Nanticoke Oil & Gas Company	Nanticoke, Ont.	2
Norfold Gas Company	Port Dover, Ont.	9
Ontario Pipe Line Company	Hamilton, Ont.	7
Onondaga Oil & Gas Company	Brantford, Ont.	12
Oxford Oil & Gas Company	17 Albion Street, Brantford, Ont.	4
Ontario Iron & Steel Company	Welland, Ont.	16
Provincial Natural Gas & Fuel Company	Niagara Falls, Ont.	173
Port Colborne-Welland Natural Gas Co.	Port Colborne, Ont.	25
Producers Natural Gas Company	Bank of Hamilton Chambers, Hamilton, Ont.	96
Port Maitland Natural Gas Company	Port Maitland, Ont.	2
Port Rowan Natural Gas Company	Port Rowan, Ont.	8
Rolston & Bennett	Dunnville, Ont.	2
Roth & Wilcox	C/o S. C. McDonald, Hamilton, Ont.	2
Regal Gas Company	Hagersville, Ont.	4
Sterling Gas Company	Port Colborne, Ont.	45
Steele, J. A.	Humberstone, Ont.	6
Standard Natural Gas Company	Dunnville, Ont.	25
Selkirk Gas Company	Selkirk, Ont.	12
South Cayuga Natural Gas Company	South Cayuga, Ont.	2
Toronto Niagara Power Company	King Street East, Toronto, Ont.	9
Telephone City Oil & Gas Co.	Brantford, Ont.	3
United Gas Companies, Limited	St. Catharines, Ont.	44
Vansickle, A. W.	Onondaga, Ont.	3
Wanes & Root	Dunnville, Ont.	73
Welland County Lime Works	Port Colborne, Ont.	30
Wellandport Natural Gas Company	Wellandport, Ont.	3
	Total Number of Wells	871

Mr. G. R. Mickle, M.E., Mine Assessor, whose duties in collecting the revenue from natural gas—two-tenths of one cent per thousand cubic feet on gas used in Canada, and 2 cents on gas exported or wasted—place him in a position to speak with authority regarding the natural gas industry of the Province, furnishes the following brief notes on the three several fields:—

The Kent Gas Field

The Kent gas field seems likely to prove the most important one in Ontario in the future, and it is desirable therefore to have an approximate record of the production from this field. In order to make operations here comprehensible, it is necessary to refer briefly to the history of gas production from this area. During the search for oil in 1906 gas was found. It was some time before it was realized that there was an important gas field, and that the gas was far more valuable than the oil. On 19th March, 1907, gas was turned into the Chatham mains by the Volcanic Oil and Gas Company, to whose skill and enterprise is chiefly due the fact that it was possible to preserve the gas supply. During 1906 and the early part of 1907 whatever gas was found by the oil operators was allowed to escape. The writer estimates that during this time about 1,500 million feet were wasted. In all, about 125 oil wells have been drilled, using probaoly 3,000,000 feet of gas each in the course of drilling, making 1,875 million feet of gas that must be credited to the search for oil.

As explained on p. 152, Nineteenth Report Bureau of Mines, one barrel of oil is equal to 5,400 cubic feet of gas in heating power, and consequently actual value, therefore the equivalent of 347,000 barrels of oil was sacrificed in searching for oil. The amount of oil that has been produced in the Tilbury and Romney field up to the end of 1911 is 955,631 barrels, and the oil production is dropping in geometrical progression about 50 per cent. each year, thus:—106,992 (first year, only part year), 411,588—201,283—124,003—63,058—48,707 barrels. Of the amount produced only an insignificant proportion, viz., considerably less than 10,000 barrels, has been derived from the gas field, as outlined in the Nineteenth Report of the Bureau referred to above. All the rest was from the adjoining oil territory; the distinction between the two being that in the gas field the gas occupied strata of rock above the oil, and unless the drilling was carried too far not a particle of oil would be found; whereas in the oil territory the two are found together. This amount of 1,875 million feet of gas wasted would supply 10,000 people for 1,875 days, or about five years. On the basis of the consumption for domestic purposes in Chatham, with 10,000 inhabitants, it would last seven years. It is evident that in this particular case what was sacrificed far exceeded in value (more than thirty times) what was ultimately produced. If the same condition should arise again, there is no efficient legislation to prevent a recurrence of these events.

The total gas yield up to the end of 1911 from the Kent field is approximately as follows:—

	Cu. Ft.
Waste in 1906 and early part of 1907	1,500 million
Drilling oil wells	375 "
Waste subsequent to enforcement of penalties for wasting gas in 1907 and gas used in drilling operations unaccounted for	125 "
Total	2,000 "

This is the amount outside the production which is utilized each year.

The amount of gas delivered yearly to consumers has increased rapidly; for 1908, the first full year of production, it was 848 million, and for 1911 5,649 million, the total amount being 13,379 million; with the 2,000 million already mentioned, this makes a total of 15,379 million coming from this field up to end of 1911. On the basis explained above, this is equivalent to 2,850,000 barrels of oil. The total production of gas from this field will undoubtedly go well beyond 100,000 million feet.

Elgin Field near Port Burwell

This was described in last year's Report. The production from this field to end of 1911 has been 126 million cubic feet. Up to the present time there is no reason to suppose that this will prove a very important field.

Welland-Haldimand-Norfolk-Brant Field

New operations in this territory have been chiefly confined to testing the area farther westward and northward, and drilling in patches of land which had been neglected or insufficiently tested before. This has been attended by an encouraging amount of success. The market for gas is good and the drain on the gas supply is very heavy. The percentage of gas used for industrial purposes as opposed to domestic is not so great from this field as in Kent.

For 1911 the production from this area was approximately 4,000 million cubic feet.

Minor Products

A feature of Ontario's mineral industry is the variety of its products, which include most of the metals and a number of non-metallic substances, in addition to those dealt with under their respective headings above. Most of them are being produced in considerable quantity, and in the case of many the supply is limited only by the demand. Among these substances are corundum, feldspar, fluorspar, graphite, gypsum, peat, phosphate of lime, quartz and talc, to which may be added, among manufactured products, calcium carbide. A few notes on these will not be out of place.

Calcium Carbide

For a number of years, in fact almost since the discovery of the fact that lime and carbon fused together would on the application of water emit acetylene gas, which could be utilized for illuminating purposes, a factory for the production of calcium carbide has been operated at Merritton, on the old Welland canal. Some years later another plant was established at Ottawa, both factories taking advantage of cheap water power for the necessary electrical current. The output of these works for 1911 was 1,383 tons, valued at $84,437. In the previous year 3,072 tons were produced valued at $184,323. The explanation of the decrease lies in the fact that the Ottawa Carbide Company sold out to the Canada Carbide Company, Limited, of Montreal, and ceased operations after the sale, having run the plant for 120 days only. The Willson Carbide Company, which carried on the manufacture at Welland, also went out of business on 13th June.

Corundum

The production of grain corundum last year was 1,471 tons, worth $147,158. In 1910 it was 1,870 tons, having a value of $171,944. Formerly, there were two companies engaged in mining and preparing corundum for the market, but in 1910 the Manufacturers' Corundum Company, Limited, acquired the property of the Canada Corundum Company, and leased the mines and works of the Ashland Emery and Corundum Company, thus obtaining sole control. An average of 199 men were employed during the year, earning wages amounting to $124,491. The corundum of Ontario is found as crystals embedded in syenitic rock, from which they are separated by crushing and concentration. The finished product is graded into sizes according to the size of the grains, and is used for abrasive, cutting and polishing purposes in the treatment of metal goods. In hardness corundum stands next to the diamond. Chemically it is pure alumina, and efforts have been made to employ it as an ore of aluminium, but the problem of getting rid of the oxygen has proven a difficult one. It is much richer in the metal than bauxite, the raw material usually employed for the production of aluminium. The mines are situated at Craigmont and Burgess mines, the former being in the county of Renfrew and the latter a short distance away in the county of Hastings.

Feldspar

The variety of feldspar raised in Ontario for commercial purposes is microcline, pink or salmon-red in color and containing 13 or 14 per cent. of potash. It is exported to the potteries of Ohio and New Jersey, and is also utilized in the manufacture of enamelled ware. The quarries are situated near Verona, in the county of Frontenac, on the Kingston and Pembroke railway. Some 17,697 tons were raised and shipped in 1911, valued at $51,610, as against 16,374 tons in 1910, worth $47,518. The largest production was by the Kingston Feldspar and Mining Company, Kingston, smaller quantities being raised by the Dominion Improvement and Development Company, Perth; the McDonald Feldspar Company, Toronto, and the Ojaipee Silica and Feldspar Company Toronto. The property operated by the last-mentioned company is situated at

Long lake, in the township of Conger, Parry Sound district. Several quarries owned by other persons or firms in the neighborhood of Verona were idle during the year.

Graphite

Two companies, the Globe Refining Company, Limited, at Port Elmsley, and the Black Donald Graphite Company, Calabogie, raised a total of 4,833 tons of crude graphite ore in 1911, and shipped refined products from their treating plants to the extent of 894 tons, worth $36,492. The Virginia Graphite Company is developing a property and erecting a plant near Wilberforce, but has not yet shipped any ore or product. Graphite has many uses, being employed in the manufacture of crucibles, in lead pencils, as a lubricant for foundry facings, as stove polish, etc. It is sometimes known as plumbago, and also as " black lead."

Gypsum

The deposits of gypsum at present being worked in Ontario are situated in the valley of the Grand river, near Caledonia, and elsewhere. Last year the output of the mines was 20,335 tons, valued in a crushed but otherwise crude condition at $32,535. The Alabastine Company, of Paris, manufactures a variety of products from gypsum, such as wall plaster, alabastine for kalsomining, etc., obtaining its supply of raw material from Caledonia. The Crown Gypsum Company's mill was destroyed by fire in 1911, but the company set about the work of rebuilding and hoped to be in a posiiton to resume operations by April 1, 1912.

The gypsum resources of the Hudson Bay slope appear to be very extensive, and are described in several of the Reports of the Geological Survey of Canada[6] and of this Bureau,[7] also by Mr. E. B. Borron, the veteran explorer of northern Ontario, in his Report on the Basin of the Moose River. Dr. W. A. Parks speaks of an exposure of gypsum on the Nipissing-Algoma boundary line near the French river, a tributary of the Moose, " having a diameter of three miles in all directions "; also of a deposit cut by the east branch of the French river, 20 chains long and 12 feet thick where exposed; and of a third deposit on the Missanabie river, about 22 miles up stream from the mouth of the Abitibi, extending on both sides of the river for about a mile and a half. J. M. Bell refers to the occurrences of gypsum at White Rocks on the banks of the Moose river, where there are two separate groups of deposits, the upper one extending for two miles and a half or two miles and three-quarters on both sides of the river, and the lower one for about a mile. The National Transcontinental and Temiskaming and Northern Ontario railways have brought these deposits within nearer range, but they are still too remote to warrant their being opened up and worked.

Quartz

Seven companies or firms were engaged in producing quartz during 1911, as follows: Canadian Copper Company, Copper Cliff; Mond Nickel Company, Victoria Mines; McPhail and Wright Construction Company, Sault Ste. Marie; Kingston Feldspar and Mining Company, Kingston; A. B. Willmott, Toronto; and McDonald Feldspar Company. Toronto. The material raised by the nickel-mining companies, as well as by some of the other producers, was for use in blast furnace operations; the remainder was required for a variety of purposes. Quartz is one of the two constituents in the manufacture of ferro-silicon, the other being iron ore, and it is also employed in one of the processes for the production of sulphuric acid.

The total quantity quarried and shipped last year was 56,723 tons, valued at $64,405. The production in 1910 was 90,685 tons, valued at $87,424. One hundred and ten men found employment in the quartz quarries, and earned in wages $40,459.

Talc

The principal talc deposit at present in operation is in the township of Huntingdon, county of Hastings, and is worked by Messrs. Cross and Wellington. Its product goes to the talc mill at Madoc, owned by Messrs. Geo. H. Gillespie and Company, where it

[6] Rep. Gen. Sur. Can., 1875, p. 321. [7] Eighth Rep. B.M., 1899, pp. 190, 191, 194, also 13th Rep. 1900, pp. 156 etc.

is ground and graded according to fineness and quality. A deposit at Eldorado was opened last year by the Canadian Talc and Silica Company, Limited, and a plant installed for treating the output. A small quantity of talc was put through the mill and converted into commercial products. In all 5,404 tons of ground talc were shipped out, worth $47,725. There are a number of uses to which ground talc is put. Perhaps the largest quantity is used in the paper-making trade; it is also employed in the manufacture of cosmetics and soap, as talcum powder, etc. The industry gave employment to 38 men, who were paid in wages the sum of $17,530.

Miscellaneous

A small quantity of phosphate of lime, about 20 tons, was shipped from a property in North Burgess, worked by the Dominion Improvement and Development Company. About 1,500 tons were mined during the year.

From a deposit of fluorspar, owned by Mr. F. F. Battle, in the township of Huntingdon, Hastings county, Messrs. Cross and Wellington shipped about 30 tons, valued at $200.

The Olden or Long Lake zinc mine in the county of Frontenac was worked for the greater part of the year, but no shipments were made. The Albemarle Zinc Company, London, extracted from an opening near Wiarton about 7 tons of sphalerite and shipped it to Cleveland, Ohio. The assay showed it to contain zinc, 47.97 per cent.; sulphur, 21.60 per cent.; lime (CaO), 9.77 per cent., iron, 0.60 per cent., and lead, 0.007 per cent.

The manufacture of peat fuel is receiving considerable attention from the Department of Mines, Ottawa, which established an experimental and demonstration plant at Alfred, in the county of Prescott. Of the product, 265 tons were sold to customers at the village of Alfred, and 815 tons were shipped by rail to Montreal and Ottawa, and sold at $3.25 per ton. The peat was used in parlor grates, in kitchen ranges, and in furnaces. It burns to a fine ash, there being practically no residue, and at the above price is said to be cheaper than coal. Dr. J. McWilliam, of London, has for some time been experimenting with a peat fuel plant in the township of North Dorchester. He produced a small quantity last year, but expects a larger output in 1912. In all, 1,180 tons of Ontario peat fuel was marketed in 1911.

Mining Revenue

For the fiscal year ending 31st October, 1911, the Province derived a revenue from mining sources, amounting to $798,920.01, a decrease, as compared with the previous twelve months, of $142,110.08. Following is a comparative statement for the two years:—

Service.	12 months ending 31st October, 1910.	12 months ending 31st October, 1911.
	$	$
Sales of mining land	327,160.12	64,268.43
Rental leases do.	29,008.79	25,797.14
Miners' licenses, permits, and fees	193,682.48	211,168.57
Mining royalties	246,529.13	285,913.26
Supplementary Revenue Act, 1907	143,209.59	209,461.51
Provincial mine	549.77	348.73
Provincial Assay Office	890.21	1,362.37
Total	941,030.09	798,920.01

It will be observed that the only item in which there is a serious falling-off is receipts from the sale of mining lands, in which the reduction is $262,531.69. This decrease is more than offset by increases in the other sources of revenue, and is due entirely to the fact that a considerable amount of purchase money for mining locations on the Gillies limit were included in the receipts for 1910, but nothing in 1911. The following table gives particulars of the lands sold and leased during the year:—

Table XVI.—Mining Lands Sold and Leased for year ending October 31st, 1911

District.	Sales.			Leases.			Total.		
	No.	Acres.	Amount.	No.	Acres.	Amount.	No.	Acres.	Amount.
			$			$			$
Nipissing	216	9,169.68	24,053.30	224	9,759.40	11,225.99	470	18,929.08	35,279.29
Sudbury	129	5,808.97	14,073.26	19	532.65	532.65	148	6,341.62	14,605.91
Thunder Bay	132	6,596.30	11,180.03				132	6,596.30	11,480.03
Algoma	38	2,303.64	3,376.05				38	2,303.64	3,376.05
Kenora	39	2,520.65	3,477.13				39	2,520.65	3,477.13
Parry Sound	4	170.00	470.00				4	170.00	470.00
Rainy River	8	206.00	206.00				8	206.00	206.00
Elsewhere	16	1,148.84	1,862.00				16	1,148.84	1,862.00
Total	612	27,924.08	58,997.77	243	10,292.05	11,758.64	855	38,216.13	70,756.41

The total received, as shown in the above table—$70,756.41—does not agree with the total of receipts from mining sales and mining leases in the preceding schedule. The explanation of this is that the latter represents only the transactions properly belonging to the fiscal year, while the former includes all sums received by the Department, whether for completed or uncompleted transactions, arrears, etc.

For miners' licenses, permits to search for minerals in forest reserves, and recording fees, there was an increase of $17,486.09. Details making up the total of $211,168.57 are:

Miners' licenses	$78,800 60
Forest Reserve permits	6,291 38
Recording fees	126,676 59
Total	$211,768 57

The receipts for these services serve as a barometer to show the degree of activity prevailing in the staking out of mining claims and speculation in mining lands. The discovery of a new and promising mineral district is immediately followed by a rush to stake out claims, and a corresponding increase in the receipts of mining recorders for licenses, and the recording and transfer of claims. It so happens that much of the prospecting and claim-staking during the last few years, including 1911, was done in the mineral belts lying within the boundaries of the Temagami forest reserve. To prospect in a reserve implies possession of a permit, the charge for which is $10 per annum. This charge has been criticized, but it must not be overlooked that the presence of a large number of prospectors in a coniferous forest, especially during the dry season of the year, exposes the timber to danger from fire, and necessitates the employment of a larger number of fire rangers than would otherwise be required.

Mining Royalties

Collections on account of mining royalties were as follows:—

Crown Reserve Mining Company	$186,356 59
Chambers—Ferland Mining Company	10,000 00
Hudson Bay Mines	27,247 17
O'Brien Mine	60,252 26
Cobalt Provincial Mining Company	1,722 66
Wyandoh Mining Company	334 58
Total	$285,913 26

In all, the receipts from mining royalties, from the time of their imposition to the end of 1911, have been $1,313,463.35, as shown in the following statement:—

O'Brien Mine	$596,305 70
Crown Reserve Mining Company	475,811 01
Hudson Bay Mines (formerly T. & H. B. Mining Co.)	208,511 44
Chambers-Ferland Mining Company	26,259 64
Hargrave Mining Company	2,777 28
Cobalt Provincial Mining Company	1,722 66
Wyandoh Silver Mines	1,298 14
Waldman Silver Mines	777 48
Total	$1,313,463 35

Supplementary Revenue Act, 1907

Details of payments under the provisions of the Supplementary Revenue Act, 1907, for the fiscal year, ending 31st October, 1911, are as follows:—

Profit Tax	$176,314 23
Natural Gas Tax	18,576 37
Acreage Tax	14,570 91
Total	$209,461 51

The following information is furnished by Mr. G. R. Mickle, M.E., Mine Assessor, with regard to the operation of the Supplementary Revenue Act. It will be noted that Mr. Mickle deals with the calendar year, 1911, (except as to the acreage tax), and not the fiscal year, ending with October, 1911, hence his figures do not agree with those given above.

Three different kinds of taxes are levied under this Act, viz.: (1) Profit tax, being on profits of all mines in the Province in excess of $10,000, with certain deductions for taxes paid municipalities; (2) Natural gas tax, this is a levy of two-tenths of a cent per thousand feet on such gas as is used in Canada; (3) Acreage tax of two cents per acre on all mining lands not in an organized municipality, and which, therefore, would otherwise be free of all taxes.

The amounts collected under this Act belonging to the calendar year, 1911, were as follows:—

(1) Profit Tax	$131,577 75
(2) Gas Tax	17,728 36
(3) Acreage Tax (15th April, 1911, to 15th April, 1912)	13,862 52
Total	$163,168 63

This is about 16 per cent. in excess of the amount collected in 1910. As payments, according to this Act, are not due till October 1st, and the fiscal year for the Province ends on October 31st, there are always a certain number of payments due in the calendar year which fall in the next fiscal year. This statement, therefore, cannot agree with the public accounts.

The profit tax was collected from twelve different companies, most of it being from the silver mines of Cobalt. Certain mines in the Cobalt district, which pay a royalty, may, according to the terms of the agreement with the Crown, deduct any tax payable to the Crown from the royalty. It has been the practice, therefore, not to collect the tax from these mines. This proviso makes the amount collected under the tax smaller by about $42,000 than it otherwise would have been. The royalty is, of course, greater by the same amount. Outside of the tax collected from silver and nickel mines and a very small amount due to operations of pyrites deposits, the other ores yielded no revenue in 1911. The tax is based on the results of the preceding year, hence nothing was due from gold mines. There is no substantial variation in the amount that will be collected as profit tax apparent in the immediate future.

The gas tax was collected from 41 different companies or individuals. New producers are constantly appearing and being bought out. About three-quarters of the tax was paid by six companies, and twenty-two of those contributing paid amounts under $100 each. The increase in gas tax over the amount paid last year (about $5,000), is due chiefly to the increased production of the Kent field, which gave about one-half of the total yield of the Province for the year. The revenue from this source will probably rise for a year or so, and then must drop, unless some important new field is found.

The acreage tax is about, as may be expected, every year. No attempt is made to keep the tax for the different years separate in the case of the acreage tax, as in many cases several years are paid at once, either in advance or in arrears, with penalties. No expansion in mining can increase the acreage tax materially. If the mining operations are successful in any district, a stable population results, municipalities are formed, and the acreage tax automatically disappears. Moreover, under the Mining Act, now in force, the areas taken up are small, and are generally abandoned before the time when the land must be patented, unless substantial encouragement is received.

Lands two years in arrears are advertised and forfeited, if the tax is not paid before a certain date. The list now ready for publication contains only about 2 per cent. of the taxable area; last time, it was 27 per cent. According to the experience last time, about one-half of the lands advertised were redeemed before the date of forfeiture; this would leave only 1 per cent. liable to forfeiture.

Mining Companies

The number of mining companies incorporated or licensed to do business year by year in Ontario is an indication rather of the degree of speculation prevailing at the time, than of the actual amount of mining work or production going forward. Much the larger proportion of these companies have a very ephemeral existence; many, indeed, are still-born, and, after the lapse of a year or two, disappear, leaving "not a wrack behind." If a play upon words is permissible in a Government report, it may be said that, in not a few instances, however, they leave a "wreck" behind. Tempted by an inflammatory prospectus, unwary investors part with their money for shares, because they are cheap, and because there is a prospect of their going up in value. Indeed, the date of the advance is frequently announced beforehand by the vendor, who admonishes his patrons to buy at once, and thus secure a certain profit. The mining industry suffers much from the tribe of company-mongers, for, when money is lost in mining shares, the blame is laid on the business itself, and not where it belongs—on the swindling sellers and the avaricious buyers of worthless stock.

Two hundred and thirteen companies were incorporated under the Ontario Companies' Act, with an aggregate nominal capital of $215,640,000, or an average of about a million dollars each. In addition, nineteen companies of extra-Provincial incorporation were licensed to do business in Ontario. In 1910, the number of incorporating companies was one hundred and sixty-two, and their total capitalization, $128,999,300, while the extra-Provincial companies receiving licenses numbered fourteen.

Following is the list:—

Table XVII.—Mining Companies Incorporated in 1911

Name of Company.	Head Office.	Date of Incorporation.	Capital.
Abaca Porcupine Gold, Limited	Toronto	May 12, 1911	$ 40,000
Aberdeen Porcupine Exploration Company, Limited	Toronto	Sept. 19 "	25,000
Acme Gold Mines, Limited	Toronto	Dec. 13 "	3,000,000
Algoma Brick and Tile Company, Limited	Sault Ste. Marie	Aug 28 "	40,000
Anglo American Development Company, Limited	Toronto	June 6 "	100,000
Anglo Canadian Exploration and Development Company, Limited	Toronto	Dec. 11 "	250,000
Apex Porcupine Mines, Limited	Toronto	Mar. 11 "	2,000,000
Beaver Asbestos Company, Limited	Walkerville	Feb. 11 "	500,000
Brandons Pressed Brick and Tile Company of Milton, Limited	Milton	Feb. 21 "	100,000
Bricks, Limited	Oshawa	July 19 "	40,000
Canada Iron Mines, Limited	Toronto	Mar. 28 "	1,500,000
Canada Lime Company, Limited	Toronto	April 24 "	100,000
Canadian Homestake Gold Mining Company, Limited	Toronto	April 19 "	1,000,000
Canadian Mining and Finance Company, Limited	Toronto	Dec. 9 "	500,000
Central Ogden Mines Company, Limited	Cobalt	May 10 "	1,000,000
Chapman Brick Company, Limited	Toronto	Jan. 25 "	40,000
Colorado Porcupine Company, Limited	Toronto	Mar. 2 "	40,000
Consolidated Swastika Mines, Limited	Toronto	July 29 "	2,000,000
Cordova Mines, Limited	Cordova Mines	July 10 "	500,000
Crown Reef Mines, Limited	Toronto	Feb. 9 "	1,000,000
Davidson Gold Mines, Limited	Toronto	Mar. 29 "	2,000,000
Deloro Porcupine Gold Mining Company, Limited	Ottawa	Feb. 20 "	40,000
Detroit-Kenora Gold Mining Company, Limited	Windsor	Mar. 14 "	40,000
Detroit New Ontario Mines, Limited	Matheson	Feb. 1 "	1,000,000
Dobie Mines, Limited	Porcupine	Mar. 24 "	1,500,000
Dome Lake Mining Company, Limited	Toronto	Mar. 23 "	2,500,000
Dome Lake Porcupine Mines Limited	Toronto	Mar. 21 "	40,000
Dominion Porcupine Mines, Limited	Toronto	Dec. 7 "	3,000,000
Dominion Refineries, Limited	North Bay	Jan. 24 "	50,000
Duluth-Shining Tree Company, Limited	Toronto	Dec. 15 "	300,000
Eldorado Porcupine Mines, Limited	Toronto	Mar. 17 "	500,000
Eleanore Gold Mines Company of Porcupine	Toronto	June 13 "	1,000,000
Elgin Oil and Gas Company, Limited	St. Thomas	Nov. 7 "	200,000
Eplett-Caswell Mining Company, Limited	Coldwater	Jan. 26 "	100,000
Foley-O'Brien Limited	Toronto	April 3 "	3,000,000
General Holding and Development Company, Limited	Toronto	Jan. 17 "	25,000
Gillies Lake Mines, Limited	Toronto	Mar. 29 "	2,000,000
Gold Crest Mines Company, Limited	Toronto	Nov. 16 "	2,000,000
Golden Age Mines, Limited	Toronto	July 14 "	100,000
Golden Centre Mill and Mines, Limited	Toronto	Mar. 29 "	600,000
Golden Porcupine Mines, Limited	Toronto	April 27 "	1,500,000
Grand River Oil and Gas Company, Limited	Brantford	Feb. 25 "	40,000
Great Golconda Mines, Limited	Toronto	Jan. 23 "	1,000,000
Harbour Brick Company, Limited	Toronto	May 5 "	50,000
Henley Porcupine Mines Limited	Toronto	Oct. 17 "	1,000,000
Hobon Gold Mines, Limited	Toronto	April 24 "	1,000,000
Hollinger Reserve Mines, Limited	Toronto	Aug. 3 "	2,000,000
Homestead Mines of Swastika, Limited	Toronto	June 5 "	2,000,000
Hughes Porcupine Mines, Limited	Toronto	June 14 "	2,500,000
Interlaken Mines, Limited	Ottawa	May 26 "	350,000
Iroquois Porcupine Mining Company, Limited	Toronto	June 14 "	1,000,000
Jajola Cobalt Porcupine Syndicate, Limited	Toronto	July 25 "	40,000
Jupiter Mines, Limited	Toronto	Mar. 17 "	2,000,000
Lake of the Woods Gold Mining Company, Limited	Toronto	Aug. 22 "	1,500,000
La Palme Porcupine Mines, Limited	Toronto	July 12 "	2,000,000
Leamington Brick and Tile Company, Limited	Leamington	April 3 "	10,000
Lenox Mining and Prospecting Company, Limited	Welland	Sept. 2 "	40,000
Lost and Found Mining Company, Limited	Toronto	July 18 "	40,000
Lucky Cross Mines of Swastika, Limited	Toronto	June 14 "	1,500,000
McCullough Mining Company, Limited	Toronto	May 5 "	1,000,000
McIntyre-Porcupine Mines, Limited	Toronto	Mar. 16 "	1,000,000
McLean Gold Mines, Limited	Ottawa	April 7 "	1,500,000
Major Mining Company, Limited	Windsor	Dec. 9 "	25,000
Maple Leaf Oil Company, Limited	Toronto	Jan. 10 "	1,000,000
Martin Porcupine Mines, Limited	Toronto	Nov. 8 "	2,000,000
Master Mine, Limited	Windsor	April 19 "	500,000
Miller Lake Silver-Lodes Mining Company, Limited	New Liskeard	Dec. 29 "	60,000
Mines Products, Limited	Toronto	Jan. 5 "	40,000
Minnesota Porcupine Company, Limited	Toronto	Mar. 2 "	500,000
Missanoga Silver Mining and Development Company, Limited	Napanee	Jan. 31 "	100,000
Moffat-Irving Electric Smelters, Limited	Toronto	Mar. 1 "	40,000
Montreal Tisdale Gold Mines, Limited	Sault Ste. Marie	Dec. 31, 10 "	2,000,000
Mulholland Mines Company, Limited	Toronto	Feb. 23 "	1,500,000
Niagara Porcupine Mining Company of Ontario, Limited	Toronto	Feb 15 "	40,000
Niagara Pressed Brick Company, Limited	Berlin	Aug. 10 "	40,000
North American Exploration and Development Company, Limited	Toronto	Feb. 14 "	50,000
North-Dome Mining Company, Limited	Toronto	Mar. 30 "	2,000,000
Northern Gold Reef, Limited	Toronto	Sept. 23 "	3,500,000
Oliver Silver Mining, Limited	Ottawa	May 31 "	3,000,000
Ontario Gold and Silver Mines, Limited	Toronto	Sept. 9 "	1,000,000
Ontario Lime Company, Limited	Toronto	Dec. 23 "	500,000
Ore Concentrators and Refineries, Limited	Toronto	April 3 "	1,000,000
Otto Gold Mines, Limited	Haileybury	June 20 "	1,000,000
Patricia Porcupine Mines, Limited	Toronto	Oct. 2 "	3,000,000
Peerless Porcupine Mines, Limited	Toronto	Mar. 20 "	2,000,000
People's Silver Mines, Limited	Toronto	May 6 "	1,500,000
Philadelphia Mining and Developing Company, Limited	Cobalt	July 8 "	40,000

Table XVII.—Continued.

Name of Company.	Head Office.	Date of Incorporation.	Capital.
Pioneer Porcupine Gold Mines, Limited	Ottawa	Mar. 28, 1911	$1,000,000
Platt Veteran Gold Mines, Po cupine, Limited	Toronto	May 11 ''	2,000,000
Plenaurum Mines, Limited	Toronto	June 30 ''	2,500,000
Plevna Mica and Mining Company, Limited	Kingston	Sept. 30 ''	800,000
Porcupine and Hudson's Bay Gold Mines, Limited	Toronto	May 29 ''	2,500,000
Porcupine Aurum Mining Company, Limited	Toronto	July 14 ''	1,000,000
Porcupine Canada Gold Mines, Limited	Toronto	Mar. 23 ''	1,000,000
Porcupine-Cobalt Mines, Limited	Toronto	May 26 ''	1,000,000
Porcupine Coronation Gold Mines, Limited	Toronto	Mar. 25 ''	1,000,000
Porcupine East Lake Mining Company Limited	South Porcupine	Dec. 29 ''	500,000
Porcupine Eastern Gold Mines Company, Limited	Porcupine	April 24 ''	1,000,000
Porcupine Gold Belt Mines, Limited	Toronto	Aug. 17 ''	1,500,000
Porcupine Gold Peak, Limited	Toronto	Dec. 8 ''	1,500,000
Porcupine Gold-Spot, Limited	Toronto	May 16 ''	1,000,000
Porcupine-Hecla Mining Company, Limited	Toronto	Nov. 30 ''	1,500,000
Porcupine Independence Mines, Limited	Toronto	May 19 ''	1,000,000
Porcupine Kendall Gold Mines, Limited	Toronto	July 3 ''	2,000,000
Porcupine Keora Mining Company, Limited	Haileybury	April 6 ''	2,000,000
Porcupine Merger Mines, Limited	Toronto	Mar. 23 ''	1,500,000
Porcupine Midas Mining Company, Limited	Toronto	Aug. 24 ''	2,000,000
Porcupine Mohawk Mines, Limited	Toronto	May 9 ''	2,000,000
Porcupine Northern Mines, Limited	Toronto	Jan. 6 ''	40,000
Porcupine Ores, Limited	Toronto	Feb. 18 ''	40,000
Porcupine Panamint Gold Mines, Limited	Toronto	June 6 ''	1,500,000
Porcupine Reserve Mines, Limited	Toronto	Feb. 24 ''	2,000,000
Porcupine Southern Mines, Limited	Toronto	June 24 ''	40,000
Porcupine Townsite Mines, Limited	Toronto	Mar. 20 ''	1,000,000
Porcupine Veterans' Exploration Company, Limited	Toronto	Aug. 17 ''	80,000
Powell Gold Mines, Limited	Ottawa	April 13 ''	3,000,000
Premier Langmuir Mines, Limited	London	April 20 ''	2,000,000
Preston East Dome Mines, Limited	Toronto	Jan. 7 ''	3,000,000
Rands Mines of Porcupine, Limited	Toronto	Mar. 31 ''	2,000,000
Rea Consolidated Gold Mines, Limited	Toronto	April 5 ''	1,000,000
Reciprocity Mines of Porcupine, Limited	Toronto	Aug. 29 ''	1,000,000
Red Cliffe Phillip Gold Mining Company, Limited	Kenora	June 30 ''	2,500,000
Redstone Mining Company, Limited	Toronto	June 30 ''	1,000,000
Roche Porcupine Gold Mining Company, Limited	Ottawa	July 18 ''	3,000,000
Rose Hill Natural Gas Company, Limited	Bridgeburg	July 17 ''	5,000
Ross Gold Mines, Limited	Toronto	Sept. 11 ''	3,000,000
Royal Dome Gold Mines, Limited	Hamilton	Aug. 31 ''	2,000,000
St. Marys Portland Cement Company, Limited	Toronto	May 19 ''	500,000
Sakta Gold Mines, Limited	Toronto	Oct. 16 ''	1,500,000
Santa Maria Mining Company, Limited	Toronto	Mar. 2 ''	40,000
Scottish Ontario Gold Mining Company, Limited	Toronto	Nov. 14 ''	1,500,000
Seneca Porcupine Gold Mining Company, Limited	Toronto	Nov. 3 ''	1,500,000
Seneca-Superior Silver Mines, Limited	Toronto	Sept. 29 ''	500,000
Smith-Vet Mines, Limited	Toronto	April 24 ''	3,000,000
South-Dome Mines, Limited	Toronto	April 1 ''	100,000
Sovereign Porcupine Mines, Limited	Toronto	April 24 ''	1,000,000
Stuart Exploration Syndicate, Limited	Toronto	May 1 ''	25,000
Sun Brick Company, Limited	Toronto	Mar. 14 ''	200,000
Superior Construction Company, Limited	Sault Ste. Marie	Feb. 2 ''	100,000
Superior Swastika Mines Company, Limited	Toronto	Sept. 2 ''	40,000
S. V. 329 Mining Company, Limited	Walkerville	Mar. 29 ''	1,000,000
Teck Swastika Gold Mines, Limited	Toronto	Nov. 20 ''	2,500,000
Telephone City Oil and Gas Company, Limited	Brantford	April 12 ''	90,000
The Achilles Mines, Limited	Toronto	May 9 ''	1,000,000
The Albemarle Zinc Company, Limited	London	Jan. 27 ''	450,000
The American Gold Fields, Limited	Toronto	Mar. 29 ''	2,000,000
The American Porcupine Gold Mining Company, Limited	Toronto	Sept. 9 ''	1,000,000
The Butwell Brick Company, Limited	Toronto	Nov. 23 ''	75,000
The Canada First Mining Company, Limited	Toronto	July 20 ''	1,800,000
The Canadian Potash Company, Limited	Toronto	Aug. 5 ''	40,000
The Canadian Talc and Silica Company, Limited	Madoc	Jan. 20 ''	100,000
The Central Pipeline Company, Limited	Niagara Falls	May 1 ''	100,000
The Chisholms Corporation, Limited	Toronto	Jan. 16 ''	500,000
The Coldwater Stone Quarry and Power Company, Limited	Toronto	Oct. 13 ''	100,000
The Combined Larder Mines, Limited	New Liskeard	Feb. 6 ''	3,000,000
The Commonwealth Oil and Gas Company, Limited	Brantford	Feb. 9 ''	300,000
The Congress Mines, Limited	Toronto	June 14 ''	1,000,000
The Crescent Mining Company, Limited	Toronto	Oct. 3 ''	100,000
The Crystal Oil and Gas Company, Limited	Paris	June 8 ''	90,000
The Daly-Taylor Porcupine Mines, Limited	Toronto	April 4 ''	1,500,000
The Digby-Dome Mines Company, Limited	Brantford	Oct. 27 ''	1,500,000
The Dome Extension Mines Company, Limited	Toronto	Jan. 20 ''	2,000,000
The Dominion Diamond Drilling Company, Limited	Toronto	Aug. 15 ''	40,000
The Dominion Lands and Mines Development Company, Limited	Toronto	Sept. 21 ''	1,000,000
The Eureka Gold Mining Company, Limited	Porcupine	April 6 ''	2,000,000
The Frobel McCourt Silver Mining Company, Limited	Ottawa	April 18 ''	500,000
The Gangir Talc Company, Limited	Toronto	Mar. 11 ''	100,000
The Grasselli Chemical Company, Limited	Hamilton	Aug. 30 ''	250,000
The Hastings Quarries, Limited	Toronto	July 19 ''	100,000
The International Potash Corporation, Limited	Toronto	Aug. 5 ''	40,000
The "Katy Did" Mining Company, Limited	Toronto	April 28 ''	1,000,000
The King Quicksilver Mining Company, Limited	Toronto	Oct. 27 ''	1,000,000
The Kingston Mica and Phosphate Company Limited	Kingston	Nov. 22 ''	500,000

Table No. XVIII.—Concluded.

Name of Company.	Head Office.	Date of Incorporation.	Capital.
The Kissinger Mining Company, Limited	Fort Erie	April 11, 1911	$2,000,000
The Langmuir Nighthawk Lake Gold Mines, Limited	Toronto	Dec 5 "	50,000
The Lethbridge Brick Company, Limited	Sault Ste. Marie	Jan. 11 "	20,000
The Loyalty Silver Mining Company, Limited	Toronto	April 13 "	1,500,000
The MacMartin Porcupine Gold Mines, Limited	Porcupine	May 12 "	1,000,000
The Medina Natural Gas Company, Limited	Niagara Falls	Feb. 20 "	500,000
The Minitaki Gold Fields, Limited	Port Arthur	June 14 "	250,000
The Nash Bay Mining Company, Limited	Toronto	Feb. 7 "	1,000,000
The National Porcupine Mines, Limited	Ottawa	May 1 "	1,000,000
The Natural Gas Company of Ontario, Limited	Hamilton	Oct. 19 "	40,000
The Nokomis Oil and Gas Company, Limited	Paris	Nov. 8 "	90,000
The North-Thompson Mines, Limited	Toronto	Aug. 1 "	40,000
The Onondaga Oil and Gas Company, Limited	Brantford	Mar. 18 "	90,000
The Ontario Cobalt Twentieth-Century Mining Company, Limited.	Toronto	Mar. 8 "	40,000
The Ottawa Concrete Homes Company, Limited	Ottawa	Sept. 5 "	200,000
The Pennsylvania Mines Company, Limited	Porcupine	April 27 "	1,000 000
The Pike Lake Gold Mines, Limited	Haileybury	July 28 "	3,000,000
The Porcupine-Angus Mining Company, Limited	Windsor	Sept. 28 "	1,500,000
The Porcupine Bristol Gold Mining Company, Limited	Toronto	Aug. 23 "	2,000,000
The Porcupine Free Gold Mining Company, Limited	Ottawa	May 15 "	2,000,000
The Porcupine Miracle Mining Company, Limited	Porcupine	Mar. 18 "	1,000,000
The Porcupine Swastika Gold Mining Company, Limited	Ottawa	Mar. 6 "	200,000
The Potash Syndicate of Canada, Limited	Toronto	Aug. 5 "	40,000
The Proprietory Mines, Limited	Toronto	April 5 "	3,000,000
The Roman Gold Mines of Porcupine, Limited	Ottawa	Aug. 9 "	2,000,000
The Switzer Mining Company, Limited	Haileybury	Nov. 28 "	500,000
The Union Natural Gas Company of Canada, Limited	Niagara Falls	Dec. 19 "	3,000,000
The Western Development Company, Limited	Sarnia	Sept. 28 "	100,000
The Western Fuel Gas Company, Limited	Chatham	April 3 "	600,000
The Willcox Lake Brick Company, Limited	Toronto	June 10 "	100,000
The Willing Mining Company, Limited	Toronto	Oct. 4 "	700,000
Tilden Mines, Limited	Toronto	May 26 "	40,000
Tivani Electric Steel Company, Limited	Belleville	Dec. 20 "	20,000
Tommy Burns Gold Mines, Limited	Toronto	Sept. 5 "	100,000
Toronto Brick Company, Limited	Toronto	Sept. 13 "	600,000
Toronto Pressed Brick and Terra Cotta Company of Milton, Limited	Toronto	Nov. 24 "	300,000
Utor Gas Company, Limited	Toronto	Aug. 15 "	40,000
Victoria Porcupine Gold Mines, Limited	Porcupine	May 4 "	2,000,000
West Dome Mines, Limited	Toronto	Jan. 31 "	3,000,000
Winyah Gold Mines, Limited	Toronto	Nov. 24 "	2,500,000
Total			$215,640,000

Mining Companies Licensed in 1911.

Name of Company	Head Office.	Date of License.	Capital.
Alpha Venture Company	Toronto	July 20, 1911	$150,000
Buffalo-Brockville Mining Company	Brockville	Sept. 25 "	50,000
Canadian Steel Foundries, Limited	Toronto	Mar. 16 "	2,000,000
Cannelton Coal and Coke Company	Toronto	Sept. 25 "	500,000
Cedarhurst Gold Development Company	Guelph	Mar. 3 "	40,000
Eugene Munsell and Company	Ottawa	Feb. 25 "	40,000
Porcupine Realty and Mines, Limited	Welland	Sept. 25 "	50,000
Rochester Development Company, Limited	Campbellford	June 27 "	50,000
Syracuse Exploration Company	Haileybury	April 4 "	40,000
The Alberta Land Company, Limited	Fort William	Mar. 7 "	£60,000
The British Aluminium Company, Limited	Toronto	Feb. 23 "	$10,000
The Dryden Mining Company	Dryden	Dec. 19 "	50,000
The Northern Ontario Exploration Company, Limited	Porcupine	May 2 "	£100,000
The Northern Ontario Prospecting Syndicate, Limited	Toronto	July 14 "	$20,000
The Ontario Porcupine Goldfields Development Company, Limited	Pearl Lake	Sept. 25 "	£600,000
The Poole Island Trap Rock Company	Sault Ste. Marie	June 13 "	$10,000
The Scottish Porcupine Goldfields, Limited	Ottawa	Aug. 23 "	5,000
The Strathcona Coal and Exploration Syndicate, Limited	Fort William	Mar. 3 "	£2,100
Virginia Graphite Company	Wilberforce	April 7 "	$300,000

Mining Divisions

The Mining Divisions remain in number and boundaries the same as described in last year's Report, being eleven in all. The list of Divisions and Recorders, together with the receipts for the year at the several offices, is as follows:—

Mining Division.	Name and P.O. Address of Recorder.	Receipts.			Total receipts.
		Purchase money.	Miner's licenses and permits	Recording fees, etc.	
		$	$	$	$
Kenora	W. L. Spry, Kenora	1,049 51	815 00	1,475 00	3,369 51
Port Arthur	J. W. Morgan, Port Arthur	9,381 17	2,098 00	2,815 20	14,294 37
Sault Ste. Marie	S. T. Bowker, Sault Ste. Marie	2,595 29	1,670 00	1,232 00	5,497 29
Sudbury	C. A. Campbell, Sudbury	1,406 39	4,779 00	22,514 50	28,699 89
Montreal River	A. Skill, Elk Lake	9,225 33	2,241 00	1,998 00	13,464 33
Gowganda	H. E. Sheppard, Gowganda	3,078 19	3,314 00	4,781 40	11,173 59
Temiskaming	G. T. Smith, Haileybury	12,989 46	17,779 00	13,580 25	44,348 71
Larder Lake	J. A. Hough, Matheson	4,724 27	1,317 00	12,275 25	18,316 52
Parry Sound	H. F. McQuire, Parry Sound	50 00	304 00	263 00	617 00
Porcupine	A. E. D. Bruce, Porcupine	10,107 33	15,931 80	62,503 85	88,542 98
Coleman	G. T. Smith, Haileybury	332 60	213 00	76 00	621 60
	Totals	54,969 54	50,461 80	123,514 45	228,945 79

The remainder of the revenue for the year was remitted direct by the parties concerned to the Department at Toronto.

Brief reports from the several Recorders for the year are appended:—

Kenora

Recorder, W. L. Spry.—Miner's licenses issued, 80; renewals, 84; certificates of performance of working conditions, 102; certificates of record, 20; applications for mining claims, 89; applications recorded, 73; applications refused, 3; claims cancelled, 21; transfers recorded, 40; partnership agreement recorded, 1; agreement recorded, 1; penalty reports of work filed, 2; extensions of time granted, 7; appeal from decision of Mining Commissioner, 1.

With regard to the mining industry, Mr. Spry states that a large amount of assessment and development work was done on claims in the Division during the year, but the expected revival of gold mining on a large scale did not take place.

Port Arthur

Recorder, J. W. Morgan.—Miner's licenses issued, 206; renewals, 320; claims recorded, 183; claims cancelled, 96, many of the latter being restaked.

The Recorder notes that the St. Anthony gold mine at Sturgeon lake had been reopened and that excellent results were being obtained by the new management. Much work had been done on other properties near the St. Anthony, and a good deal of ore blocked out. No new mining territory had been opened up by prospectors during the year, notwithstanding the existence of large areas in the Division which have never been prospected. The new line of the Canadian Northern railway, under construction from Port Arthur to Sudbury, would doubtless facilitate the exploration of the region traversed by it.

Sault Ste. Marie

Recorder, S. T. Bowker.—Miner's licenses issued, 152; renewals, 200; claims recorded, 119; claims cancelled, 50.

Sudbury

Recorder, C. A. Campbell.—Miner's licenses issued, 517; renewals, 509; claims recorded, 2,309.

Mr. Campbell adds that few, if any, claims were staked for silver in his Division during the year, interest in this metal having for the time being subsided. There was, however, much activity in taking up claims for gold in the earlier part of the year, south of Musgrove and Bartlett townships, round Muskasenda lake and west of Pharand township and Kenogaming lake. Later, reports of finding free gold at West Shining Tree lake brought in a large number of prospectors, and resulted in the staking out of a considerable portion of four townships, namely, Churchill, Asquith, Fawcett and McMurchy. About the same time there was some staking done round Groundhog lake, along the line of the Canadian Northern railway, and a few miles north. West of Sudbury, some claims were staked at Schist lake, a small lake near Opeepesway, also in Davis and Parkin townships to the east. Some interest was taken in nickel and iron, and one claim was staked for cinnabar, said to have been discovered by an Indian named Commando on an island in the Groundhog river, south of Bremner island, and about eight miles north of the Transcontinental railway.

Montreal River

Recorder, Albert Skill, Elk Lake.—Miner's licenses issued, 81; renewals, 285; claims recorded, 98; certificates of work granted, 126; certificates of record granted, 42.

Mr. Skill remarks that 1911 was a "lean" year in his Division, there being little activity compared with former years. Most claims already located, however, were protected by performance of the working conditions. Actual mining work, as distinct from assessment work, was confined to a few properties, the principal of which were the Moose Horn, Donaldson, Barnet, Paragon and Cobalt Frontenac, the last-named company mining for gold in the township of Tudhope. At the Hitchcock property (silver) in the same township a new 6-drill plant was installed, and it was proposed to carry on work extensively during the summer of 1912. The prospects of railway extension into Elk lake were favorably affecting the future of the district.

Gowganda

Recorder, Harry E. Sheppard.—Miner's licenses issued, 270; renewals, 310; certificates of work issued, 185; certificates of record issued, 31; claims recorded, 258; claims cancelled, 165.

With respect to actual mining in his Division, Mr. Sheppard reports that the year was marked by the finding and mining of valuable bodies of silver ore. The market for mediocre claims was and continues very dull. The discovery of rich ore in the diabase on the Millerett Mining Company's property created a favorable sentiment with regard to the possibilities of the diabase at depth. Good finds were also made at some depth at the Calcite lake and Canadian Gowganda prospects. In the latter part of the year the Mann Company, long idle, discovered a new ore body at the surface. About a carload of ore was mined, and a force of 20 men employed. Other companies operating were:—Miller Lake-O'Brien at Miller lake; Powerful and Bishop at Calcite lake; Gamey-Thompson at Spawning lake; Hudson Bay, south of Hanging Stone lake; M. J. Foley, Eplett-Caswell, McIntosh, Shining Tree lake; Homestake, Obushkong lake. The Willans prospect on the east branch of the Montreal river had recently changed hands, and the purchasers with a gang of men were preparing for mining operations. Altogether, these companies had from 300 to 350 men under employment. A great deal of assessment work on mining claims was done during the year, the owners in many cases completing the same and taking out a Crown lease.

Temiskaming

Recorder, George T. Smith.—Miner's licenses issued, 1,042; renewals, 2,054; claims recorded, 922.

Mr. Smith makes these comments:—In view of the fact that a great number of the old-time prospectors and mining men, with headquarters at Cobalt, Haileybury and New Liskeard, are deeply interested in the Porcupine and Sudbury Mining Divisions, and that a considerable portion of this Divison was transferred to that of Larder Lake, it is not to be wondered at that the volume of business transacted in the Temiskaming Mining Division during the past year was somewhat smaller than usual. In South

Lorrain and the Metabitchewan area, largely on account of the difficulty of interesting prospective purchasers in silver properties, very little more than the actual amount of development work necessary to maintain mining claims in good standing was performed, and several promising properties, on which all the necessary work had been done, and which might with a reasonable outlay have been added to the list of shippers, were allowed to remain idle. A comparatively small number of the claims, however, were allowed to lapse for non-performance of work. Considerable development work was done in the township of Bryce; the Casey Cobalt mine in Casey township was steadily worked with satisfactory results; there was a revival of interest and two new mining plants installed in the Portage Bay district, and the Green-Meehan mine in Bucke township was again in operation.

Larder Lake

Recorder, John Atwell Hough.—Miner's licenses issued, 203; renewals, 100; claims recorded, 1,252; transfers recorded, 421; certificates of work issued, 149; certificates of record issued, 93.

Recorder Hough states that there was much activity in his Division during the year. There are excellent showings of gold in the Swastika area, and many claims were staked out there. Machinery has been installed on some of the most promising claims and shafts are now being sunk. At Larder lake a number of claims were taken up, and it was reported that the Reddick Company had struck their ore body at the 100-foot level, where it was 20 feet wide, showing free gold. The development of the water power at Raven river was nearly completed, and a power line ten miles in length erected to connect with the Harris-Maxwell property (Goldfields Limited), where a 40-stamp mill is being erected. Some activity was shown in Munro, Guibord and Beatty townships, and a little gold produced. There are in this locality nice showings of free gold. Work was resumed on the nickel properties in the townships of Dundonald and Clergue, and the intention was to ship the ore. The ore body is said to have been traced for 900 feet with an average width of seventeen feet.

Parry Sound

Recorder, H. F. McQuire.—Miner's licenses issued, 25; renewals, 42; claims recorded, 15; claims cancelled, 157.

Mr. McQuire reports the mica properties in the township of McConkey to be promising. The samples shown are good, and development work on the claims is being kept up. Some progress was made in proving the iron ore locations in the township of Lount. The Hamilton Steel Company had an option on a number of the claims, and at the end of the year had a core drill at work which was said to be in ore at a depth of 25 feet.

Porcupine

Recorder, A. E. D. Bruce.—Miner's licenses issued, 1,240; renewals, 743; claims recorded, 3,756.

Under date of 24th January, 1912, Mr. Bruce writes:—The early part of 1911 was a season of marked activity and continued so until the great fire of July 11th,, after which prospecting dropped off. The mill at the Dome mine is nearing completion, and all the buildings now being put up are substantial structures of brick and concrete. The Hollinger mill is also being rushed to completion, but it will be some little time before the machinery is installed. The power plant at Sandy Falls on the Mattagami river is completed and is supplying the mines and town with electric light and power. Free gold showings on the surface in the township of Geikie were attracting some attention. The Temiskaming and Northern Ontario railway will soon be opened to Timmins. The railway service in the camp was excellent. A large amount of mining development is in progress.

Coleman

On 10th January, 1911, the Mining Recorder's Office at Cobalt was abolished, and the special Mining Division of Coleman was transferred to the charge of Mr. G. T. Smith, Mining Recorder at Haileybury.

Provincial Assay Office

Mr. N. L. Turner, Provincial Assayer, reports as follows for the year 1911:—

The Provincial Assay Office was established in the city of Belleville in 1898 as an aid to geologists, mining engineers, prospectors and all others interested in the mineral development of the Province of Ontario. The work of the office has never been confined to Ontario only, as samples are received from all parts of Canada and also from parts of the United States.

The fees for examinations and assays have been kept at practically cost, and in fact in some cases less. All samples that are brought to the office personally are examined and identified free of charge.

During the latter part of 1910, it was decided to move the office from Belleville to Toronto in order to make it more central. The necessary building was procured at number 5 Queen's Park, and in November, 1911, the change was made. This change naturally interfered somewhat with the work of the office, and as a consequence a number of samples had to be kept over until 1912. For this reason, the total number of samples assayed is less than in previous years.

The new offices are in a fine, commodious building, part of which is used for laboratory purposes by the Provincial Board of Health. The laboratories are connected with a central ventilating fan, which affords excellent ventilation for all the rooms. The lack of this was one of the chief drawbacks to the Belleville office.

The fittings and equipment are all practically new and up to date, so that the office is now probably one of the finest in the Province.

The grinding room is equipped with a 5-horse power electric motor which drives the crushers, grinders, air compressor, blower for the assay furnace and a direct current dynamo for charging storage batteries.

The fire room has a new gas muffle furnace manufactured by the Rockwell Furnace Company of New York, and all the other necessary appliances.

The wet laboratory is supplied with hot and cold water, compressed air, suction, gas and electric light. Particular attention has been paid to the ventilation of this room, and the system installed is proving very satisfactory. This laboratory has all the necessary equipment of a first-class office, including drying ovens, water still, titrating table, etc. A fine large fume cupboard divided into two sections is one of the features of this room.

A room has been set aside for electro-chemical analysis, and at the time of writing is being fitted up with necessary storage battery, switchboard, meters, etc. It is the intention to make all copper, nickel, cobalt, lead and most of the silver determinations by electro-chemical methods.

The balance-room has a new Teoemer analytical balance, a button balance, and the necessary pulp balances.

There is also a private office and library, and the necessary store-rooms.

During the past year 644 samples were examined and reported on. This number is less than in previous years, owing to the fact that the work had to be curtailed during the months of November and December, and a large number of samples carried over to 1912. They will appear in the report for that year.

The work of the office during the past year consisted of:—

(1) The examination and assaying of samples received from mining engineers, geologists, prospectors and the public generally. This covered a wide range of work, as all kinds of minerals were sent in for examination and assay.

(2) The analysis of samples of rock for the various geologists of the Bureau of Mines.

(3) The sampling of car lots of cobalt-silver ore shipped from the mines upon which the Government collects a royalty. This necessitated having a sampler at Deloro, Copper Cliff and Thorold for a large portion of his time. Mr. T. E. Rothwell attended to this work.

(4) The assaying and valuating of these car lots of ore required considerable time.

During the coming year it is the intention of the chemist in charge to direct investigations along different lines, such as the occurrence of mercury at Cobalt, of tungsten ores at Porcupine, etc. The results of these investigations will be published from time to time.

The following is a list of the fees for the more common assays and determinations; others will be furnished on application.

Price List for assays (each checked off by a duplicate):—

Gold and Silver Ores	For one Sample	For 3 to 5 Samples at one Time Each	For 6 or more Samples at one Time Each
Gold by fire method	$1 00	$0 90	$0 75
Silver by fire method	1 00	0 90	0 75
Gold and silver by fire method	1 25	1 00	0 90
Gold by amalgamation assay for free gold	2 00	1 80	1 50

For amalgamation assay of gold ore at least 5 lbs. of ore must be sent.

The following tests are recommended along with the amalgamation assay: Fire assay of the ore to see how results obtained check off with the amalgamation assay; panning down of ore to obtain concentrates; and fire assay of concentrates; also fire assay of tailings.

The laboratory is also prepared to do cyanide assays on raw ore, tailings, concentrates, etc., with amalgamation tests and fire assays where needed. Not more than 50 lbs. of ore can be treated.

Check Assays.—The laboratory makes a specialty of check assay work on gold ores. Samples sent in for check assays must be crushed at least 5 or 10 mesh, especially in the case of gold ores variable in richness. At least 12 ounces of the pulp must be sent for assay. A sample consisting of a single piece of ore, however large, is practically of little value in testing a deposit, and in no case suitable for check assay. Two pieces of gold ore taken from the same spot in a deposit will not necessarily give the same values on assay. The amalgamation assay for gold with fire assay of concentrates and tailings is recommended for gold ores either in the rough or pulped containing coarse free gold, as the fire assay alone will give variable results.

The most satisfactory method of checking results is to mix ore pulp and divide the pulp into two equal parts, sending the separate lots to this laboratory with different marks.

Each determination made in the laboratory is checked off by a duplicate when sufficient ore is sent, thus reducing errors to minimum. The pulp of each sample is retained for future reference.

Miscellaneous Assays.

Copper by fire assay method	$1 25	$1 00	$0 90
Copper by cyanide method	1 25	1 00	0 90
Copper by electrolytic method	1 25	1 00	0 90
Lead by titration method	1 25	1 00	0 90
Zinc by titration method	2 00	1 80	1 50
Nickel by electrolytic method	3 00	2 70	2 25
Platinum by fire assay method	2 00	1 80	1 50
Cobalt by electrolytic method	3 00	2 70	2 25
Arsenic by titration method	2 00	1 80	1 50
Manganese by titration method	3 00	2 70	2 25
Chromium by titration method	3 00	2 70	2 25
Antimony by titration method	2 00	1 80	1 50
Bismuth by titration method	2 00	1 80	1 50
Iron (metallic) by titration method	0 50	0 45	0 30
Molybdenum by titration method	2 00	1 80	1 50
Tin fire assay by titration method	2 00	1 80	1 55

Reduction of Fees.—A reduction of 15 per cent. on the total is allowed on 6 or more assays on one sample and 20 per cent. on 10 or more assays on one sample.

Fees for Qualitative Examination.—Not equivalent to an assay or analytical determination, only showing the presence or absence of certain constituents, no values of percentages given.

Iron	$0 25
Copper	0 25
Nickel	1 00
Cobalt	1 00
Zinc	0 50
Lead	0 50
Chromium	1 00
Manganese	1 00
Platinum	$1 00
Arsenic	0 50
Bismuth	0 50
Molybdenum	0 50
Lime	0 50
Magnesia	0 50
Alumina	0 50

Complete qualitative examination of any sample, $8.00; other constituents at same rates.

Identification of mineral samples, that is, determination of the constituents that may be determined by inspection, field tests, blow pipe or rough qualitative examination, is done by the laboratory at a nominal charge of 50 cents per sample; three or more samples at one time, 40 cents each.

This also includes a report as to the probable commercial value of the sample.

Samples for identification must be sent in a rough state, *i.e.*, not pulverized. Samples for identification will be reported on free of charge, if brought to the laboratory by parties desiring such reports.

Directions for Sending Samples.—Crushed samples, representing the average of large quantities, or samples less than 5 lbs. in weight, may be sent by mail as 3rd class matter (2 cents for first 4 ounces or fraction thereof, and 1 cent for each additional 2 ounces). Write your own name and address plainly on the parcel and send instructions with money in payment of fees in a separate letter. When more than one sample is sent at one time, each sample must be distinctly marked or numbered, so that they may be identified by instructions in letter. Samples may be sent per express, charges prepaid.

Sample bags addressed to this laboratory for sending ore pulp by mail may be obtained free on application; also canvas bags for shipping ore.

Each determination made in the laboratory is checked off by a duplicate when sufficient material is sent, thus reducing errors to a minimum. The pulp of each sample is retained for future reference, subject to order of sender.

Terms.—Money in payment of fees sent by registered letter, post office order, postal note, express order, etc. must invariably accompany samples in order to insure prompt return of certificates, which are not sent until fees are paid in full.

MINING ACCIDENTS IN 1911

By E. T. CORKILL, Chief Inspector of Mines.

During the year 1911 in and about the mines regulated by the Mining Act of Ontario there were 33 fatal accidents which caused the death of 36 men. The fatalities below ground numbered 33, and above ground 3. Altogether, at the mines, metallurgical works and quarries regulated by the Mining Act there were 45 fatal accidents, causing the death of 49 men, an increase of 1 over the number killed in 1910. The accidents at metallurgical works and quarries are separated in this report from the accidents at the mines, and are set out in tables following those for the mine accidents. In former reports of the Bureau of Mines all the accidents have been included in the one table, and this should be taken into consideration in comparing the accidents for 1911 with those of previous years.

The total number of serious accidents in the mines of Ontario reported to the Bureau of Mines was 111, resulting in 36 men killed and 86 injured. Of these accidents 82 occurred below ground and 29 above ground. The fatal accidents took place in mines operated by 21 different companies.

At the metallurgical works there were 33 accidents which caused the death of 9 and serious injuries to 25 men.

The number of accidents therefore at mines and works regulated by the Mining Act of Ontario is 144, causing the death of 49 men and serious injuries to 111 men. Of the men seriously injured, 60 received their injuries below ground and 51 above ground.

A "serious" accident is not defined by statute, but is here taken to mean an accident by which a man is incapacitated for work for more than seven days.

Investigation and report were made in 30 out of the 33 fatal accidents in the mines, in 6 out of 9 fatal accidents at the metallurgical works, and in all the quarry accidents. In accordance with the requirements of the Mining Act, inquests were held on most of the men killed; and to assist in bringing out the facts, were attended by either the Inspector or the writer. In a few instances, through the lack of knowledge on the part of the Coroner as to the law requiring an inquest, none was held. An investigation in such cases was made by the Inspector or the writer, and the evidence of witnesses taken under oath.

Analysis of Fatalities

By months the 36 fatalities occurred as follows:—January, 6; February, 1; March, 6; April, 0; May, 3; June, 4; July, 0; August, 0; September, 3; October, 2; November, 4; December, 7; total—36.

A comparison of the causes of the fatalities at the mines for 1910 and 1911 is as follows:—

	1910. Per cent.	1911. Per cent.
Falls of ground	19.0	5.5
Shaft accidents	21.6	22.2
Explosives	27.0	44.5
Miscellaneous (underground)	8.1	19.5
Surface	24.3	8.3

These figures show a marked decrease in the accidents from falls of ground and in surface accidents, but a large increase in those caused by explosives.

There were employed at the producing and non-producing mines during 1911 approximately 9,423 men. At these mines 36 men were killed, which is equivalent to 3.82 per 1,000 men employed.

Table of Fatal Accidents in Mines, Metallurgical Works and Quarries, 1900 to 1911.

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	Total
Persons killed in producing and non-producing mines	17	13	10	7	7	9	11	22	47	49	48	49	289
Persons employed in producing mines	3,330	4,135	4,426	3,499	3,475	4,415	5,017	6,305	7,435	8,505	10,862	12,543	73,847
Persons employed in non-producing mines (estimated)..	650	550	450	400	400	500	750	1,140	1,750	2.000	2.000	2,000	12.590
Total persons employed.........	3,980	4,685	4,876	3,899	3,875	4,915	5,767	7,345	9,185	10,505	12,862	14,543	86,437
Fatal accidents per 1,000 employed......................	4.27	2.77	2.05	1.79	1.80	1.83	1.90	2.99	5.11	4.66	3.73	3.37	3.34

The following classification distributes the responsibility for the cause of the fatalities at the mines:—

1.	Fatalities due to danger inherent to the work itself..................	10 or 27.8 per cen t
2.	" arising out of defects in the mine workings	10 or 27.8 "
3.	" due to fault of fellow workmen	2 or 5.5 "
4.	" due to fault of injured person............................	14 or 38.9 "

The specific occupation in the mine of the men who were killed, and their nationality, are shown in the following table:—

Occupation	English Speaking	Polander	Finlander	Italian	French	Hungarian	Austrian	Total
Drill runner	5	1	7	......	1	......	1	15
Trammer..............................	......	4	......	......	......	1	......	5
Drill helper..........................	......	2	2	1	1	......	......	6
Bucket or Cage tender..................	......	1	......	1	......	......	......	2
Laborer	1	......	......	1	......	......	......	2
Shift boss	1	......	......	1	......	......	......	2
Powderman	1	......	......	......	......	......	1	2
Deckman	1	......	......	......	......	......	......	1
Hammerman..........................	......	......	......	......	1	......	......	1
Total...........................	9	8	9	4	3	1	2	36

The ages of the men killed at the mines were as follows:—

17 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	56 to 60	Unknown	Total
2	15	5	7	4	1	1	1	36

Cause and Place of Fatalities in Mines

The following schedule shows the cause and place of the fatalities in 1911 compared with 1910:—

		1911.	1910.
Below ground:			
Falls of ground		2	7
Shaft accidents:—			
Falling from bucket	3		
Falling down shaft	3		
Objects falling down shaft	1		
Falling down shaft due to staging giving way	1		
	—	8	8
Explosive Accidents:—			
Premature explosion while loading or lighting holes	5		
Drilling into bottom of old or missed holes	3		
Explosion of box of dynamite while preparing charges	3		
Asphyxiation from gases from explosives	3		
Picking or putting bar into old hole containing explosive.	2		
	—	16	10
Miscellaneous accidents:—			
Falling down chute	3		
Struck by steel, etc., falling down stope or from staging.	3		
Falling down stope	1		
	—	7	3
Above ground:—			
Blowing up of thawing house	2		
Crushed under falling material	1		
	—	3	9
		—	—
Total		36	37

Cause and Place of Non-Fatal Accidents at Mines

The following schedule shows the cause and place of the non-fatal accidents in 1911 at the mines, and the number injured:—

Underground:—		
Falls of ground		4
Shaft accidents:—		
Cage accidents	4	
Bucket accidents	1	
Falling part way down shaft	3	
Objects falling down shaft	1	
	—	9
Explosives:—		
Drilling into old or missed holes	8	
Picking or putting bar into old hole	1	
Premature explosion	1	
	—	10

Miscellaneous accidents:—		
Falling down stopes, raises, winzes, chutes or man-ways	8	
Jammed by cars, skips or buckets	8	
Scaling	4	
Falling from staging	3	
Foreign material in eyes	2	
Fall of rock or ore from chutes	8	
Burned	2	
Flying rock	1	
Rock rolling down muck pile	1	
	—	37
Surface:—		
Falling from elevated places	11	
Caught by machinery	3	
Falling objects	4	
Explosives	2	
Caving of trench on rock pile	2	
Foreign material in eye	2	
Coupling cars	1	
Burned	1	
	—	26
		—
Total		86

The table giving the details of the above accidents will be found following the table of fatal accidents.

Mining Regulations and How Observed

There is much room for improvement in observing the mining regulations in Ontario both by managers and men. By referring to the classification distributing the responsibility for the cause of the fatalities it is seen that 72.2 per cent. were due to carelessness, neglect or foolhardiness on the part either of the mine management or the workmen themselves. This does not mean that all these fatalities were due to non-observance of the mining regulations; in fact only about 25 per cent. were due to direct infringement of the Mining Act. The other 47 per cent. were due mainly to dangerous mining practice, foolhardy methods or carelessness in performing the work.

Negligence has been shown by mine managers in carrying out the regulations in respect of the following:—

1. The erection and maintenance of approved thawing houses.
2. The installation of safety cross-heads.
3. The proper and efficient scaling of the roof and walls of working stopes, shafts, drifts and cross-cuts.
4. The forbidding of riding in buckets and skips.
5. Maintaining auxiliary ladders in the shaft while sinking.
6. The proper ventilation of underground workings.
7. The enforcement of the provisions regarding the blasting of missed holes, and forbidding drilling into bottoms of holes that have been blasted.

Failure to strictly observe the regulations provided for the above matters has been a prolific cause of accident.

The provisions that are most frequently broken by the workmen have reference to:—

1. Proper care in the handling of explosives.
2. Drilling into missed or cut-off holes.
3. Drilling into the bottom of old holes that have been blasted.

4. The tamping of holes after charging.
5. Riding in buckets or skips.
6. Keeping in position guard-rails around the shaft openings.
7. Proper scaling of walls and roof of working places.

These provisions are sometimes wilfully disobeyed by the workmen, and at other times broken through ignorance, carelessness and neglect. The violation of each is responsible every year for serious and often fatal accidents. The Mining Act makes provision for the reporting of careless acts to the Inspector of Mines by mine managers. Very few cases are ever reported, however, until an accident occurs, when the manager is only too anxious to place the blame on the workman. The proper time for reporting these careless practices is the first time a man is found guilty. When not reported, the manager assumes the responsibility along with the workman.

A dangerous practice that has resulted in serious and fatal accidents is the placing of men to work over other workmen in such a position that a careless act on the part of the workmen above imperils the safety of the men working below. This practice is most dangerous and should never be allowed under any circumstances.

The following notes briefly describe the fatal accidents at the mines from the several causes, and the methods that should be adopted for their prevention.

Falls of Ground

There was a marked decrease in the number of fatalities from this cause, there being only two men killed in 1911 compared with 7 in 1910. One of these men was killed by deliberately walking under a piece of ground that another man was endeavoring to take down, and when directly under it the piece fell. The other man was killed by being struck by a piece of ore falling a distance of about 30 feet. The roof of the stope had been examined and scaled on the day of the accident, but the scaling must have been poorly done. It is necessary to emphasize again the need of constant watchfulness on the part of the shift bosses over the scaling operations of the workmen. Only unceasing vigilance will prevent accidents from this cause.

Shaft Accidents

There were eight fatalities in shafts in 1911, being the same number as in 1910. The accidents, however, resulted from different causes.

Three men lost their lives through falling from buckets. Of these, two were the result of an infringement of the Mining Act.

One man in a Porcupine mine was riding up in the bucket when in some manner he fell from it and was killed. This was a direct violation of the Act, and a prosecution would have followed, but the Porcupine fire occurred just at the time, and action, under the circumstances, was deferred.

Another man was riding down in the bucket when the cross-head stuck, and after the bucket had descended about 120 feet, the cross-head dropped and the man fell to the bottom of the shaft. The company were prosecuted for maintaining a cross-head in the shaft not in accordance with the Mining Act.

Another man fell from the bucket, due to its upsetting with him. It was not ascertained how the lug holding the bucket upright became unfastened. To guard against this type of accident it would be safer to have a fastener on each side of the bucket for holding it in position.

Three men were killed by falling with car down the shaft. In two of the cases the man pushed the car into the shaft entrance while the cage or door was not in proper position. If the guard-rails around the shaft entrance were always kept in proper position, except when actually taking the car off or putting it on the cage, such accidents would not occur. The third man was apparently leaning over the shaft to see if the cage was coming and lost his balance, pulling the car into the shaft after him. This was another accident that would have been prevented if the guard had been kept in its proper position.

One man was killed by being struck by a rock falling from some place in the shaft. A round oı holes was blasted in a shaft about 100 feet distant from the shaft in which this man was at work. Apparently the concussion from the blast caused the rock to fall either from the wall or from the timbers on which it may have been lodged. Blasting should not be done in such close proximity to where men are working. Another met his death through a staging on which he was working giving way and causing him to fall to the bottom of the shaft. This accident was due to carelessness in putting up the staging.

All the above shaft accidents were preventible if the Mining Act had been obeyed and proper care had been exercised in carrying out the work.

There were no fatal cage accidents in 1911. The type of cage used in the mines of Ontario is, however, not satisfactory, and accidents are liable to occur, due to the sides of the cage being so open. It is advisable that the type of cage outlined in the last report of the Bureau of Mines should be adopted. Another safeguard for shafts is the automatic gate, which can only be opened while the cage is at the level.

The safety cross-head illustrated in the Twentieth Report of the Bureau of Mines has been found to work satisfactorily wherever installed, and has no doubt reduced the number of accidents due to the sticking in the shaft of the old style of cross-head

Explosive Accidents

There were 16 fatalities resulting from the use of explosives underground and 2 on the surface, a total of 18 men killed. There were 36 men in all killed at the mines, so that explosives were responsible for 50 per cent. of the fatalities. In 1910 there were 10 men killed by explosives at the mines, or 27 per cent. of the total number killed. It is, therefore, evident that there has been an increase of nearly 100 per cent. in the fatalities from this cause.

This condition is a matter for regret and also for censure when, on an analysis of the fatalities, we find that at least half of the accidents was the result of carelessness. In the greater number of accidents from explosives there are generally only two factors. The first is the condition of the explosive, and the second the care with which it is handled. The first cause is one over which the Inspector of Mines has but little control, and has no facilities for acquiring such control. There has never been in Canada any legislation dealing with the inspection of explosives, which is a matter coming within the jurisdiction of the Federal government. At present anyone who has a substance that will explode may sell it, if he can get a buyer. Before the quality of the explosive is proven accidents may result. It is not only the small dealer who needs inspection, but also the large producers. In the competition for making sales and the desire for large profits, the grade of the explosive may not be kept up to the standard. Improper mixing, improper proportion of ingredients, improper packing, all tend to render the explosive unsafe and to increase the accident rate. Old explosives that have been in storage for more than a year are sometimes shipped into the less accessible camps in the winter time, and have to be used by the mining companies during the summer, as no others can be obtained. When an accident occurs now from an explosive, there is no way by which this explosive may be thoroughly tested, to ascertain wherein the fault lies.

Careless handling of explosives is a factor for the prevention of which the Mining Act contains certain regulations. The mine foremen and the mine managers are the men most closely in touch with this phase. They are supposed to see that the men use care in all their work pertaining to mining. The large accident list goes to show that they do not at all times fulfil their duties satisfactorily. It would seem that a number of men are employed in Ontario, handling explosives, who are totally unfitted for their work. A man may be discharged from one mine for incompetence and carelessness, but he obtains work at an adjoining mine and goes on as before. A careless workman should never be allowed near explosives, to say nothing of handling them.

Of the 5 men who lost their lives through premature explosions, 3 were killed while lighting a round of holes entirely untamped. The explosion was caused by fire from the lighted fuse igniting the exposed explosive in the hole. Accidents from this cause are preventible, and are due to the negligence and carelessness of the men, and also of their superiors, who should take precautions to see that the men do this work properly. The other two men were killed while loading holes. No explanation of the cause of the accidents could be given. It is possible that they were due to the explosive used being inferior.

Three men were killed as a result of drilling into old or missed holes. Two of these men purposely drilled into the bottoms of old holes, that had been blasted but did not break properly, with the idea of deepening the holes a little. There was some explosive left in the bottom of the hole, and as a result the men were killed. This practice is strictly forbidden by the Mining Act, and is one of the most dangerous and foolhardy of the careless practices indulged in around the mines. The other man was killed as a result of drilling into a missed hole. The missed hole was a lifting hole in a cross-cut, and could easily have been found if the drill runner had been careful. He started the new hole about 10 inches from the collar of the missed hole, and at an angle to it. After drilling a couple of feet he drilled into the missed hole, causing an explosion which killed his helper.

Three men were killed in one accident through the premature explosion of a box of dynamite that had been brought into the mine preparatory to loading a round of holes in the shaft. No cause for this explosion was found, as all the witnesses were killed, and it was impossible to ascertain just what the men were doing when the explosion occurred.

Three men lost their lives through being overcome with the gases emanating from the discharge of a round of explosives. Two of these men were shift bosses who went to the part of the mine where blasting had been done, and where none of the men were working. They were overcome by the gases and were dead when found. In connection with these two accidents it was found that the gases had been allowed to remain for some hours without turning on the air to blow them out. It is essential to allow the air to blow into the working face after a round has been blasted, whether the men are to return to work in that place the next shift or not. After these gases cool and settle they are much more deadly than immediately after the blasting. The other man was asphyxiated in a winze. Owing to there not being sufficient air to hoist the men from the winze after the round of holes had been lighted, one of them was unable to reach a place of safety, and, after the blasting, was overcome by the gases and was dead before he could be taken out. The mining company and the foreman in this case were prosecuted under the Mining Act by the Inspector of Mines for not maintaining an auxiliary ladder in the winze. The former was fined $100 and costs, and the latter $50 and costs.

Two other men lost their lives through striking explosives with a bar. In one case the explosive was in a cut-off hole, and in the other it was either an old hole containing an explosive or some explosive in the muck. In the first case it was impossible to understand why the workman did not see the cut-off hole, and it was due to lack of proper inspection that the accident occurred. In the second case the man was using his bar in a pile of rock cleaning off a bench in order to set up the drill. It is therefore quite probable that even a close inspection would not have disclosed the presence of the explosive.

Thawing House Explosions

Two thawing houses blew up during the year, causing in each case the death of the powderman. In one case it was proved that the powderman had a lighted candle in the thawing house, which no doubt caused the explosion. In the other case it was impossible to find any cause for the explosion. The thawing house was, when inspected two months before the explosion, in very good condition, with a satisfactory heating arrangement.

It is necessary to emphasize the following points that should be observed in the construction of a safe and efficient thawing house:—

1. It should be built of such materials that in case of an explosion, there will be the smallest number of pieces to be projected any distance.

2. The heating arrangements should be by means of hot water or steam circulating in pipes.

3. These heating pipes must be so arranged that no explosives can be placed or accidentally fall on them.

4. The racks should be so placed that they are some distance away from the heating pipes.

5. These racks should be thoroughly cleaned and washed at least once a month.

6. The house should be constructed with an ante-room opening into the room in which the explosives are thawed. This will guard against a sudden change in the temperature of the thawing room.

7. The thawing room should be maintained at as uniform a temperature as possible and a recording thermometer kept therein.

8. A proper ventilator which can be opened or closed should be built in the roof of the house.

9. A separate building should be constructed in which to prepare the exploders.

10. No caps or fuse should be kept in the thawing house.

11. A wooden or copper wedge should be used for opening the boxes of explosives.

12. A competent man should be placed in charge of the thawing house, and no other person allowed to enter it.

13. A proper system of lighting should be installed, and a naked light never allowed near the building.

14. The powderman should never carry matches or tobacco while on duty.

Miscellaneous Accidents

There were 7 men killed in miscellaneous accidents underground. Of these 6 were killed in stopes and 1 in a drift.

Three of the fatalities were the result of men falling into the ore chutes from the stopes. The mouths of chutes in stopes are hard to keep guarded at all times, owing to the blasting. They should, however, be covered with timbers at all times except when actually in use. In one of the cases the ore had hung up in the chute, and the man was up on it trying to drive an iron pipe through in order to start the ore running. It loosened unexpectedly, and the workman was drawn down by the ore and smothered.

Three other men lost their lives through being struck by objects falling from above them. One of these men was struck by a hammer-drill which fell from the staging, due to the breaking of the steel. The staging was about 6 feet above the floor of the drift, and the man killed was standing about 8 feet from the end of the staging.

The other two men were killed by being struck with drill-steel. In one case, and probably in the other, the steel fell down the stope from where the machine men were working. These machine men were set to work on a bench of the underhand stope, which was in such a position relative to the trammer that anything falling from the bench would in all probability strike the trammers, unless they heard it coming and ran to a place of safety. Such a practice is very dangerous, and should never be followed. One man slipped while taking down the tripod for the drill and fell to the bench, 12 feet below, and was killed.

Surface Accidents

Three men were killed on the surface about the mines. Of these, two were killed by the blowing up of thawing houses. This matter has been discussed under a previous heading. The other man was at work piling up pieces of shafting. One end of the shafting was on a brace about 2 feet above the ground. The man slipped and fell with his head under the shafting; at the same time the brace gave way, allowing the shafting to fall on the man, killing him instantly.

Prosecutions

The following cases of prosecution for infringement of the Mining Act were undertaken by the Inspector of Mines:—

1. One company were fined $100 and costs for a violation of sec. 164, rule 23, of the Mining Act, in not maintaining an auxiliary ladder in the winze while sinking was in progress.

2. The foreman of the above company was fined $50 and costs for the same offence as No. 1.

3. The manager of a second company was fined $100 and costs for a violation of sec. 164, rule 19, of the Mining Act, in not maintaining guard rails at the collar of the shaft.

4. A third company were fined $100 and costs for a violation of sec. 164, rule 24a, of the Mining Act, in not maintaining a safety cross-head so constructed that it cannot stick in the shaft without also stopping the bucket.

Porcupine Fire

A most disastrous fire swept over the Porcupine camp in July, causing the death of 71 persons and the loss of thousands of dollars in camp buildings and equipment. The largest loss of life occurred in the West Dome shaft, where some 34 persons took refuge from the fire. This shaft was about 80 feet in depth, with no auxiliary exit. The timbers took fire at the collar of the shaft, and were burned to a depth of about 30 feet. As a result all in the shaft were suffocated. Several other persons were suffocated in the Dome shaft, where they had taken refuge. This is a startling example of the danger of erecting buildings too near the shaft when there is but one entrance to the mine. It also proves the necessity for securing an auxiliary exit as soon as possible. The location for magazines for explosives in a wooded country is also a difficult problem on account of the danger from fire. Frequently sufficient care is not taken in cleaning up around these magazines, or in their method of construction.

Health of Miners

There was no marked outbreak of disease among the miners during the year. A little typhoid was present in nearly all the northern Ontario camps. The question of providing sanitary camps and a proper water supply does not receive sufficient attention until an outbreak of disease compels the companies to look after it. The overcrowding of the bunk houses in our newer camps is also to be condemned. There is not sufficient care shown in providing a properly equipped dry house, in which the men working underground can change their clothing when coming off shift. This is specially necessary in Ontario in the winter time on account of the very cold climate.

Mine Hospitals

The mine hospital at Cobalt has done efficient work throughout the year. Mr. Tom R. Jones has again been elected president of the board. All the operating mining companies in the Cobalt camp are now subscribers to the hospital.

The Canadian Copper Company's hospital at Copper Cliff has also done good service throughout the year in taking care of the sick and injured employees of the company. It is to be very much regretted that this fine hospital was destroyed by fire on January 17th, 1912.

There is much need of a hospital at Porcupine. The Dome Mines, Limited, have built and equipped a hospital for the care of their own employees. None of the other mines there have as yet provided any place where their sick or injured workmen may be cared for in the camp. It is necessary to send them to some hospital outside,—a journey which, in the case of badly injured or very sick persons, lessens their chance of recovery. A concentrated effort should be made at once for the erection of a mine hospital.

The Ventilation of Mines

The Mining Act of Ontario requires that "an adequate amount of ventilation shall be constantly produced, so that the shafts, adits, tunnels, winzes, raises, sumps, levels, stopes, cross-cuts, underground stables and working places of the mine and the travelling places to and from such working places shall be in a fit state for working and passing therein." But little attempt has been made in the mines of Ontario to adopt any form of artificial ventilation except compressed air, exhausted in the workings by the drills or blown between the shifts, for cleaning the workings of fumes resulting from blasting. It has been found necessary in coal mines to adopt complete systems of artificial ventilation owing to the presence in the mines of noxious gases. In recent years, however, owing to the extent to which some of the metalliferous mines have been worked, artificial ventilation has been adopted with most advantageous results.

The Transvaal Mining Regulations require the following standard of ventilation:—

I. In every metalliferous mine sufficient air shall be provided and such other arrangements made, that in any sample of air taken under normal working conditions from any part of the mine, not less than one hour after blasting:—

(a) The proportion of carbon dioxide shall not, as regards any mine within the Witwatersrand area, exceed 20 volumes per 10,000 of air=0.2 per cent.

(b) The proportion of carbon monoxide shall not exceed 1 volume per 10,000 of air =0.01 per cent.

No practically determinable amount of the oxides of nitrogen (NO and NO_2) shall be present.

At the East Rand mines ventilating fans were installed at the Angelo and Cason shafts, producing respectively 300,000 and 350,000 cu. ft. of air per minute. The effect on the air of the mine was marked. Before the installation of the fans an average analysis gave:—

CO_2	0.493 per cent.
CO	0.012 "

but after the installation of the fans:—

CO_2	0.127 per cent.
CO	0.005 "

The total cost of the equipment was about $125,000. Mr. Penlerick, the manager of the mines, states: "The cost is insignificant compared to the valuable results obtained, and under the circumstances some system of artificial ventilation should be adopted in practically every mine on the Rand."

A complete artificial ventilating system by means of fans has been in use at the Comstock mines, Nevada, for some years, and has proved most effective.

Another system that has proven beneficial is confining all the blasting operations to one shift.

There are many types of ventilating fans in use, the majority being fairly efficient. The installation and operation cost of any of these at the mines in Ontario, where the capacity required would not be great, would be comparatively small, and would be insignificant compared with the valuable results obtained.

General

A number of men every year receive injuries which can only be classified as serious. Through some constitutional weakness or neglect, other complications occasionally arise, resulting in death. There were three such cases in 1911, which have not been placed in the fatality list, though the injured men ultimately died.

Mr. V. Gravelle, employed as table helper at the Northern Customs Concentrator, had his back broken on April 27th, through falling a distance of about 12 feet to the floor. He was engaged in shifting a belt when in some way he lost his balance and fell backwards. Gravelle was cared for at the Cobalt Mines Hospital until Sept. 24th, when he was removed to his home. A few days after he contracted pleurisy and died as a result, on Oct. 14th. There is little doubt that the injury left him in a weakened condition, so that he was an easy victim to the disease.

Mr. C. Rinker was employed as foreman at the blast furnace of the Algoma Steel Company. He was burned about the neck and hands on Sept. 22nd, through the sudden dumping of a ladle of cinders on which he was working. On Oct. 15th he returned to work, these wounds being apparently quite healed, and worked three shifts. He then consulted a doctor, who told him that his heart was very much affected, and advised him to refrain from excitement or heavy work of any kind. He died on Oct. 29th. At the inquest the result of the post-mortem was given, and it was shown that heart disease was most marked, and that this was the primary cause of death, although it may have been hastened by the shock of the burns.

Martin Urenovizh, a laborer, employed at the blast furnace of the Algoma Steel Company, on May 5th, got a piece of hot metal in his eye. He was taken to the hospital, and, after examination and treatment, the doctor recommended that the eye be removed. Urenovizh refused to allow the operation to be performed, and as a result both eyes became badly infected, and his general health suffered. Finally he permitted the operation but the infection had become too widely spread, and he died on June 2nd. The attending physician states that there is no doubt that the man's life would have been saved had he permitted the operation to be performed at the proper time.

The following table summarizes the fatal accidents in or about the mines, giving the name of the person killed, nature of injury, cause of accident, etc.:

Table of Fatal Accidents

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
1	Feb. 13.	Beaver	Beaver Con. Mines Co..	George Rannick, powderman ....
2	Dec. 6.	Buffalo	Buffalo Mines, Ltd. ...	Wilfred Rheaume, drill helper ....
3	Dec. 23.	Silver Leaf	Crown Reserve	J. Graham, deckman ....
4	Dec. 26.	Calcite Lake	Calcite Lake Mg. Co. ..	Sigmund Terdk, mucker ....
5	Dec. 29.	do	do ..	Thos. Whitten, drill runner ......
6	Jan. 14.	Crean Hill	Canadian Copper Co. ..	Fred. Turcrack, trammer ....
7	Mar. 2.	Creighton	do ..	Roman Katyn, drill helper ......
8	June 28.	Crean Hill	do ..	Maetro Lazoveritch, trammer ....
9	Sept. 18	Creighton	do ..	George Wuori, drill helper ....
10	Oct. 11.	do	do ..	Ignot Vasilkoski, trammer ....
11	Nov. 30.	do	do ..	Nicholas Hluchaniuk, trammer ....
12	Dec. 8.	do	do ..	Patrick Sammon, powderman ....
13	Nov. 25.	Station Grounds.	Cobalt Station Grounds Mining Company ...	Michael Nace, laborer ....
14	Dec. 15.	Townsite	Cobalt Townsite Mg. Co	W. Mandley, drill runner ....
15	Oct. 27.	Dome	Dome Mines, Ltd.	Otto Nemine, drill helper ....
16	Dec. 9.	do	do	Marvin Sommers, laborer ....
17	Sept. 29.	Drummond	Drummond Mines, Ltd	John Kalaska, drill runner ......
18	June 26.	Foley O'Brien ...	Foley O'Brien Mg. Co...	Grovanni Gentile, drill helper ....
19	Jan. 26.	Helen	Lake Superior Power Co	John Maki, drill runner .... Oscar Mantynen, drill runner .. John Thompson, drill runner ..
20	May 22.	do	Lake Superior Power Co.	Louis Niemi, drill runner ....
21	Sept. 18.	do	Lake Superior Power Co.	Vertillio Spina, bucket tender ....
22	Mar. 27.	Hollinger	Hollinger Gold Mines, Ltd.	Fred. Dupuis, drill runner ..... Joseph Knash, drill helper ....
23	June 16.	McKinleyDarragh	McKinley-Darragh-Savage Mines, Ltd.	Jas. Graves, drill runner ....
24	Mar. 8.	Millerett	Millerett Silver Mg. Co.	John S. Kennedy, shift boss ......
25	Jan. 29.	Garson	Mond Nickel Co.	Otto Heinanen, drill runner ......
26	May 10.	do	do	John Riley, drill runner ....
27	June 22.	Nipissing	Nipissing Mining Co .	Victor Leina, drill runner ....
28	Nov. 6.	do	do ..	Peter Milensnic, drill runner ....
29	Jan. 19.	Norrington	R. W. Norrington	Albert Brunette, hammerman ....
30	Mar. 19.	Northern Pyrites	Northern Pyrites Mg. Co.	Geo. Cavazza, shift boss ....
31	May 23.	Nova Scotia	Nova Scotia Silver Cobalt Mining Co.	Aleck Szniter, cage tender ....
32	Nov. 9.	Richardson	Kingston Feldspar and Mining Co.	Michael O'Connor, drill runner ...
33	Mar. 16.	Temiskaming ...	Témiskaming Mg. Co...	Albert Sullivan, drill runner .....
				Total ....

Table of Serious Non-Fatal

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
1	Jan. 20.	Atikokan	Atikokan Iron Co.	Wm. Bortis, drill runner ....
2	May 7.	Bailey	Bailey Cobalt Mines, Ltd	Henry Briscoe, drill runner ......
3	May 9.	Beaver	Beaver Con. Mines, Ltd	L. Salo, drill runner ....
4	Aug. 14.	do	do	H. Feener, carpenter ....
5	Sept. 18.	do	do	H. Russell, machinist ....
6	Dec. 5.	do	do	J. McGinnis, laborer ....

In or About Mines.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
......	1	Back and right side injured.	Explosion in thawing house.
1	......	Skull fractured	Explosion resulting from drilling into bottom of missed hole.
1	......	Skull smashed and body very badly mangled	Fell down shaft.
1	......	Skull fractured	Fell from bucket.
1	......	Fracture of skull	Fell down shaft, due to staging giving way.
1	......	do	Fell down chute.
1	......	Whole body badly lacerated.	Struck bar into missed hole or some unexploded powder in muck.
1	......	Fracture of skull	Struck by rock, falling from back of stope.
1	......	do	Struck powder in cut-off hole while scaling.
1	......	do	Struck by falling rock or piece of steel.
1	......	do	Struck by falling steel.
......	1	Blown to pieces	Thawing house blew up.
1	......	Fracture of bone of skull	Fell from bucket down shaft.
1	......	Body greatly lacerated	Premature explosion due to fuse spitting into dynamite in untamped hole.
1	......	Fracture of skull	Struck by piece of falling rock in shaft.
......	1	Neck broken	Fall of shafting.
1	......	Head badly injured	Explosion of dynamite while loading hole.
1	......	Fracture of skull	Fell from bucket.
1	......	Body badly lacerated	Explosion of box of dynamite.
1	......	do	
1	......	Broken back	
1	......	Body lacerated	Fall of ore on which deceased was standing.
1	......	Instantly killed	Fell with car of muck down shaft.
1	......	Fracture of skull	Premature explosion in untamped hole.
1	......	Body lacerated	
1	......	Fracture of skull	Struck by hammer drill falling off staging.
1	......	Asphyxiation	Overcome by fumes from dynamite explosion.
1	......	Fracture of skull	Fell down stope into chute.
1	......	Chest crushed	Fall of piece of rock.
1	......	Fracture of skull	Drilled into hole containing explosive.
1	......	Chest badly crushed	Explosion while loading hole.
1	......	Killed instantly	Drilled into hole containing explosive.
1	......	Asphyxiation	Overcome by gas.
1	......	Fracture of base of skull	Fell down shaft.
1	......	Fracture of skull	Fell with drill down stope.
1	......	Asphyxiation	Unable to escape from winze after lighting round of holes.
33	3		

Accidents in or About Mines.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
1	......	Shoulder bruised	Was sand blasting when apparently fuse spit into exposed dynamite.
1	......	Body slightly burned	Clothing caught fire from candle.
1	......	Right leg broken	Fell ten feet with staging.
......	1	Ankle sprained	Fell from roof of power house.
......	1	Right wrist broken	Fell from top of boiler.
......	1	Body bruised	Fell from scaffold while engaged on mill construction.

Table of Serious Non-Fatal

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
7	Dec. 18.	Beaver	Beaver Con. Mines, Ltd.	J. Olska, deckman ....
8	May 15.	Buffalo	Buffalo Mines, Ltd.	D. Desjardins, carpenter ....
9	Aug. 7.	do	do	H. Slack carpenter ....
10	Sept. 21.	do	do	W. Cooper, carpenter ....
11	Oct. 2.	do	do ...	H. Harrison, laborer . ...
12	Nov. 1.	Buffalo Mill	do	Joseph Doyle, spare shift boss ....
13	Dec. 6.	Buffalo	do	Bert Reid, drill runner .... Isadore Marion, drill runner .... A. Hunton, drill helper ....
14	Aug. 17.	Badger	Badger Mines, Ltd. ...	E. O. Evans, laborer ....
15	Feb. 7.	Creighton	Canadian Copper Co ..	Ilia Puscas, trammer ....
16	Mar. 2.	do	do ..	Mike Baylick, drill runner ......
17	Apr. 27.	do	do ..	Yak Maki, drill runner ....
18	May 10.	do	do ..	Guiseppi Fera, trammer ....
19	May 5.	do	do ..	E. M. Medlen, time keeper ....
20	June 19.	do	do ..	Carmino Fisico, trammer ....
21	Aug. 25.	do	do ..	Walakin Manilan, block-hole driller.
22	Sept. 4.	do	do ..	Yalmar Virta, drill runner ..... Emil Maka, drill helper .... Aisak Laari, drill helper ....
23	Oct. 26.	do	do ..	Adolphe Kinos, scaler ....
24	Feb. 7.	City of Cobalt ..	City of Cobalt Mg. Co...	A. Cain, drill runner ....
25	Mar. 7.	do ..	do ..	T. W. Bradley, drill runner ......
26	June 1.	Cobalt Lake	Cobalt Lake Mining Co	W. Biledo, carpenter ....
27	June 15.	Town Site	Cobalt Townsite Mg. Co	S. Donaldson, drill runner ....
28	Oct. 27.	Coniagas	Coniagas Mines, Ltd...	Henry Barkel, timberman ......
29	Nov. 9.	do	do ..	Thos. Hayward, drill helper ......
30	May 19.	Crown Reserve ..	Crown Reserve Mg. Co.	Edward Edwards, pump man ....
31	Oct. 14.	Dobie	Dobie Mines, Ltd.	Chas. Teare, trammer ....
32	Dec. 24.	do	do	E. J. Gaudet, drill helper ....
33	Oct. 25.	Dome	Dome Mines, Ltd.	J. Glasskowski, trammer ....
34	Sept. 15.	Gillies	John Gillies	Jas. Cowdy, laborer ....
35	Oct. 10.	Hollinger	Hollinger Gold Mines Ltd. ...	John Karpela, trammer ....
36	Sept. 12.	Hargraves	Hargraves Silver Mines, Ltd.	Thos. Troughton, drill runner .. Isaac Wilson, drill helper ......
37	Mar. 10.	Richardson	Kingston Feldspar and Mining Co.	John P. Cooper, trammer ....
38	May 4.	Kerr Lake	Kerr Lake Mg. Co.	G. Burgin, carpenter ....
39	June 17.	do	do	Herbert Day, powderman ....
40	Feb. 18.	La Rose	La Rose Mines, Ltd. ...	George Buhajczuk, drill runner ...
41	Apr. 27.	Lawson	do ...	M. Bajurink, nipper ....
42	Aug. 3.	do	do ...	John Szmyrk, trammer ....

Accidents in or About Mines—Continued.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
......	1	Fractured rib	Fell from trestle while dumping car.
......	1	Concussion and shock	Fell from staging thirty feet.
......	1	Index finger taken off at first joint	Came in contact with knives of buzz planer.
......	1	Fingers of left hand cut	Came in contact with knives of buzz planer.
......	1	Hip bruised	Fell off wagon.
......	1	Arm badly lacerated	Clothing caught an exposed set screw on shaft.
1	......	Face injured	Explosion resulting from drilling into missed hole. (See Fatal Accident.)
1	......	do	
1	......	do	
......	1	Fracture of clavicle	Fell from porch of boarding house.
1	......	Head cut	Struck on head by falling rock.
1	......	Cuts on body	Bar struck missed hole or some unexploded dynamite in muck.
1	......	Arm injured	Struck by piece of rock while scaling.
1	......	Lost sight of one eye	Struck by piece of rock while sledging.
1	......	Internal injuries	Struck by tram-car. ....
......	1	Scalp wound	Struck by skip while passing under skip track on surface.
1	......	Lost sight of both eyes	Drilled into missed hole.
1	......	Face cut and eyes injured	Drilled into old hole.
1	......	Lost sight of both eyes	
1	......	Legs cut	
1	......	Head injured	Knocked off bench and down stope by falling rock.
1	......	Bruised.	Falling rock struck plank on which injured stood and precipitated him 10 feet.
1	......	Fractured rib and scalp wound	Fell about ten feet while timbering shaft.
......	1	Concussion of brain and body bruised	Fell 43 feet while working on mill construction.
1	......	Slight concussion of brain ..	Fall of rock broke staging and precipitated injured 50 feet down stope.
1	......	Fracture of shoulder blade..	Fell from ladder 6 feet.
1	......	Scalp wound and bruises to body	Pile of rock on which injured stood gave way and carried him down chute.
1	......	Bruised	Fell down winze 30 feet.
1	......	Scalp wound and cuts on head	Loaded bucket caught on timber and upset.
1	......	Leg bruised	Fell 15 feet in man-way of shaft.
1	......	Fracture of scapula and scalp wound	Struck by drill which fell down shaft.
......	1	Arm broken	Struck by falling bucket.
1	......	Both arms had to be amputated	Overcome with gas and fell on candle.
1	......	Scalp wound	Struck by fall of rock while timbering raise.
1	......	Leg broken	
1	......	Fractured thigh	Struck by rock hurled by blast.
......	1	Leg broken	Fall of jig.
1	......	Body bruised	Fell down winze 48 feet.
1	......	Right leg broken	While scaling, rock struck him on leg.
1	......	Hip and shoulder bruised ...	While taking steel up with him on cage piece caught on timber.
1	......	Left arm broken	Left arm caught in timber while riding up on cage.

Table of Serious Non-Fatal

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
43	Aug. 28.	La Rose	La Rose Mines, Ltd. ..	George Robitaille, drill runner ...
44	Sept. 11.	do	do ...	D. Tkacruz, trammer ....
45	Sept. 13.	do	do ...	John Smith, trammer ....
46	Feb. 9.	Helen	Lake Superior Power Co.	Dan Vezmar, trammer ....
47	Feb. 15.	do	do	John De Diana, drill runner ......
48	Feb. 23.	do	do	L. Pegararo, drill runner ....
49	Mar. 24.	do	do	G. Murma, trammer ....
50	Mar. 29.	do	do	M. German, trammer ....
51	Apr. 7.	do	do	Valentine Trombine, trammer ....
52	Apr. 19.	do	do	Harry Lipka, trammer ....
53	Apr. 26.	do	do	John Matijczuk, trammer ....
54	Apr. 19.	do	do	Mike De Sacco, drill runner ......
55	May 27.	do	do	G. Zanetti, trammer ....
56	May 31.	do	do	V. Monaco, chute tender ....
57	May 31.	do	do	G. DelFavero, laborer ....
58	June 1.	do	do	A. Alamaki, blacksmith ....
59	June 22.	do	do	J. Uba, trammer ....
60	June 24.	do	do	G. Svaluto, trammer ....
61	June 24.	do	do	A. Budzinski, trammer ....
62	July 26.	do	do	Geo. Del Ferro, trammer ....
63	Aug. 21.	do	do	T. Wolosianka, crusherman ......
64	Oct. 7.	do	do	Victor Muki, drill runner ....
65	Oct. 10.	do	do	Thomas Dudgeon, machinist .....
66	Oct. 30.	do	do	J. Marastini, trammer ....
67	Nov. 13.	do	do	L. Svanson, chute tender ....
68	Dec. 14.	do	do	A. Chatinaca, skip tender ....
69	June 22.	Magpie	do	Victor Salo, hand driller ...... Anti Hankela, hand driller ....
70	Apr. 4.	Burgess	Manufacturers' Corundum Co., Ltd.	Neil McAlpine, trammer ....
71	Sept. 22.	T. R. 57	Reginald Merriman ...	W. Wilkinson, laborer ....
72	Sept. 20.	McIntyre	McIntyre Porcupine Mines, Ltd.	Robt. Richardson, drill helper ....
73	May 29.	Nipissing	Nipissing Mg. Co., Ltd..	J. Robin, drill runner ....
74	Jan. 19.	Norrington	R. W. Norrington	Fred. Carroll, hand driller ....
75	Apr 27.	Mill	Northern Customs Concentrators, Ltd.	V. Gravelle, table helper ....
76	Nov. 28.	Quarry	Port Credit Brick Co...	H. Proinor, signal man ....
77	Oct. 6.	Swastika	Swastika Mining Co. ..	John England, drill runner ....
78	Jan. 25.	Temiskaming ...	Temiskaming Mg. Co...	William Allan, drill runner ......
79	Dec. 23.	do ...	do ..	E. Dunnigan, timberman ....
80	July 24.	Henderson	S. Wellington	John Reeves, trammer ....
				Total..........................

Accidents in or About Mines—*Continued.*

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
1	......	Shoulder and hip bruised ...	While scaling from staging, rock fell breaking staging causing him to fall.
1	......	Big toe broken	Rock rolled from top of muck pile on it.
1	......	Arm bruised	Jammed arm between car and rock.
1	......	Large toe broken	Bucket fell on toe.
1	......	Bones in foot broken	Rock fell on foot.
1	......	Sprained ankle	Struck by piece of ore, falling from chute.
1	......	Right hand bruised	Hand caught between car and truck.
1	......	Left hand bruised	do
1	......	Large toe broken	Rock fell from chute on foot.
1	......	Sprained ankle	Cage dropped 25 feet due to friction slipping.
1	......	Finger broken	Caught finger between car and truck.
1	......	Leg broken	Cage dropped 25 feet due to friction slipping.
1	......	Finger broken	Piece of ore fell from chute on hand.
......	1	Tear in scrotum	Fell from ore car.
......	1	Ankle injured	Struck on ankle by piece of iron.
......	1	Face burned	Face burned in blacksmith shop.
1	......	Foot injured	Piece of ore fell from chute on foot.
1	......	do	Piece of ore fell from chute on foot.
1	......	Nail torn off thumb	Piece of ore fell from chute on hand.
1	......	Fingers cut	Hand jammed between car and rock.
......	1	Eye injured, sight impaired.	While sledging ore, piece flew, striking him in eye.
1	......	Eye injured	Got piece of ore in eye.
......	1	do	Got piece of emery from wheel in eye.
1	......	Finger crushed	Piece of ore fell on hand.
......	1	Finger broken	Hand caught while coupling car.
1	......	Finger crushed	Caught finger between car and skip.
......	1	Right hand blown off .... }	While loading hole explosion occurred. Were working on sewer trench.
......	1	Eye and nose injured ..... }	
......	1	Three ribs broken, also collar bone	Went under frozen pile of broken rock which fell on him.
......	1	Two ribs broken	Side of trench caved in on him.
1	......	Head badly lacerated	Became gassed, and fell from ladder.
1	......	Wounds and bruises on head and body	Fell twenty feet down raise.
1	......	Leg broken	Drilled into hole containing explosives.
......	1	Back broken (died on Oct. 14th of pleurisy)	Trying to shift belt guard, when he lost his balance and fell 14 feet.
......	1	Injury to spine	Fell a distance of twenty feet from a rock bin.
1	......	Scalp wounds	Fell from ladder down man-way.
1	......	Fracture of the skull	Fell down a stope a distance of about 80 feet.
1	......	Leg broken	Fell about 12 feet, due to breaking of sprag holding platform on which he was working.
1	......	Arm broken	While scaling, rock falling hit bar, jamming Reeves against wall.
60	26		

Accidents at Metallurgical Works

Inspection of the metallurgical works of Ontario forms part of the duty of the Inspector of Mines. These works include blast furnaces, copper-nickel smelters and converter plants, and silver smelters. At such works during 1911 there were nine fatalities.

Blast Furnaces

At blast furnaces two men were killed in 1911. One of these men was run over by a yard engine. A number of non-fatal accidents also occurred from this cause. It is essential in blast furnace yards, where there is so much noise at all times from the furnace, to have all engines, trolley cars, etc., provided with an efficient alarm bell or gong, which can be rung continuously when moving where workmen are employed. Another man was killed by being struck on the head with a brick falling from a platform inside the furnace when bricklayers were at work re-lining it. Care should be taken in such cases to see that men are never put to work immediately below other workmen unless proper protection is afforded them. A number of serious accidents occur annually at the blast furnaces due to burns received. These burns are either caused by hot cinders, or by explosion of the molten iron due to its coming in contact with water. Proper care should be taken to see that the workmen working in proximity to this hot material are properly clothed to afford protection. More use should be made of shields, asbestos mitts, etc.

Copper-Nickel Smelters and Converter Plants

Six men lost their lives while employed at copper-nickel smelters and converter plants. One of the men was crushed between cars in the converter building. The same care should be taken in having the engines equipped with alarm bell or gong as for engines around blast furnaces. Another man while working on the top of the converter patching up a hole with fire-clay, was struck by a piece of matte and slag, falling a distance of about two feet, from the converter hood. The man was struck on the back of the head, and the blow caused a fracture of the base of the skull, which resulted in his death.

Another man received fatal injuries by the fall of the converter hood, due to the breaking of the bar on which the hood was hinged. The pieces of the broken bar were subjected to a microscopic examination, and the bar was found to be composed of what is known as "bushelled" wrought iron. This class of iron bar is not suited to such a use on account of its lack of uniformity of texture.

A third workman while engaged in repairing, fell through the roof of the converter building, and was killed. The tiles with which the roof was covered had deteriorated, owing to the action of the gases. They were being replaced by new ones and the man was engaged at this work. He inadvertently stepped off the plank on which he was standing, which broke, allowing him to fall to the floor.

A fourth man was killed by an explosion in the settler, which must have been caused by the metal coming in contact with a leakage from one of the coolers. The man was burned to death by the molten matte.

An engineer in a smelter power-house was electrocuted through coming in contact with a high pressure wire. Sufficient care is not always taken in transformer rooms to have the high voltage wires removed from easy access. No matter how experienced a workman may be, he is apt at times to forget the necessity of constant care in the neighborhood of electric wires carrying high voltage. Such wires should, therefore, be so installed that a workman could not come in contact with them without some effort of his own. This would eliminate nearly all the accidental shocks.

Silver Smelters

Silver smelters furnished one fatality during the year. This occurred while the employee was engaged on construction work outside of the building. While on a scaffold six feet above the ground the scaffold fell, and the man had his back broken and died a few days later.

There were employed at the metallurgical works during 1911, approximately 3,718 men. At these works nine men were killed, which is equivalent to 2.42 per 1,000 men employed.

The following table shows the number and nationality of the men killed at the various classes of work at the metallurgical plants:

	English Speaking	Polander	Finlander	Italian	Total
Engineer	1	....	....	....	1
Tuyere puncher	....	1	....	....	1
Tapper	1	....	....	....	1
Converter puncher	....	....	....	1	1
Carpenter's helper	....	....	1	....	1
Converter puncher's helper.	....	1	....	....	1
Laborer	....	....	....	2	2
Carpenter	1	....	....	....	1
Totals	3	2	1	3	9

Cause and Place of Fatalities at Metallurgical Works

		1911	1910.
BLAST FURNACES:			
Run over by yard engine	1		
Struck by falling brick while re-lining furnace	1		
	—	2	3
COPPER-NICKEL SMELTERS AND CONVERTER PLANTS:			
Explosion in settler	1		
Crushed between cars	1		
Struck by piece of slag falling from hood	1		
Falling through roof while engaged in repair work	1		
Falling of converter hood through breaking of bar	1		
Electrocuted in power-house	1		
	—	6	4
SILVER SMELTERS:			
Falling from scaffold	1		
	—	1	3
Total		9	10

Cause and Place of Non-Fatal Accidents at Metallurgical Works

BLAST FURNACES:		
Falling from elevated places	2	
Falling objects	1	
Run down by cars	5	
Burned	8	
Part of body coming forcibly in contact with object	2	
	—	18
COPPER-NICKEL SMELTERS AND CONVERTER PLANTS:		
Falling	1	
Falling objects	1	
Struck by skip	1	
	—	3
SILVER SMELTERS:		
Falling from elevated places	2	
Caught by machinery	2	
	—	4
Total		25

A table follows giving particulars of the fatalities at the metallurgical works; also one with regard to the serious non-fatal accidents.

Table of Fatal Accidents at

No.	Date.	Works.	Owner.	Name and Occupation of Injured.
1	July 15.	Blast furnace....	Algoma Steel Co.	Geraldi Vinzinzi, laborer ....
2	Jan. 16.	Converter plant..	Canadian Copper Co. ..	P. Pologseyk, tuyere puncher .....
3	Mar.27.	Smelter.........	do ..	Arthur Jennings, tapper ....
4	Apr. 5.	Converter plant..	do ..	Valpini Attillio, converter puncher.
5	Aug.15.	do ...	do ..	John Micska, carpenter's helper ...
6	Oct. 28.	do ..	do ..	Ignotz Chiptomi, converter puncher's helper ....
7	Apr. 6.	Smelter.........	Coniagas Reduction Co.	Wm. Allen, carpenter ....
8	Aug. 4.	Power house.....	Mond Nickel Co.	Chas. Longfellow, engineer ....
9	Oct. 10.	Blast furnace....	Steel Co. of Canada ..	David FeDuzzi, laborer ....
				Total.........................

Table of Serious Non-Fatal Accidents

No.	Date.	Works.	Owner.	Name and Occupation of Injured.
1	May 1.	Blast furnace....	Algoma Steel Co.	Raffael Gullo, laborer ....
2	May 5.	do	do	Martin Urenovizh, laborer ....
3	Aug.28.	do	do	Fabio Finani, laborer ....
4	Sept. 7.	do	do	John Murray, stove tender ....
5	Sept. 8.	do	do	Peter Brown, labor foreman ......
6	Sept.16.	do	do	Campanelli Dellino, laborer ....
7	Sept.17.	do	do	G. Guglielimine, laborer .... / Pietro Artusi, laborer ....
8	Sept.21.	do	do	Roy Goatbe, brakeman ....
9	Sept.22.	do	do	Chas. B. Rinker, night foreman ...
10	Oct. 24.	do	do	Valenti Micheli, yard foreman ....
11	Oct. 30.	do	do	John Clarke, hoistman ....
12	Nov. 5.	do	do	John Sirkoe, keeper ....
13	Nov. 21.	do	do	Hector Gagnier, oiler ....
14	Nov. 23.	do	do	John Cutigras, laborer ....
15	Dec. 16.	do	do	Arthur Strand, blower ....
16	Mar.25.	Converter plant..	Canadian Copper Co....	Baoli Bacco, laborer ....
17	June 19.	do ...	do	Fachimi Getulia, liner ....
18	Feb. 6.	Smelter..........	Coniagas Reduct'n W'ks	Chas. Welham, laborer ....
19	Nov. 8.	do	do	Walter Rapsey, carpenter ....
20	Dec. 13.	do	do	Herbert Putnam, carpenter ....
21	Dec. 19.	do	do	Henry Carter, ass't foreman ......
22	June 26.	do	Mond Nickel Co.	John Smith, laborer ....
23	Jan. 22.	Blast furnace....	The Steel Co. of Canada	Tomaso Silenze, laborer ....
24	Nov. 6.	do	do	Benj. Carter, pitman ....
				Total.........................

Metallurgical Works.

No. Killed.	Nature of Injury.	Cause of Accident.
1	Body seriously cut up	Run over by engine in blast furnace yard.
1	Thigh and abdomen crushed.	Caught between drawbars of two cars.
1	Burned to death	Explosion of settler, due to leakage in cooler.
1	Fracture of base of skull ..	Struck by piece of slag falling from hood.
1	Injury to spinal column .. .	While repairing roof, stepped on defective tile and fell to floor below.
1	Pelvic bone fractured, which punctured bladder	Bar supporting converter hood broke, precipitating injured to floor.
1	Fracture of spinal column.	Fall of scaffold.
1	Electrocuted	Came in contact with wire carrying 15,000 volts.
1	Deep gash at base of skull...	Struck by falling brick while relining furnace.
9		

at Metallurgical Works.

No. Injured	Nature of Injury.	Cause of Accident.
1	Foot cut off below instep....	Run over by train.
1	Right eye burned	Struck by hot cinder in right eye; refused proper treatment, and died 2nd June, from septic embolus.
1	Leg injured	Bucket dropped on leg.
1	Right foot scalded	Escape of hot water from furnace pipe.
1	Knee injured	Struck knee on small pipe.
1	Legs burned	Cinder ladle burst.
1	Neck burned	Furnace slipped, throwing out hot coke.
1	Neck burned	
1	Left leg injured	Thrown off while standing on foot-board of engine.
1	Hand and neck burned	Ladle of cinders dumped unexpectedly. Rinker returned to work Oct. 15, and worked three days. He went home and consulted a doctor, who told him he had heart disease. He died from arrested circulation, on Oct. 29th, 1911.
1	Heel crushed	Struck by cinder ladle, kicked in on cinder track by locomotive.
1	Ankle sprained and head cut.	Overcome by escaping gas while replacing hook on charging can, and fell to top of furnace.
1	Left leg and both hands burned	Struck by molten iron ejected from furnace while drilling clay from iron hole.
1	Toes on right foot crushed ..	Scale car ran over foot.
1	Leg cut	Man struck by passing car.
1	Face burned and pitted	While changing tuyere, iron ran out, struck water and exploded.
1	Injured internally	Prying on bar, when it suddenly gave way.
1	Leg injured	Leg crushed by drop ball on converter.
1	Right knee injured	Fell from ladder 15 feet.
1	Fracture of tip of right elbow.	Fell from ladder.
1	Index finger of left hand cut off	Hand came in contact with jointer knives.
1	Left leg and two ribs broken, other bruises	While oiling main shaft, clothing became wrapped around it.
1	Scalp wound, bruised back..	Struck by skip.
1	Knee and chin cut	Fell 15 feet.
1	Several ribs broken	Fell over iron box while running away to avoid being burned.
25		

Accidents at Quarries

Under this heading are classified the accidents that occur in all kinds of stone quarries and in excavations at brick yards.

Four fatalities occurred at stone quarries during 1911, all of which were on the surface and not in the quarry. Two men were killed while engaged in shovelling fine rock from a car, owing to another car striking it. Both cars were on a siding which had a heavy grade. A loaded car was being let down from the bins, but the brakes did not work properly and the man lost control of it. It struck the car in which the two men were working, throwing them on the track where they were crushed beneath the wheels.

Another workman was crushed between two locomotives. One locomotive was off the track and the other one was being used to push it back on the track. A tie was placed between the bumpers of the two engines to accomplish this. The tie slipped and the man was caught and crushed to death.

An engineer in the power-house at one of the quarries was killed through being struck with a piece of rock projected by a blast in the quarry. There is not sufficient care taken at quarries to have proper shelters for the men wherein they may take refuge while a blast is being discharged.

There is also much negligence shown around quarries in the handling of explosives. The management in a number of cases seems to be either ignorant or careless in the matter of providing proper magazines and thawing houses. It is just as essential to have a proper thawing house, where only a few sticks of explosive are being thawed, as if it were an equal number of cases. There is also negligence shown in the reporting of accidents. All accidents that are likely to incapacitate a workman for seven days or over must be reported within 24 hours after the time of occurrence.

Table of Fatal

No.	Date.	Quarry.	Owner.	Name and Occupation of Injured.
1	Mar. 28	Doolittle & Wilcox	Doolittle & Wilcox, Ltd.	Medio Toro, laborer .... Louis Pace, laborer ....
2	Sept. 22.	do	do	Ernest Finlay, crusher man ......
3	April 19	Hagersville......	Hagersville Contracting Company	George Arthur Howard, engineer..
				Total..........................

Cause and Place of Fatalities at Quarries

		1911.	1910.
In quarry		0	1
On surface:—			
Run over by car on siding	2		
Crushed between two locomotives	1		
Struck by flying rock	1		
	—	4	0
Total		4	1

The following table shows the occupation and nationality of men killed at quarries:

Occupation.	Canadian.	Italian.	Total.
Labourers	....	2	2
Engineer	1	....	1
Crusherman	1	....	1
Total	2	2	4

There were employed at the quarries during 1911, approximately 1.402 men. At these quarries four men were killed, which is equivalent to 2.85 per 1,000 men employed.

The following table sets out the particulars of fatal accidents in the quarries :

Accidents at Quarries

In Quarry	On Surface	Nature of Injury.	Cause of Accident.
......	1	Body crushed	Unloading a car on siding, when it was struck by another coming down grade.
......	1	Legs crushed	
......	1	Body crushed	While assisting to replace locomotive on track, crushed between it and another locomotive.
......	1	Fracture of skull	Struck by piece of rock hurled by blast.
......	4		

Details of Fatalities

In the following pages the fatal accidents of the year are described in some detail, in the hope that the information may be useful in impressing upon all concerned the need for constant vigilance and steady forethought on the part alike of employers and employed. Particulars of mining fatalities are given first, followed by those in metallurgical works, and afterwards by those in quarries.

Beaver Silver Mine

At the Beaver mine on February 13th, at 3.30 a.m., George Rannick, an Austrian, was killed by the blowing up of the thawing house. Rannick was powderman on the night shift and had gone to the thawing house to make up loads for a machine-runner, named Salo. Salo went to the thawing house when his powder was ready, told Rannick to make up eight more loads, and then returned to the shaft house. About a minute later the explosion occurred. Rannick's body was found 60 or 70 feet from the side of the thawing house, and from his position, and the nature of the injuries, which were all on the back and right side, it would seem he was not in the house when the explosion occurred. Apparently Rannick had some warning of danger and was trying to escape. Salo, the last man in the thawing house, stated that Rennick had a lighted candle in the thawing house, placed on a ledge and within about five inches of an open box of detonators. There is, therefore, little doubt as to the cause of the accident. The thawing house was covered with corrugated iron and heated by steam pipes. At the inquest held on February, 17th, Salo, the important witness, was not present. His evidence was, however, later obtained by the Inspector of Mines, which brought out the fact that Rannick had a lighted candle in the thawing house, just a few minutes prior to the explosion.

Buffalo Silver Mine

At the Buffalo mine on December 6th Wilfred Rheaume, a Frenchman, aged 25 years and single, was instantly killed.

The deceased was employed as drill helper on the third level of the mine in the cross-cut towards No. 6 shaft, the cross-cut being about nine feet wide and the usual height. Two machines were at work in it at the time of the accident. Bert Reid was runner on the drill on which the deceased was helping. Isadore Marion was runner, and A. Hunton helper, on the drill on the opposite side of the drift. On Tuesday night three of these men employed in the cross-cut completed the drilling of a round and blasted it. They first loaded six holes and blasted them, getting four reports. On going back and examining the face they found all the holes had gone. They then loaded the remaining thirteen holes and blasted them, getting eleven reports. The explosive used was 40 per cent. dynamite. On returning to the heading they found that two holes on the upper lefthand corner of the heading had been cut off, leaving dynamite in both of them. They re-charged these holes and loaded another one that had not broken, and blasted the three, getting three reports. The machine-men apparently concluded that these two holes in which they found the dynamite were the two from which they did not get reports. The runner, Isadore Marion, however, met the runner of the same machine on the opposite shift and gave him the particulars. No report was made to the shift bosses or to the mine captain, and these officials were ignorant of what had been the result of the blasting in this heading that night. On the day shift the mucking resulting from the blasts had been taken out and several holes drilled in the upper part of the face. On Wednesday night the four men mentioned above went to work, Bert Reid running the machine on the righthand side of the drift, as on the night before, and Isadore Marion the other machine. They worked up to about 5 a.m., when Reid was engaged in drilling the lifter on the righthand side, and Marion the centre lifter. Reid found that the bottom of the cross-cut on his side had narrowed a little, and therefore he had to start the side lifter a little back from the face, with the hole looking towards the wall. He had drilled this hole to depth of thirty inches to three feet when an explosion occurred, killing his helper, Wilfred Rheaume, instantly, and slightly injuring himself and the two other men. Rheaume sustained a fracture of the vault of the skull.

In company with Mr. Sutherland, Assistant Inspector of Mines, and the mine captain, William McAllister, the writer made an inspection on the morning of December 7th, and found that the explosion had been caused through Reid drilling into the bottom of a missed hole. This hole had been drilled and loaded by Reid on the night before, but for some unknown reason must have missed fire. The hole was drilled parallel to the side of the cross-cut and the collar of it was about 10 inches from where Reid started the hole that caused the explosion.

An inquest was held at Cobalt on December 7th by Dr. Hair, and the coroner's jury returned a verdict in which they attributed the accident to neglect on the part of the machine runners.

Calcite Lake Silver Mine

At the Calcite Lake mine on December 26th, Sigmond Terdk, employed as a trammer was killed by falling from the bucket.

The deceased, a Hungarian, 21 years of age, single, arrived at the Calcite Lake mine from Cobalt at noon on December 25th, and hired as a trammer. He went to work in the shaft on the night of the 25th at 12 o'clock, and again on the night of the 26th at 7 o'clock. In the shaft, which is 275 feet deep, a station was being cut at the 270-foot level. No other underground work was in progress.

Shortly after 9 o'clock on the night of the 26th, deceased went on deck for some tobacco and took the water pail with him. A bucket of rock was sent up, and on the return trip the deceased started down in the bucket with the pail of water. He put one foot inside the bucket and the other hung outside. On this trip the cross-head stuck on the guides about 8 feet below the collar of the shaft, and when the bucket had been lowered about 130 feet the crosshead became loosened and followed the bucket. The deceased heard the crosshead coming, and either tried to catch the timber or bent away from the cable to such an extent that he tumbled backwards out of the bucket. The man was instantly killed. This crosshead was not equipped with a safety appliance, and in cold weather was known to stick about 8 feet below the collar of the shaft. The deck-man was supposed to watch and see that the crosshead passed this place safely. On this night the deck-man was a new hand, having been hired at the same time as deceased. The latter had been warned by the other trammers to watch the crosshead, but had not been warned by the manager. No captain or shift boss is employed at this property.

The manager stated that the crosshead had been in use since March, and that he did not know it was not in accordance with the Mining Act. He had made several attempts to rig up a safety appliance without success.

The company were prosecuted by the Inspector of Mines for a violation of Sec. 164, rule 24a of the Mining Act of Ontario, and fined $100 and costs.

At this mine on December 29th, Thomas Whitten, machine runner, was killed by falling from a staging in the shaft.

The deceased, a Scotchman 26 years of age and single, had been employed as machine runner at the Calcite Lake mine for about a month. On the afternoon of December 29th Whitten and another machine man, by the name of Stojko, with their helpers, were timbering the shaft. They had put in a station in the man-way and one ladder, and were preparing to place a set in the shaft. To do this a staging was put in about seven feet below the last set; it was suspended by ropes from three corners and a chain on the fourth corner from a hanger fastened to the hanging rods. This hanger was made of ¾-inch iron, bent at right angles with a hook at one end, to be attached to the hanging rods on the lowest set of timber, and a ring on the other end of it. The ring was not completely closed, the opening being about 1¼ inches. A piece of 1¼-inch rope was used for holding the staging, and was supposed to be threaded through the ring on the hanger and tied with two half hitches, the loose end of the rope being fastened to the main rope by means of battery wire. The men put in the staging and worked about 20 minutes, when one corner gave way, and Whitten dropped to the bottom, a distance of about 25 feet, sustaining a fracture of the jaw and a compound fracture of the skull. He died about ten hours later. It would appear that when the hanger was attached to the hanging rods it was turned to one side; when righted, the 1¼-inch rope, instead of lying on the lower side of the pass ring, was looped through the upper, or open side of it. This opening was just about 1⅛ inches, which explains why the staging held for about 20 minutes with Whitton working on it.

The coroner's jury brought in a verdict of accidental death.

Canadian Copper Company

At the Crean Hill mine on January 14th Fred Turcrack, Polander, employed as trammer, was killed through falling into a mill hole in the No. 3 stope of the fourth level.

The system of mining followed at this mine is to fill the stopes with waste rock, carrying up mill holes at regular intervals for handling the ore. In this stope the filling was about fifty feet above the level, and, at the time of the accident, the mill hole was emptied to within about 10 feet of the level.

The gang of trammers had just returned from dinner and were working within 20 to 25 feet of the mill hole. A large acetylene light was used for lighting the stope and was within a short distance of the mill hole. Turcrack apparently fell into the mill hole while returning to work after dinner, as he was seen in the level about 1 o'clock, and his body was found in the chute about 1.15 p.m. The mill hole was circular, 3½ feet in diameter, and the ore was trammed to it from the ore pile on a track. The tops of the mill holes are supposed to be kept covered, excepting when the trammers are at work dumping into them. It was uncertain just how this man happened to fall into the mill hole, as there was no witness to his fall.

The coroner's jury brought in a verdict of accidental death.

At the Creighton mine on March 2nd Roman Katyn, drill helper, was killed through an explosion of dynamite in the broken ore while working at the edge of the open pit.

On the night shift of March 1st the deceased, with drill runner Mike Bayluk, drilled two 10-foot holes and loaded them with six sticks of 40 per cent. dynamite each, blasting at 6 a.m., March 2nd. After blasting they went back and scaled down until 7 a.m. No work was done at this place during the day, and at 7 p.m. Katyn and Bayluk went back to work where they had left off in the morning. About 7.45 p.m., while Bayluk was shovelling and Katyn barring out a piece of rock, an explosion occurred that killed the latter and injured the former. The explosion was apparently caused by Katyn's bar setting off some unexploded powder in the broken material or striking a cut-off hole. Bayluk was incapacitated for work for 29 days.

The coroner's jury brought in a verdict that Roman Katyn came to his death while using a bar in a muck pile, from an explosion of dynamite.

At the Crean Hill mine on June 28th, Maetro Lazoveritch, a Polander, employed as trammer, was killed through being struck on the head by a falling rock.

The deceased was 19 years of age and was employed as trammer on the dry wall of No. 3 stope, near No. 9 chute, on the fourth level. The roof of this chute is about 30 feet above the dry wall. The scaling reports show that the stope had been examined on the day of the accident by three men employed continuously on day shift scaling on this level. The stope had been examined and scaled practically every day that work had been carried on in it for two or three weeks prior to the accident. The block holer, Mike Murmock, was standing about four feet from the deceased when he was struck by the rock, and states that the piece of rock fell from the roof and was about two and a half pounds in weight. Two other men were near at the time of the accident, but did not see the piece of rock strike the deceased.

Drs. Morrison and McAuley gave evidence that the injured man was brought to the hospital about 9 p.m., June 28th, and they at once performed an operation to raise the broken part of the skull. The man, however, did not recover from the effects. They stated that there was a fracture of the skull about 1½ inches in circumference on the back of his head, and that death was due to concussion caused by the blow.

At the inquest held in Copper Cliff on July 6th the scalers, shift boss and superintendent were examined regarding the scaling done on this stope. Their evidence corroborated the statements given in their scaling reports. The coroner's jury brought in a verdict of accidental death.

At the Creighton mine on September 18th, George Wuorri, drill helper, was killed.

The deceased was a Finlander, 25 years of age, and was employed as drill helper on the fourth level back-stope. He, in company with his partner, Henry Ramy, fired a round of two holes at 11 o'clock on Saturday night. On Monday morning both men proceeded to the place where these holes had been fired and began scaling. They worked about ten minutes, when an explosion occurred, which fatally injured Wuorri and slightly injured his partner. The evidence seemed to show that Wuorri and his partner started to scale as soon as they went into the stope. None of the shift bosses had got round to this part of the stope to examine it before the explosion, consequently it is impossible to get an intelligent description of the back, as it was before the explosion occurred. The evidence, however, showed that Wuorri was picking and prying with his scaling bar immediately before the explosion. He must therefore have struck a hole in which there was some explosive. Whether this hole was a cut-off hole, or whether some powder remained in the bottom of a hole that had failed to explode, it is impossible to say. The nearest machine hole to it was five to seven feet away. It therefore seemed improbable that it was a cut-off hole. It would be almost impossible for anyone to examine the back of this stope, which was only about six feet above the broken material, and not find this old bottom before the explosion. It would accordingly appear that neither the machine man nor his helper examined the back of the stope thoroughly before commencing to scale.

Dr. McAuley gave evidence at the inquest held at Copper Cliff by Coroner Farnham on September 23rd, that George Wuorri was brought to the hospital about 9.30 a.m. September 18th, in an unconscious condition. He found his left eye was destroyed and his skull fractured above and in front of the left ear, the brain exuding. He died about 6 o'clock the same night.

On October 11th, Ignotte Vasilkoski, a Polander, single, about thirty years of age, employed as a trammer, at the Creighton mine, received injuries, which resulted in his death, on October 17th.

The deceased, at the time of the accident, was, with four others, tramming in the open pit, on the 300-foot level, on the hanging-wall side of the pit. About 35 feet above these trammers, two machines, operated by Polanders, were carrying down a bench, which was about eight feet wide, and overhanging. The car, into which the trammers were shovelling, was slightly under the bench, but the trammers themselves, working on the outside of the car, would not be so protected. The deceased was struck by some falling object at about 4 a.m., although none of the witnesses would state that they had actually seen him struck, or what struck him. The pit was lighted by a large acetylene lamp. A drill starter was found beside the man, after he had been struck. This steel had blood on the bit end, and had not been noticed by any of the trammers before the accident. The starter was sharp, and the machine men gave evidence that they had taken in their own steel, and had not passed the place where the men were tramming, consequently the steel could not have been dropped while these men were carrying in their tools.

At the inquest, the machine men and the trammers all tried to make it appear that a rock had struck the deceased. The shift boss, however, gave it as his opinion that the man was struck by a piece of steel. The coroner's jury brought in a verdict that

Ignotte Vasilkoski met his death by being struck by a piece of rock falling from parts unknown.

Nicholas Hluchaniuk, a Polander, aged 32, was injured at the Creighton mine, 30th November, dying as a result of the accident on December 2nd.

The deceased was employed as a trammer on the third level of the Creighton mine in the open cut. He was working with a gang of about fourteen men, tramming into two cars from the broken material, near the north wall of the open pit. Two machine men, Henry Heinanen and Otto Malinen, were working on a bench, about 80 feet above the level of the open cut and about 50 feet from the surface. This bench had apparently an average width of six feet. At the time the accident occurred, Malinen was on the bench, and Heinanen was at the surface lowering six drills from the surface to this bench. When the drills were lowered part way, Malinen alleges that he heard a steel falling past him down the wall of the stope, and shouted to the men working below to watch out. The men below heard the shout and ran for the shaft, but Nicholas Hluchaniuk was struck when a few steps away from the rock pile. The blow was on the head, the man sustaining a compound fracture of the base of the skull, from which injury he died on December 2nd, about 9 p.m.

An inquest was held at Copper Cliff, on December 8th, by Coroner Farnham, and a verdict of accidental death was returned.

On examination of the place where the accident occurred, it was found that the deceased had been struck by an 8-foot drill, which was dull, showing that it was not one of the drills being lowered by the machine men, mentioned above. It was impossible at the inquest to ascertain just where this steel came from, although it was proved conclusively that it fell from somewhere on the face of the stope. In all probability, it came from the bench on which was the machine helper, Otto Malinen, who, no doubt, accidentally caused the steel to fall. The men below, however, were not warned of the fact that they were about to lower steel from the surface to the bench, which the several foremen alleged was the usual practice, but which, apparently, was not carried out with any degree of regularity. It would not appear, however, that the machine men on the stope were to blame, to any great extent, for the accident.

At the Creighton mine, at 4.30 a.m., on December 8th, Patrick Sammon, powder man, was killed by an explosion of powder in the thawing house.

The deceased, a Canadian, 25 years of age, and single, had been employed at the Creighton mine for seven months.

The thawing house was a frame building, about 16 by 22 feet, and was heated by hot water circulating through pipes. The water was heated by a water-jacketed stove, situated in a building about 40 feet distant from the thawing house. The pipes were placed around the walls of the thawing house, and the racks in which the dynamite was placed were set out from the pipes sufficiently far to ensure no drip or leakage from the dynamite, coming in contact with them. The thawing house was divided into three rooms, the large one at the back being used exclusively for the thawing of explosives. The outside door opened into a room where dynamite in boxes could be placed before it was put in the racks. Opening from this room was a door leading into a small room in which the exploders were prepared for blasting.

The last time the writer inspected this thawing house was on September 23rd, 1911. At that time it was found that the building was kept clean and in good condition, with the exception that there was an over supply of explosives in it, and that an iron wedge was being used to open boxes. Both these facts were mentioned to Mr. John Lawson, general superintendent of the Company, who then instructed Mr. Wm. Hambly, superintendent of the mine, to have both the objections removed.

At the inquest, held at the Creighton mine, on December 9th, John Sippola, the powderman on the day shift, gave evidence that he left in the thawing house, when he went off shift at 7 o'clock, on the night of December 7th, approximately 3,700 sticks of dynamite. This would be about 42 cases, or 2,100 pounds. According to the evidence of Wm. Hambly, the superintendent, the requirements for twenty-four hours at the Creighton mine are from 2,000 to 3,000 sticks. This would mean that there were on hand about 700 sticks more than the maximum requirements for twenty-four hours. The daily returns show that on December 5th, there were actually used 2,147 sticks during the twenty- four hours. The explosive in the thawing house at the time of the accident was 40 per cent. dynamite, manufactured by Curtis and Harvey, and, in addition, 159 sticks of gelignite. At about 4.20 a.m., Frank Durand, nipper, took an order to the thawing house for dynamite for the shaft men. Sammon took the order at the door of the thawing house, and told Durand to come back at a quarter to five and help him carry the powder to the shaft. Durand then saw him take a bag and start into the thawing house, presumably to fill the order. When Durand got to the corner of the dry, about 300 feet distant from the thawing house, and about two minutes after speaking to Sammon, the explosion occurred. There had been two or three men at the thawing house that night, and all stated that everything seemed as usual there. They saw no naked lights, excepting the lantern used for lighting the thawing house, and no one had ever seen Sammon smoking while on duty.

The writer arrived at the mine about five hours after the explosion, and, therefore, had a good opportunity to observe the results of it. It was found that Sammon had been practically blown to pieces. All that was found of him was about 15 pounds of flesh and pieces of bones. The doctor was able to identify a piece of the skin found as human skin, and a small section of the scalp was found, with hair on it the same color as Sammon's. A sweater and trousers were also found similar to those worn by Sammon on the night of the accident. The thawing house was also literally blown to pieces, there being no pieces large enough to do any damage thrown more than 100 feet from the building. Considerable injury was done to property at the mine, and also to to the houses of the town, through the breaking of windows by the concussion. No one was injured in the least by the explosion, with the exception of Sammon. The construction of the building showed that, in case of an explosion, it was the best kind, by reason of nothing being thrown from it to endanger the lives of anyone near.

It was impossible to arrive at any decision as to the cause of the explosion. It would appear that Sammon was a careful, experienced man; also that the heating arrangements were quite satisfactory. One thing that may have been a factor in causing the explosion was the fact that the exploders were made up in the small room in the building. Another cause of the explosion may have been the lantern used for lighting the building. It is necessary on the night shift to use light of some kind, and the writer has always considered a lantern the safest light that can be used, with the exception of electric light properly installed. There are, however, dangers connected with the use of electric light, which probably balance those connected with the use of a lantern.

Cobalt Station Grounds Silver Mine

At the Cobalt Station Grounds, on November 25th, Michael Nace, an Italian, about 24 years of age, fell down the shaft, and was killed.

Nace was employed at the Station Grounds as blacksmith's helper and general handy man. The property had been closed down for a few days, and work unwatering it was started on the night shift on November 23rd. On the morning of the 25th, the deceased was employed baling out the shaft, the water being within two and a half feet of the bottom. The captain had been underground until about 10.30 a.m., fixing a platform for the deceased to stand on. About 11.15 a.m., the deceased sent up a bucket of water, and, on the return of the bucket, got on and rode to the 150-foot level. He then climbed the ladders to the surface, told the deck-man that his feet were wet, and that he was going to change. The deceased, on his return, took the ladders to the 150-foot level, and the bucket was sent down to him there. After a short time, the hoist-man received two bells, and lowered the bucket about three and a half feet, when there was considerable vibration of the cable, and a heavy ring of one bell. The bucket was stopped, and, on investigation, it was found to be turned at an angle of about 45 degrees. Nace was found lying dead on the platform at the bottom of the shaft, having fallen a distance of about 50 feet. The bucket was held upright by a single snatch on one side. This was in proper working condition after the accident, but must have opened when the deceased got on the bucket at the 150-foot level. It was impossible to ascertain why the snatch was not fastened. It apparently was in proper position when the bucket left the surface. It is possible that the deceased emptied the bucket before getting into it at the 150-foot level, and did not properly fasten the snatch.

The coroner's jury brought in a verdict of accidental death.

Cobalt Townsite Silver Mine

At the Townsite mine on December 15th, at 11.30 p.m., Wilfred Mandley, a Canadian, aged 23 years, was killed.

At the time of the accident the deceased was employed as a machine runner in a drift on the 200-foot level of the Cobalt Townsite mine. His helper was Archie Macdonald. On the night of December 15th, at 6 o'clock, Jesse Barker, machine runner on the opposite shift to Mandley, fired 14 holes in the heading of the drift in which Mandley was working. They had 13 reports, and marked on a board at the mouth of the shaft "one report missing in this heading." When Mandley and his helper went to work at 7 o'clock they read this message, and consequently were on the lookout for missed holes. They worked until about 11 o'clock, shovelling back from the heading. They then found two holes, which had apparently been cut-off, containing powder, and one back hole which did not break well. About this time Mandley gave an order for powder, and it was sent down by the nipper. This order was for two sticks of cheddite and three fuses and caps. The powder used in loading the holes was 40 per cent. dynamite for all but the sticks in which the primer was placed. This stick was cheddite. It is altogether likely then that the powder in the cut-off holes was dynamite. The reloading this night was done altogether by Mandley. The helper, Archie Macdonald, assisted him in getting materials, etc., but was not right at the heading. On account of the muck having been thrown back from the heading, there was a pile of it to within about three feet of the roof of the drift, necessitating a man crawling in on his hands and knees. Macdonald, the helper, was lying on this muck pile, while Mandley finished loading and started lighting the holes. The evidence given by Macdonald was the only evidence that could be obtained as to the method adopted by Mandley in loading the holes. He stated that one and a half sticks of cheddite were placed in the back hole, and that the other half stick of cheddite was cut in two, one part of it being used to hold the primer for one cut-off hole and the rest of the stick for the other cut-off hole. On account of the powder being flush with the collar of the holes, there was no room to put in the additional pieces holding the primers. Mandley, however, placed the piece holding the primer against the powder and held it in position by a small piece of rock. The fuse was six feet in length, and, according to Macdonald's evidence, only a few inches were cut off the fuse to fire the round in the proper order. When all the holes were loaded, a warning was given to the other men working near, and Mandley proceeded to light the round. He had succeeded in lighting two holes, and Macdonald stated that he had lighted the third and was turning to come away when the explosion occurred. Macdonald also stated that before the explosion he saw a flash of light from one of these holes, which would indicate that the powder caught fire. Mandley was instantly killed.

The doctor stated that death was due to the shock caused by the wound received in the explosion. The body of the deceased was badly lacerated on the left side from the head down, the internal organs in the central part of his body being exposed. Macdonald was slightly injured about the eyes.

The scene of the accident was inspected on Saturday night, December 16th, and it was found that there was still powder in two holes in the heading and fuse and cap in one of them. This was the back hole. The fuse in this hole was only about 18 inches in length. The other hole in which powder was left was apparently again cut off by the other blast. It is impossible to explain the short fuse that was found in the back hole. Macdonald swears positively that none of the fuses were less than 5 feet in length. However, the shortness of the fuse had nothing to do with causing the explosion. There was no tamping placed on the exposed powder to keep any spark from falling into it when the fuse was lighted. It is evident that, when the fuse was lighted, the fire from it spit into the powder, setting it on fire and causing the explosion. What makes this more probable is the fact that the powder was practically sticking out of the collar of the hole. A number of accidents are caused every year by similar neglect on the part of the miners to tamp their holes. There was no evidence whatever that pointed to the possibility of a quick fuse.

The coroner's jury brought in a verdict of accidental death.

Dome Gold Mine

At the Dome Mines on October 27th, Otto Nemine, a Finlander, 37 years of age, married, employed as machine driller, received injuries which caused his death on October 28th.

The deceased, with two other men, had been tramming in the No. 7 shaft, which was at a depth of 140 feet. This tramming was finished by midnight, and at 1 o'clock the men went down to blow out the rest of the holes which would be shot by the powderman within the next hour or two. The powderman first shot 12 holes in the No. 6 shaft, 100 feet distant, which was about 110 feet in depth. The jar of these shots caused a rock to drop in the No. 7 shaft, fracturing the skull of the deceased. The shaft was timbered to within about 40 feet of the bottom.

An inquest was held at Cobalt on November 10th, and the coroner's jury brought in the following verdict: "We find that the deceased died from a fracture of the skull, caused by a falling rock in what we consider an unsafe shaft."

At the Dome Mines on December 9th, Marvin Sommers, a laborer, was killed.

The deceased was a Canadian, about 56 years of age, and had been employed at the Dome Mines since the 13th October, 1911. On the day of the accident he was working under labor foreman F. B. Henderson, who had instructed Sommers and five or six Italians to carry over several pieces of shafting and pile it up, so that it would not become covered by snow. In order to keep this shafting off the ground, Sommers spiked a piece of 2 by 4 inch scantling against the building about 24 inches from the ground, holding up the other end by spiking it to a pole. In spiking this scantling to the building six 4 inch spikes were used. The shafting that was being piled was three inches in diameter, about 15 feet long, and would weigh about 500 pounds. The accident occurred about 4.20 p.m. Six pieces of the shafting had been piled on this scaffold nailed to the building, one end of the shafting being on the ground. When the six pieces of shafting had been placed on this scaffold, and the men started back for the other, Sommers apparently slipped and fell with his head under the shafting. The spikes holding the scantling to the building pulled out, allowing the shafting to fall to the ground, crushing Sommers under it and breaking his neck. He died almost instantly. The ground was covered with a little snow and it was quite mild at the time of the accident, which would make it slippery where these men were working. It is also probable that when Sommers slipped his shoulder struck the upright of the scaffold and assisted in causing it to fall. This kind of scaffold was hardly the proper one for holding up shafting of this weight, but no accident could have been anticipated. Sommers was apparently the only man on the labor gang that was familiar with English, and the orders were consequently given to him by the labor foreman, and he built the scaffold on which the shafting was placed. Henderson, the labor foreman, was not present at the time of the accident.

Drummond Silver Mine

At the Drummond mine on September 29th John Kaliska, hammer-drill man, was killed while loading a hole in the stope, through an accidental explosion of dynamite.

The deceased was working alone when the explosion occurred; a man was taking samples 30 feet north and three muckers were at work 30 feet south. The deceased had drilled 15 back holes and had taken 40 sticks of dynamite and 15 fuses with which to load these holes. Twelve holes had been loaded, and while in the act of loading the thirteenth or fourteenth hole the explosion occurred. From the wounds on the body it would appear that the deceased was looking up at the time and was grasping the tamping stick with both hands. The tamping stick was of hardwood, and the broken pieces of it were afterwards found. The explosive used was 40 per cent. dynamite and the size of the cartridge ⅞-inch.

The coroner's jury returned a verdict of accidental death, the cause of the explosion unknown.

It is impossible to ascertain the cause of the explosion. It is probable that the deceased may have been putting the exploder into the hole, with the cap projecting from the stick of powder, the friction against the rock causing it to explode. There was, however, no evidence to show that such was the case.

Foley-O'Brian Gold Mine

At the Foley-O'Brian shaft on June 25th Giovanni Gentile, an Italian machine helper, was killed by falling from the bucket.

The deceased was working in a drift in the No. 2 shaft, which was 160 feet in depth. Two missed holes had been fired about two hours before the accident, and the deceased had gone underground before the other men and began shovelling back preparatory to setting up his drill. He apparently became sick from the powder gas, and decided to go to the surface. He went to the station, got on the bucket, and, when about 70 or 80 feet from the bottom, fell from the bucket, sustaining a fracture of the skull and of both legs and one arm. When the deceased, sick from the powder gas, was hoisted up to the warmer air, he probably became dizzy and fell from the bucket.

It was shown at the inquest that the men were violating the Mining Act by riding on the bucket. Owing to the fire at Porcupine shortly after this accident no action was taken against the company for violation of the Mining Act.

Helen Iron Mine

At the Helen mine on January 26th John Maki, Oscar Mantynen and John Thompson, machine men, were killed by a premature explosion of dynamite. The three men killed were Finlanders, who had been in the employ of the company for several years. Maki was 32 years of age, Mantynen 37, and Thompson 28. These men were engaged in sinking No. 2 shaft from the seventh to the eighth level, and were preparing to blast when the explosion occurred.

The shaft was all drilled out, and the men were ready to blast at 8 o'clock in the morning. Mantynen went up to get the powder and lowered two boxes in the bucket to the seventh level. He placed one box on the station and took the other box into the cross-cut, where he and John Maki started to make up the exploders. This cross-cut is from the end of the shaft and is intended to be used as a hoisting station for sinking the shaft to the lower levels. It is about 30 feet in length and six feet in width, and is driven through rock.

The partners of the men who were killed were Oscar and Victor Niemi, who were in the bottom of the shaft blowing out the holes, and Konsta Nynam, who was on the level, first helping Mantynen and Maki to make up the exploders, and then going to the bell cord to signal for Thompson, who was in the bucket taking up the lines.

The box of powder had been opened and a number of sticks taken out and placed on a board, so that they would be handy in putting the caps and fuse in them. The men, before beginning to handle the powder, stuck their candlestick into a box near, but far enough from the powder to be away from contact with it. Oscar Mantynen had a wooden stick, with which he was putting the holes in the powder for the caps, while Maki was greasing the fuse and caps. Konsta Nynam had left the men only about two minutes when the explosion occurred. The force of the explosion broke down the timber at the station level, one piece striking Nynam and falling across him, so that he was unable to get up until released by the rescue party. John Thompson, who was in the bucket in the shaft, was jarred from it by the force of the explosion, falling a distance of about 40 feet, from which injuries he died about six hours later. The men who were working in the bottom of the shaft were uninjured. Nynam, who was knocked down by the timber, was able to resume work in a day or two. The two men, Maki and Mantynen, were instantly killed.

A machineman, Appoloni Piazza, working on the seventh-level main drift, passed by Maki and Mantynen on his way to the level above, two or three minutes before the explosion, and asked them if they could let him have some powder. They replied in the negative. Piazza corroborated the statement of Nynam regarding the position of their candlestick and the nature of the work they were engaged in.

An investigation was made into the causes which led to the accident on February 21st. It is impossible to say what caused the explosion. Mantynen had the reputation of being most careful in the handling of explosives in the mine, and would not allow anyone to handle explosives near him without first placing his light in a safe position, and also using a stick for putting the holes in the sticks of dynamite for the fuse.

It would appear that the explosion must have resulted from some unusual sensitiveness of the dynamite. The dynamite used was 40 per cent., manufactured by the Standard Explosives Company. The caps were manufactured by the Dominion Cartridge Company, and graded as No. 4. The writer examined the explosive in use at the mine on February 21st but could see nothing unusual about it. There were no complaints from the men as to the condition and behavior of the explosive in use at the time of the accident.

At the same mine on May 22nd, Louis Niemi, a Finlander, aged 23 years, machine runner, was killed by falling down a raise and being buried in the ore.

The accident occurred at raise 4-B on the seventh level. The ore in this raise had become hung up through large pieces blocking up some distance above the level. The raise at the top had been breasted and was full of ore. Attempts had been made to cause the ore to run in the raise by blasting from the bottom, but without success. Work was then begun from the top of the raise and a 2-inch pipe was being driven through the material. It was intended to drop some dynamite down this pipe and get it as near where the raise was blocked as possible. A ladder was laid on the ore across the top of the raise, reaching from side to side. Louis Niemi was sledging on this pipe, and Oscar Boro was holding a piece of wood on the end of the pipe to protect the threads. The superintendent, A. Hasselbring, was standing over the raise, watching the men working. The ore became loosened from below, and the superintendent jumped clear of the raise, and Boro, who was on the ladder, stayed there. Niemi tried to get clear, but did not succeed, and fell into the raise with the ore. As there was considerable ore around the collar of the raise, which was ready to fall into it, it was dangerous to attempt to lower a man into raise to rescue Niemi, for fear of further falling material. His body was rescued by drawing the ore from the chute at the bottom of the raise. Niemi, however, was dead when taken out.

An inquest was held by Dr. McLurg at the Sault, and a verdict of accidental death returned.

At the Helen Mine, on September 18th, Vertillio Spinae, an Italian 18 years of age, bucket tender, was killed by falling with a car from the seventh to the ninth level. A four-compartment shaft was being sunk from the eighth to the ninth level, and a platform had been placed across under the two hoisting compartments on the seventh level, and hoisting from below the seventh level was done by means of a hoist placed on this level and with a bucket. A heavy door was hinged over the bucket compartment on this level so that it could be closed when the bucket was hoisted, the car shoved in on it, and the bucket dumped into the car. A guard rope was placed across the entrance into this bucket way. This guard was supposed to be kept in place when the door was opened into the shaft. The deceased was tending the bucket on this level. It would appear from the evidence taken at the inquest that the deceased pushed the car into the shaft and fell with it to the bottom, a distance of 140 feet, and was instantly killed. The deceased had been employed at this work for three days. He apparently forgot to lower the trap door when the bucket was hoisted and consequently pushed the car into the shaft.

The coroner's jury returned a verdict of accidental death, due to the negligence of the deceased, no blame attaching to the management of the mine.

Hollinger Gold Mine

At the Hollinger mine on March 27th, Alfred Dupuis was instantly killed, and Joseph Knash received injuries which resulted in his death on May 5th. Alfred Dupuis was a Frenchman about 25 years of age, and Joseph Knash a Polander 23 years of age.

Dupuis, with his helper Joseph Knash, had completed drilling a round of holes in this heading before 12 o'clock at night, and had blasted the cut-holes before going off shift at noon. After shovelling back, they found that these holes had not broken very well, and decided to reload them along with the rest of the round. Dupuis went to the thawing house at the surface for powder, and brought down about 90 sticks of powder and 18 exploders. He was helped in the loading of these holes by Knash. Knash claims that they tamped them all, he having made up a cartridge of the loose material for his partner to use as tamping. Dupuis then started to spit the fuse, using a short piece of fuse for this purpose Knash was standing back, counting the fuse as Dupuis spit them. He had counted eleven, when he saw the centre cut-hole catch fire and start to burn. He immediately called to Dupuis and then started to run from the drift. They got out 25 or 30 feet when the hole exploded, knocking both men down. Knash, however, managed to crawl on his hands and knees to the shaft, 100 feet distant, before the rest of the holes exploded. He was met there by the shift boss, George Schmelzle, who sent for assistance, and got Knash taken to the surface to be cared for by a doctor. The injuries of Knash consisted of broken femur of the right arm and a large number of small wounds in the back, caused by his being struck by the small pieces of rock sent out by the blast. When the mine captain. R. Richards, got underground, he and the shift boss managed to get in the drift, where they found Dupuis lying dead, his skull having been fractured by a piece of rock.

There is no doubt that the accident was caused by the failure of Dupuis to tamp the centre cut-hole. When he spit the fuse of the upper holes one of them must have spit fire into this hole, setting the powder on fire. This burned until the cap was reached, which exploded, setting off the rest of the charge. This is a type of accident that is altogether too prevalent, and must be attributed to the negligence of the workmen themselves. It was shown in this case that it was the order in the mine that all drill holes should be properly tamped before firing. It would appear that Dupuis had been carrying out these instructions fairly well, but neglected to do so in this one instance.

Millerett Silver Mine

At the Millerett mine, on March 8th, John Stephen Kennedy, aged 36 years, employed as shift boss, met his death by being overcome with fumes from blasting.

The deceased had been engaged in mining for about 17 years, and had occupied the position of shift boss at this mine for nearly two years. The accident occurred in the No. 7 shaft, which had a depth of 156 feet with levels at 70 feet and 150 feet. The inside dimensions of the shaft were 8 by 5 feet. At the 150-foot level a station had been cut and drifts started north and south of the shaft. The timbers reached within 10 feet of the level. At 6 p.m. on March 7th a round of 13 holes was blasted at the 150-foot level, and as no night shift was employed in this shaft, air had not been turned on to blow out the smoke, since it was Kennedy's intention not to do any more work on this level until about 9 a.m. on the 8th. The explosive used was gelignite, manufactured by the Hamilton Powder Company. When the shift went to work at 7 a.m. on the 8th, the drill runner and helper descended to the 150-foot level to see how the round had broken, and found the air very bad. They climbed at once to the 70-foot level and went to work there. They did not turn on the compressed air. At 8 a.m. Kennedy came to the shaft and went down to the 70-foot level, where he asked the machine men how the round on the 150-foot level had broken. The machine men told him they had been down, but there was so much gas they had to come up again. Kennedy said he would go down and turn on the air. He then left them and went to the trammers and told them to come down to the next level as soon as they had finished their work on the 70-foot level. This was the last seen of Kennedy until he was found unconscious at the bottom of the shaft three-quarters of an hour later by the trammers going down to work. They found him lying on the broken rock at the bottom of the shaft, bleeding from several bad cuts in the head. They also found that the valve had not been opened. Kennedy was at once taken to the surface and every effort made to revive him, but without success. He apparently went to the bottom of the shaft, without opening the air valve, attached the air hose in the north drift and started to climb the ladder to open the air valve, when he was overcome by gas and fell off the ladder. The doctor stated that death was due to asphyxiation.

The coroner's jury brought in a verdict: "That Stephen Kennedy came to his death from asphyxia, and no blame can be attached to anyone."

McKinley-Darragh Silver Mine

At the McKinley-Darragh mine on June 16th James Graves, machine runner, was killed.

The deceased was running a drill in a cross-cut on the main north drift of the 150-foot level. Daniel Kavanagh and James Brazeau were running hammer drills on this staging six feet above the level and about six feet from the mouth of the cross-cut in which the deceased was working. Brazeau was working about four feet from the end of the staging, and had drilled a hole about thirty inches in depth. He had just started drilling after changing the steel when the latter broke, throwing him and the machine backwards off the end of the staging, and causing the machine to turn completely over. The foot of the machine struck Graves on the side of the head, and fractured his skull, causing his death. Graves was standing just outside the cross-cut waiting for his partner to help him pick up their drill. He was at least ten feet distant from where Brazeau was drilling and about six feet below him. All the witnesses that gave evidence told the same story about the accident.

The coroner's jury brought in a verdict of accidental death.

Mond Nickel Company

At the Garson mine, January 29th, Otto Heinanen, machine-runner, was killed by falling into the chute of No. 32 stope, which is a small underhand stope between the second and third levels. Three machines were working in the stope the night of the accident. The men had finished drilling, and were loading the holes. Heinanen finished loading first, and started to walk around the stope towards the other machines. While walking around on the steep side of the ore pile, he either stumbled, or slipped and pitched headlong down the ore into the chute at the bottom, and fell through i to the level below. The coroner's jury brought in a verdict of accidental death.

At the same mine, on May 10th, John Reilly, machine-runner, 25 years of age, was killed by being crushed under a falling rock. Reilly was working in stope 33, which is mined by means of a dry wall and filling system, and was filled with broken ore to about 40 feet above the level, with the roof of the stope not more than six to eight feet above the rock filling. The stope had been inspected by the shift boss, Alex. Polluck, about 10 a.m., who had instructed Reilly to blast down a piece of rock when they fired that night. A Polander was employed breaking up large pieces of rock in this stope.

and had noticed a piece of ground that he thought was loose, shortly after the shift boss had been around, and called the attention of the machine man to it. Reilly looked at it, and said it was all right. The Polander, however, endeavored to take it down, and, when going into the mine after dinner, brought a gad with him to help in taking down this rock. He inserted this gad in a crack in the rock, and was pounding at it until 1.45 p.m. Reilly, in the meantime, went from this machine to take a look at the piece of ground that he had been instructed by the shift boss to take down. This piece was about 14 feet from where the Polander was working. In going back, Reilly started to walk directly under the piece of ground upon which the Polander was working. He had just got under it, when it fell. The piece weighed about 600 pounds, and, apparently, crushed his chest, as he died in a few minutes. Peter Chairon, machine-runner, was working within 8 feet of this loose piece, and when scaling in the morning had considered it safe. The work that the Polander did on it, however, gradually loosened it. The coroner's jury brought in a verdict blaming Reilly for walking under the piece of ground that the Polander was attempting to take down.

Nipissing Silver Mine

At the Nipissing mine, on June 22nd, Victor Leino, machine driller, was killed.

The deceased, a Finlander 27 years of age, was employed at the Kendall shaft, running a hammer drill in the stope on vein 108, between the second and the third level. He had been hired by Capt. Jeffrey on June 19th, and worked Tuesday night, Wednesday night, and had started to work Thursday night. On Wednesday night, the deceased had, at the orders of the shift boss, Peter Landry, blasted eight holes at 12 o'clock. He reported one shot missing, and, when the shift boss visited the stope in the afternoon, he gave instructions to the deceased to fire this hole, which was a burnt-out one, with three others, when going off the shift. The deceased did so, and reported to the shift boss that he had received four reports. The shift boss, Peter Landry, turned in the blasting report for this stope that 12 holes had been fired, and 11 reports received. The day-shift boss, W. McComb, and Capt. Jeffrey inspected this stope early Thursday morning, and found the hole that looked as if it was a burnt-out one. They examined it, but could find no powder in it, and ordered the day driller to drill about three feet back of this hole. This was done, but no blasting was done by the day shift in this stope. The day shift had, however, drilled some four holes, in addition to two that had been left the previous night, making three rows of two holes each back of the burnt-out hole. The night-shift boss, Peter Landry, came in the stope about 7.30 p.m. and examined this hole that had been reported to him by the opposite shift, and, according to his evidence, told the deceased that it was a burnt-out hole, and not to drill near it; to set up his machine back of the three rows of holes that had been drilled, and to blast the other at 12 o'clock. The shift boss then went to lay out the work for the machine-man working at the end of the stope, about 30 feet distant. He had left the deceased only about three minutes, when he heard an explosion. Going back, he found Leino badly injured. He was taken to the surface, and Dr. Hair summoned. The doctor had the man removed to the hospital and operated on him, removing some of the fractured bone from the skull. He died, however, in about two hours. The doctor stated that his skull was fractured (the brain exuding), and that the fracture extended to the base of the skull.

On an examination being made into the cause of the accident, it was found that the deceased had started to drill in this hole that had apparently been a burnt-out one. After the explosion, the steel was found stuck in the hole, and the machine practically under it. There were no witnesses to be found that could corroborate fully the evidence of the shift boss, Peter Landry. Leo Cote, the machine runner working in the same stope, gave evidence that he had heard the shift boss tell the deceased that there was a burnt-out hole, and to drill about three feet back of it. The other witnesses called had apparently heard no conversation. Both the shift boss and the mine captain stated that they were sure that Leino knew English sufficiently well to understand the orders given to him. There must, however, have been some misunderstanding on the part of the deceased of the orders of the shift boss, or otherwise he would not have deliberately drilled into this hole, when told not to do so. The deceased had worked at the McKinley-Darragh mine from 19th April to 19th May, and he was regarded there as speaking English as well as the majority of Finns. Before being hired by Capt. Jeffrey, he told him that he had worked in the mines of Michigan for five years.

The coroner's jury brought in the following verdict: "Victor Leino met his death by drilling into a missed hole contrary to orders. We would recommend the employment of men who understand English when working at hazardous work."

Section 164, rule 9, of The Mining Act was violated, and as a result of this the accident occurred.

At the Nipissing mine on November 6th Peter Milensnic, an Austrian, was killed by the accidental explosion of dynamite.

The deceased was employed as a hammer-drill man in stope No. 148, worked from the Kendal shaft. When coming off work on the night of November 4th he shot 15 holes. On returning to work on Monday morning he found that three holes had been cut-off, one hole had blown out, and that one or two old bottoms would have to be fired again. Accordingly he procured the necessary explosives, and was loading the hole that had blown out when the explosion occurred that caused his death. The deceased was using 60 per cent., 1¼-inch dynamite, loading with a wooden tamping stick, his light being on the far side of the stope, and it is probable that the detonator was not in this hole, as the machine helper, about 30 feet distant, was watching him charging the holes and noticed three fuses hanging from the back, but did not observe any fuse hanging from the hole he was loading.

At the inquest held on November 8th the witnesses stated that the dynamite was in good condition and that the holes were of sufficient size to freely admit the cartridge. The coroner's jury returned a verdict of death due to accidental explosion; cause of explosion unknown.

It was impossible to ascertain the cause of this premature explosion. An almost similar accident occurred at the Drummond mine on September 28th, excepting that in the latter case 40 per cent. dynamite was used instead of 60 per cent. It is possible that the dynamite had been overheated at some time while being thawed, and was thus in a supersensitive condition.

Norrington Gold Prospect

On January 8th on mining claim T.R.S. 863, township of Deloro, Albert Brunette, hammer man, was killed and Fred. Carroll injured as a result of starting to drill into a hole that had been blasted.

The accident occurred in a pit about 15 feet deep. The day before the accident eight holes had been fired and only seven reports obtained. No sign of a missed hole could be found on examination, and it was thought that two holes had exploded simultaneously. On mucking it was found that one hole at the side of the shaft had only broken off the collar. No powder was visible in the part of the hole remaining. The explosive used was cheddite. After mucking out, drilling was proceeded with, Brunette and his partner working at one end of the shaft and two other men at the other, each putting in three end holes. Brunette and his partner were the last to finish and were alone in the pit. Brunette said they would drill an old hole a little deeper and fire it, to take a knob off the side of the shaft. Carroll cleaned out the hole, taking out about six inches of dirt, but seeing no sign of an explosive. Then they began drilling in it with Carroll turning and Brunette striking. After drilling a minute or so an explosion followed, which killed Brunette and injured Carroll.

Owing to the fact that there was no coroner in Porcupine no inquest was held, but an investigation was made into the accident by the Assistant Inspector of Mines.

Northern Pyrites Mine

At the Northern Pyrites mine on March 19th George Cavazza, an Italian, a shift boss, met his death by being overcome by dynamite fumes.

The accident occurred on the second level in a raise driven from a cross-cut midway between No. 1 and No. 2 shafts. This raise was up about 15 feet. Cavazza loaded and fired a round of six holes in this raise between 11 and 11.30 a.m., March 19th. About 2 p.m. he again went below and started up the pumps. Not returning to the surface, at 5 o'clock the engineer on duty notified Cavazza's brother-in-law, who went below to ascertain the cause of his delay. He did not find him the first time, and thought he must have come up the other shaft. He went down again and found Cavazza, sitting on timber in the raise about 15 feet above the level, unconscious. He was at once brought to the surface, and the company's physician worked on him for some hours without being able to resuscitate him. As March 19th was Sunday, Cavazza was the only person in the mine, and his movements are therefore not accurately known. He did not open the valve to blow air into the raise before going into it. When found he was sitting on the timber in a natural position, and it is assumed that he sat down here for the smoke to clear.

Owing to there being no coroner near the mine, the body was sent to Fort William, where an inquest was held on March 23rd, and a verdict of accidental death was returned.

Nova Scotia Silver Mine

At the Nova Scotia silver mine on May 23rd Aleck Szniter was killed by falling down the shaft.

The deceased was a German Pole, aged 35 years and married. He had been employed at the mine for about a month and as cage tender for two weeks. A sub-level had been driven about 25 feet below the collar of the shaft and an adit driven out to the rock pile on the surface. This rock was being hoisted and treated in the mill. The duties of the deceased were to take the loaded cars from the switch, about 80 feet from the shaft, to the shaft and send them up on the cage. He was then to wait until the cage came down with the empty, then take the empty out to the switch and return with the loaded car. Just prior to the accident the deceased had taken in a loaded car and sent it up. He immediately went back to the switch, got another loaded car and took it into the shaft, not waiting for the cage to come down, as was the custom. This was the last seen of him until he was found by the men working near, lying on the sixth level, very seriously injured. Wm. Ade and Allan McWatters, timbermen, were working about 75 feet from the shaft on the sixth level, just about 70 feet below the level where the tramming was being done. They were interrupted in their work by hearing a noise which sounded like falling rock. They did not know at first where the sound came from, but, after it stopped, they went out to the shaft and found the deceased lying about five feet from the entrance to the shaft and the car wedged in the shaft just below the entrance. On examining the injured man they found him severely cut about the head. He was lying on one side, with his left hand grasping the handle of the hook used for throwing the cage chairs in and out of position. He was immediately taken to the surface, but died in about 15 minutes. The doctor stated that death was caused by fracture of the base of the skull.

At the inquest held in Cobalt by Dr. Hair on May 26th several witnesses were examined, but no direct evidence could be obtained as to how the deceased fell into the shaft, as he was alone there and not in sight of anyone. There was a chain used as a guard across the entrance to the shaft on the level, on which tramming was being done. This chain was in no way damaged, so that it could not have been in position when the man fell into the shaft. The cage was at the surface at the time of the fall, according to the evidence of one of the workmen who rushed into the shaft on hearing the noise. The hook, which the deceased held in his left hand, is always hung on a nail outside the entrance to the shaft. In order to have taken hold of this in the way he did, he must have stopped the loaded car near the entrance to the shaft, have gone round in front of it and have taken the hook off the nail. There was no evidence to show whether the man fell into the shaft before or after the car. It is probable, however, that the fall was caused through the deceased leaning out in the shaft, possibly looking up to see if the cage was coming, when, losing his balance, he with one hand grabbed the car, which, being near the entrance and not fastened, ran into the shaft. The man in falling apparently struck on one of the shaft timbers, which threw him out on the station level. The shaft was about 80 feet deep below the sixth level.

The coroner's jury brought in a verdict: That Aleck Szniter came to his death through falling down the shaft at the Nova Scotia mine on May 23rd; cause unknown.

Richardson Feldspar Mine

At the Richardson feldspar mine on November 9th Michael O'Connor, a Canadian, aged 34 years, unmarried, was killed by falling down a stope.

O'Connor had worked at this mine at intervals for the past six years, and had been running a machine drill for from two to three years. On the morning of the accident, assisted by Archibald McGowan, his helper, he drilled two 10-foot holes, and had set up on the third hole, when the superintendent, M. J. Flynn, ordered them to tear down to blast. The bench on which they were working was from six to seven feet in width and about 10 feet from the bench below, the stope being carried in benches. They took the machine drill off the tripod and, with the assistance of two Russians, carried it up the stope to the bench above. The weights were also taken off and laid away. They then started to take the tripod down by pulling it out from where it was set up. O'Connor ordered the hip to be loosened by McGowan, the two Russians holding one of the legs of the tripod. When this was done O'Connor called all three of the men to let go, which they did. Apparently at the same time O'Connor stepped in front of the tripod and slipped. In falling, he grabbed the tripod, and carried it off the stope with him. He fell to the bench below, a distance of about 10 feet, on his left side, the tripod falling on him. As a result of the fall O'Connor sustained a fracture of the skull, which caused his death about an hour afterwards.

The tripod weighed about 100 pounds, so that it could easily have been handled by the four men present. When the leg of the tripod was loosened, it made it very unwieldy.

Through lack of knowledge of the law on the part of coroners Mundell and Geddes no inquest was held, but an investigation was conducted by the writer.

Silver Leaf Silver Mine

At the Silver Leaf shaft, operated by the Crown Reserve Mining Company, on December 21st, J. Graham, a Canadian, 44 years of age, and married, was killed through falling down the shaft.

The deceased had been employed as deck-man at the Silver Leaf shaft for about three weeks. This shaft is 500 feet in depth, and hoisting is done by means of a cage. It has been the custom of the hoist-man when hoisting rock to oil the friction of the hoist about three times in ten hours. When the cage is on the chairs at the station, the cups to oil the friction are on the lower side of the drum, and the cage has therefore to be raised half a revolution on the drum, or lowered half a revolution, to bring the oil cups in a convenient position for filling. On the night of the accident the friction was oiled at 10 p.m., and about 1.30 a.m. the hoist-man, according to his own evidence, told the deceased that when the cage came up the next time he was going to oil the friction. When the cage came up he again told the deck-man, and requested him to be sure to put down the shaft-guard. The shaft-guard consisted of a bar of iron 1½ inches wide by ¼ inch thick and was fastened to one side of the shaft by a lag screw. The hoist-man stated that after the car was taken off the cage he heard the shaft-guard drop. He then hoisted the cage half a revolution of the drum. The deceased took the car of rock out to the dump, emptied it and returned. He evidently thought that the cage was back in position or forgot for the moment that the hoist was being oiled, as he wheeled the car into the shaft and followed it to the bottom. He was instantly killed. On examination of the shaft-guard after the accident it was found that the lag screw was pulled out. If the guard-rail had been in proper position it would have been impossible to push the car into the shaft. The guard-rail was probably dropped, but did not fall into its proper position, and was struck by the car while it was being shoved into the shaft, tearing out the lag screw to the position in which it was found.

The coroner's jury brought in the following verdict: "That J. Graham came to his death by falling down the shaft at the Crown Reserve mine Thursday morning, 21st day of December, 1911, by an accident caused by the deceased failing to place the guard-rail in its proper place."

Temiskaming Silver Mine

At the Temiskaming mine on March 16th Albert Sullivan, drill runner, met his death by being overcome with powder gas.

Sullivan and J. B. Brown, another drill runner, with their helpers, were working at the bottom of an incline winze 75 feet below the 500-foot level. Drifts were being started from the bottom of the winze north and south. On the morning of the 16th the two machine men mentioned above loaded 20 holes, 10 in each face, using 7-foot fuse for each hole. Hoisting from the winze was carried on by means of a small hoist placed near the mouth of the winze and operated with compressed air. It apparently was customary at the mine to permit the steam to go down in the boilers about 5 o'clock, in order to allow the firemen to clean their fires. On the morning in question, after the two machine men had their holes loaded, the hoist-man at the winze told the machine men that he would not answer any blasting signal until he found he had sufficient air pressure to hoist them. He went to the nearest gauge at the 400-foot level and found it registered 50 lbs. Here he met Jempson, the powderman, who said he would go to the surface and tell the engineer to keep the compressor running, as they were going to blast in the winze. Jempson went to the surface and saw engineer Henry, who told him the air pressure was down to 30 lbs. and the compressor just turning over, and that he could not get the air up in time to pull the men out of the winze. Jempson answered that he would close the valves at the 400-foot level, where they were blowing smoke, and try that. This was the evidence given by engineer Henry and his oiler. Jempson, however, gave evidence that Henry told him to go ahead and he would keep the compressor running. Jempson then went below to close the valves at the 400-foot level, and told the machine men that it was all right, to go ahead and blast. Sullivan and Brown then went down in the bucket to light their holes and gave the blasting signal, which was answered by the hoist-man. They then lighted the holes and gave the signal to hoist. The hoist-man tried to raise the bucket, but found that he had no air and could not do so. He called to the men that there was no air and to try and climb up by the rope, as there was no ladder in the lower part of the winze. The men started up, holding on to the rope with one hand and to the skids with the other. About 30 feet up Sullivan stopped on a stull, apparently exhausted, saying that he would stay there. Brown continued up the rope to a bulk-head about 45 feet from the bottom from which there were ladders to the level. The blast in the winze went off just as Brown reached the bulk-head. He, however, managed to climb up the rest of the way, Sullivan remaining on the stull. On account of there being no steam, it was impossible to get the winze clear of gas and get down into it for about two hours later, when Sullivan was found lying dead at the bottom of the winze. He had apparently been overcome by the gas while lying on the stull and had fallen to the bottom. Death was due to asphyxiation. There was no ladder in the winze for the last 40 feet, as required by section 164, rule 23, of the Mining Act. Had there been a ladder Sullivan would doubtless have escaped. The reason given for having no ladders was that all blasting in sinking was being done by electric battery, and orders had been given that no fuse was to be used. Sullivan and Brown, however, had obtained fuse from the powderman and used it, not only for this round but for the round preceding this one fired by them. This was apparently done with the knowledge of the shift boss, William Stephenson, but not with the knowledge of the mine captain, William McVichie.

The coroner's jury brought in the following verdict: "That Albert Sullivan came to his death in a winze at the Temiskaming mine Thursday, March 16th, 1911, as a result of gas from powder, having been unable to reach the ladder above. We are of the opinion that, had a ladder been there, the accident would not have happened. We find Stephenson, the shift boss, negligent for not enforcing the captain's orders, and find the captain equally negligent for not having a ladder at the bottom of the shaft to provide an auxiliary means of escape. We recommend that the captain shall have charge of all engines and give all orders regarding the time for starting and stopping compressors."

Information was laid before Magistrate Atkinson at Cobalt against the Temiskaming Mining Company and the shift boss, William Stephenson, for violation of section 164, rule 23, of the Mining Act of Ontario. Convictions were recorded in each instance, the company being fined $100 and costs, and the shift boss $50.

Metallurgical Works

Algoma Steel Company

At the blast furnace of the Algoma Steel Company, Sault Ste. Marie, on July 15th, Geraldi Vinzinzi, an Italian, was killed by being run over by the yard engine.

The deceased was a laborer, employed around the yards of the blast furnace. On the day of the accident he was sent by the foreman, Dugald McArthur, to take the hose and put out some fire. McArthur was with him at the time. While at this work the yard engine came along and struck both of the men, knocking down McArthur and running over Vinzinzi, injuring him so seriously that he died half an hour later. The accident occurred on the track just in front of the power house, so that there was considerable noise. The foreman stated at the inquest that he did not hear the engine coming. Neither of the men on the track were seen by either the engineer or the fireman on the approaching engine, according to their statements.

The coroner's jury brought in a verdict of accidental death.

The Steel Company of Canada

At the blast furnace, Hamilton, on October 10th. David Fe Duzzi, an Italian labourer, was killed.

It would appear from the evidence taken at the inquest that work at relining the furnace was in progress and that it had reached a height of about 35 feet. In order to handle the brick and fireclay a temporary shaft was built up through the centre of the furnace. This shaft was about 30 inches square, and the brick and clay were hoisted in buckets through it. All the rest of the space in the furnace was filled up by a scaffold on which the bricklayers worked. On the night of the accident three men were employed at the bottom of the furnace filling the buckets, while other men were employed on the platform, 35 feet above, taking out the brick and handing them to the bricklayers. The accident was apparently caused by one of the bricklayers having been handed a broken brick. He threw it down on the platform and one part of it fell into the shaft falling to the bottom and striking Fe Duzzi on the back of his head, causing a fracture of the skull.

The coroner's jury brought in a verdict of accidental death.

Canadian Copper Company

At the smelter on January 16th, P. Pologseyk, a Polander, 28 years of age, single, employed as a tuyere puncher on the convertor, received injuries which resulted in his death on January 21st.

The deceased was apparently standing between two cars, resting on the draw-bar. The yard locomotive came into the converter building to pick up the cars, and as they were shoved together Pologseyk was caught, and received severe injuries to his thigh and abdomen which caused a serious hemorrhage. These injuries resulted in his death four days later. The deceased had been employed at the smelter for about three months.

The coroner's jury brought in a verdict that P. Pologseyk came to his death through his own inattention, by being caught between the couplings of cars.

At the smelter on March 26th Arthur Jennings, a Canadian, employed as tapper at the No. 1 furnace, was burnt to death through an explosion of the settler. The deceased had been employed as tapper at this furnace for over four years and had worked at the smelter for about ten years.

On the Thursday night preceding the accident a new tapping jacket had been put on No. 1 furnace. This tapping jacket was made of cast iron, with the tap hole water-cooled. In the construction of the settler it was found that the matte scoured away the lining in that part of the settler near the tap hole, causing frequent accidents through the matte eating through the wall of the settler. To overcome this difficulty, that part of the furnace round the tap hole was water-cooled by three coolers, one being placed on each side of the tap hole and one above it. These coolers are about 15 inches wide, 6 inches thick, and reach to the top of the settler, where the water connections are made. They are made of cast iron, having a coil through them, through which the water circulates. At the tap hole these coolers are from 10 inches to 11 inches apart, thus forming a square of about 11 inches. This square is filled with chrome brick, leaving a tap hole in the centre about 1½ inches in diameter. Inside the water coolers is a lining of chrome brick 18 inches thick. When the tapping jacket is burnt out, which occurs every seven or eight days, the chrome bricks in the square surrounding the tap hole are examined, and if scoured away to any extent are replaced. This can be done after tapping out the furnace.

Before the new tapping jacket was put on, on the Thursday night preceding the accident, the chrome brick surrounding the tap hole was examined by Cecheta Luigi, the tapper, and Judson Webb, smelter foreman. They both pronounced it in good order, the bricks not being worn away to any appreciable extent. Arthur Jennings came on shift on Sunday, March 26th, at 12 o'clock, and was informed by the tapper on the opposite shift that there was a leak in the tapping jacket and they were running it dry. Pat Sullivan, Jenning's helper, stated that they had run this tapping jacket dry after he came on shift, but they had sometimes turned on the water to cool off the tapping jacket when they were not tapping. Sullivan was holding the bud in the tap hole at the time the explosion occurred, a ladle full of matte having just been tapped off. The explosion threw him and Jennings back, the latter falling about 10 feet distant from the tap hole. The explosion was immediately followed by a rush of molten matte from the settler, which flooded the trough and flowed over Jennings before he was able to rise. Before anyone could come to his assistance he was completely surrounded and embedded in the molten matte. It was consequently some 15 or 20 minutes before they were able to get the matte sufficiently cooled to take him out. When they did so, it was found that his flesh was all practically cooked. The doctor stated that his death would be almost instantaneous.

The coroner's jury brought in a verdict of accidental death.

At the smelter on March 27th Volpini Attelio, an Italian, employed as converter puncher, received injuries which resulted in his death on April 5th.

About 5 p.m. March 27th the matte of No. 1 converter broke through at the back. The skimmer immediately rang the bell and the converter was turned down. The deceased was sent over to the furnace building for some fire clay, and on his return went up the ladder to the top of the converter to patch up this hole in the lining with the fire clay. He had finished this work, had thrown down the remaining fire clay to the ground and was just rising on his knees when a piece of matte and slag about 8 inches in length and 1¼ inches thick fell from the hood about two feet above him and hit him on the head. Attelio then came down from the top of the converter and went to the time office to get the foreman to fix him up. The foreman said he complained of a pain in the back of his head, but there was no bruise to amount to anything. He waited round until 6 o'clock, when he went to the hospital, where he was examined by Dr. McAuley, who told him to go home and stay there for a day or two. Dr. McAuley saw him again on the 29th March at his home. He found him vomitting, which was a symptom of fracture of the base of the skull. The man was then brought to the hospital but grew gradually worse, dying on Wednesday, April 5th.

A post mortem was conducted by Drs. Morrison and McAuley, who stated that they found three small fractures at the base of the skull. They found that the skull at this point was about one-third the normal thickness. The fracture had caused acute inflammation of the brain membranes.

The converter foreman, William Kent, stated that all the loose material which accumulated in the hood was cleaned out every morning at 7 o'clock and every time a shell was changed, but that no definite instructions had been given to the men to clean it out at all times before going under it. The hood had therefore not been cleaned out for ten hours.

The coroner's jury brought in a verdict of accidental death.

On August 15th, John Miesko was injured by falling through the roof of the converter building, dying next day.

The deceased had been employed by the Canadian Copper Company for upwards of four years, and had, during that time, been employed chiefly in laying tile on the roofs of the converter and other buildings around the plant. He was a Finlander, 31 years of age. On the morning of August 15th, he had been set to work on the east side of the converter building to take off the old tile that had become weakened through the action of the gases from the converter. These tiles are 4 feet 3 inches long, 2 feet wide, and 1¼ inches thick, and are laid on purloin plates, which are 3 feet 6 inches between centres. These tile, when new, are strong enough to hold the weight of a man, but, owing to their weakened condition, the deceased, assisted by Aleck Puponen and Antti Rauhanen, took up planks to lay over the tile to support their weight. The foreman, John Schofield, remained in the converter room to keep everything clear, so that they could throw down the defective tile. The deceased, according to the evidence of his two helpers, had lifted off one of the defective tile, thrown it down, and, in stepping back, put one foot off the plank on to the tile. His weight broke the tile, and he fell through to the floor below, a distance of 43 feet. He was at once taken to the hospital, where he was examined by Drs. Morrison and McAuley, who found that both feet and ankles were badly fractured, but no signs of other injuries. He was put under an anaesthetic, and the fracture reduced. He did not rally from the shock, and died at 3 a.m., August 16th.

The coroner's jury brought in a verdict of accidental death.

At the same plant, on October 28th, Ignatio Chiptomi was injured by falling from the top of the converter stand, dying on October 4th.

The deceased, a Polander, 29 years of age, and single, had worked at the converter plant for four months. On the morning of the accident, the converter had been turned down for the last time, preparatory to dismantling it, and Chiptomi climbed on the top of it, which was about 12 feet from the floor, to lower the hood. This hood is about nine feet long by four feet four inches wide, and weighs approximately 2,750 lbs. It is held in position by a bar of iron ¾ inch in diameter, passing through two hinges. It is impossible to say how long this bar had been in position, as the practice was to renew it whenever any sign of bending was apparent, which generally takes place in the centre, between the hinges. When Chiptomi released the latch, it fell into position, and then toppled over, striking the converter stand, and falling to the ground. The witnesses of the accident, Alfred Wuiff and John Suckon, crane men, were unable to see, on account of the dust raised by the hood in falling, whether Chiptomi was struck by the hood or not. His injuries, however, would indicate that he was not. No doubt, he lost his balance, and so fell off the converter stand to the floor, landing on a rail, and causing internal injuries, which resulted in his death.

The bar broke between the hinges on both sides. On the one side, it showed signs of shearing, and on the other, there was a clean fracture.

The pieces of the bar were subjected to a microscopic examination, and a shearing and tensile test by Mr. T. R. Loudon, of Toronto University. The microscopic examination showed the iron bar to be what is known as "bushelled" wrought iron and the metal to be extremely dirty, with high carbon areas almost entirely separated from the rest of the metal by a surrounding fence of slag. The section taken nearest to the point of failure was worse than any other part of the metal examined. The result of the shearing test showed a single shear 41,000 lbs. per square inch. The tensile test was as follows: Elastic limit, 31,000 lbs.; ultimate strength, 41,600 lbs. Both the shearing test and the tensile test gave good values, but it is well to point out that this type of metal should not be used where the metal is to be subjected to any considerable stress.

The coroner's jury brought in the following verdict: "That Ignatio Chiptomi came to his death by either jumping or falling off a converter on October 28th, causing internal injuries."

Mond Nickel Company

At the power house of the smelter, at Victoria Mines, on August 4th, Charles Longfellow, engineer, was killed through coming in contact with a high-pressure wire, situated back of the switch board. The deceased was a Canadian, 53 years of age, and had been employed as engineer in the power house about a month. The place where the accident occurred was back of the switch board, where a 15,000-volt wire, leading to the oil switch, came in a vertical position from the main wires, about 10 feet high to within four feet of the floor, where a bend was made in it, so that it ran in a horizontal position for about 18 inches to this oil switch. The deceased had apparently gone to the back of the switch board for some reason unknown, and had stooped down in the corner under this high pressure wire. In raising, his head had come in contact with it, and he was was found some time afterwards lying on his face in this corner. The doctor stated that death was due to an electrical shock, as there was a mark on the back of his head and on his left elbow, where the current had made a connection with the concrete wall. There is no doubt that the deceased had no business in this part of the power house, but he had never received explicit instructions not to enter it. The only indication of danger was a sign board, "Danger, 15,000 volts."

The coroner's jury brought in the following verdict: "That the deceased, Charles Longfellow, came to his death, August 4th, 1911, by coming in contact with a live wire behind the switch board in the power house of the Mond Nickel Company, at Victoria Mines, and being electrocuted. They further find that the said wires were insufficiently guarded to protect a person from shock."

Coniagas Reduction Company

At the Coniagas Reduction works, at Thorold, April 26th, William Allen, carpenter, was injured, dying as a result of the accident on April 28th. The deceased was a Canadian, 54 years of age, and had worked at his trade as carpenter the greater part of his life. He was engaged along with William Rapsy in putting paroid roofing on a building to be used as a silver refinery. To enable them to get to their work, a scaffold had been erected, which was about six feet from the ground. It was built of two jacks, held in place against the wall by short pieces of scantling. On these jacks was a plank 2 inches by 10 inches by 14 feet. The two men had been working on this scaffold for about fifteen minutes, when one end of it suddenly slipped. Allen was standing on this end of the scaffold, and fell with it, lighting on his hands and knees. He was apparently struck on the back by the falling plank. Rapsy was standing at the middle of the scaffold, and received no injuries. Doctors McDonald and Harvey made a post mortem examination, and found that the cause of death was the displacement of the vertebra, which had flattened the spinal cord. The accident was caused by the slipping of the scantling, and holding up one of the jacks. Apparently no hole had been made for this scantling, and no brace put against it to keep it from slipping. The coroner's jury brought in the following verdict: "That William Allen came to his death from injuries received through being struck by a falling scaffold, not properly erected, at the works of the Coniagas Reduction Company, Thorold."

Stone Quarries

Doolittle and Wilcox Stone Quarry

At the Doolittle and Wilcox quarry, near Dundas, on March 28th, Louis Pace and Midio Toro, Italian laborers, received injuries which resulted in their death. The injured men were in a car on a siding unloading fines. The siding at this point is on a fairly steep grade. One of the shippers was letting down a load of stone from the bins, when, in some way the car got away from him, and crashed into the car in which the men were working. Toro fell under the wheels, and was instantly killed; Pace fell under the car, and the wheels passed over his leg. He died a week later, as a result of his injuries. The men apparently had been instructed not to get into the car until a loaded car with brakes set had been placed ahead of it, so as to prevent an accident. Through some misunderstanding, the men received an order to unload the car. When the car that caused the collision was started down the grade, it was seen that the brakes would not hold it. After it gathered headway, the man on the car found it impossible to check its speed and jumped off.

An inquest was held at Dundas, on March 31st, and a verdict returned censuring the Company for carelessness in the operating or shifting of cars.

At the same quarry, on September 22nd, Ernest Findlay met with his death by being crushed between two engines.

On the morning of September 22nd, No. 1 engine went off the track, near the switch. No. 3 engine was run down on the track running to the switch, with the object of pushing No. 1 engine back on the rails. To accomplish this, Ernest Findlay and C. Gravelle placed a tie between the bumpers of No. 1 and No. 3 engines, and No. 3 engine was moved up until this tie was tight. No. 3 engine was then stopped, and the men were told to step back clear, as the tie was apt to break or slip. The engineer of No. 3 engine, Jim Borman, received a signal to move forward. He did so, and the tie slipped, and Findlay, who had apparently not stepped clear, was caught between the bumpers. He was quickly released and taken to the hospital at Hamilton, but died the same day.

Findlay was a Canadian, about 35 years of age, and unmarried. He was usually employed as a drill runner, but, on the day of the accident, was helping at the crushers. When the engine went off the track, he came up to give assistance in replacing it.

The superintendent, James Small, was present at the time of the accident directing affairs. The evidence shows that he had warned the men to step clear when the No. 3 engine started to put pressure on the tie. The engines are of the small contractor's type for narrow-gauge railway.

An inquest was held in Hamilton by Dr. Rennie on Monday night, September 25th. The coroner's jury brought in a verdict of accidental death.

Hagersville Stone Quarry

At the Hagersville quarry, on April 19th, George Arthur Howard, engineer, was injured by being struck with a rock thrown by a blast from the quarry, dying as a result of his injuries on April 24th.

Howard was at work in the boiler house shovelling coal, when a rock came through the building, striking him on the head, and fracturing his skull. The boiler house was a skeleton frame, covered with 1-inch lumber, and consequently afforded no protection against falling rocks from blasts. The blast fired on the night of the accident was for the purpose of breaking up a large piece of rock. As a result, there would be more danger than usual of fragments flying great distances. A warning cry was apparently given before the blast was put off. The boiler house was about 140 feet from where the blasting took place.

An inquest was held at Hagersville, on April 27th, and a verdict of accidental death returned.

MINES OF ONTARIO

By E. T. Corkill, Chief Inspector of Mines

1.—NORTHWESTERN ONTARIO

There was little change in the condition of the mining industry in northwestern Ontario in 1911 from the preceding year. A number of properties were worked for gold, and a small production was recorded. These operations were widespread, and include properties on the Lake of the Woods, near Dryden, Upper Manitou lake and Sturgeon lake.

On the last-named area, where gold discoveries were made and many claims staked in 1899 and subsequent years, there was much activity in 1911. The St. Anthony mine is the most important property in this area yet discovered, and has been worked intermittently since 1899. The property was purchased from the former owner, the St. Anthony Gold Mining Company, by the Sturgeon Lake Development Company, of which Mr. Geo. Glendenning is president, in March, 1911, and active development work has been carried on since that time. The acquiring of this property caused a revival of interest in the area. A number of claims were staked, old properties examined and assessment work done.

In addition to gold mining, other minerals produced were silver, iron and iron pyrites. Although the Port Arthur silver area was formerly a large producer, there was but little actual mining work done in 1911. The Atikokan Iron Company shipped steadily most of the year to their blast furnace at Port Arthur. The Northern Pyrites Company shipped iron pyrites during the season of navigation from their mine near Graham.

Quarries were operated in the Port Arthur area and at Hawk Lake station, near Kenora. On account of the lack of available building stone of good quality in the Province of Manitoba, and its occurrence in this part of Ontario, quarrying should become an important industry.

Lake of the Woods Area

Mikado Gold Mine

Mining was carried on at this time by the Kenora Mines, Limited, during the first half of the year. This consisted chiefly of development work on the second, fourth, and seventh levels. A winze was sunk from the fourth level a depth of about 90 feet. The mine is kept unwatered, but no mining is at present being done.

Cameron Island Gold Mine

Several examinations were made of this property during the year, and preparation for a mill is now under way.

Olympia Gold Mine

Work was resumed at this property, which is about half a mile from the Mikado, late in 1911. Operations consisted chiefly of surface work.

Ophir Gold Mine

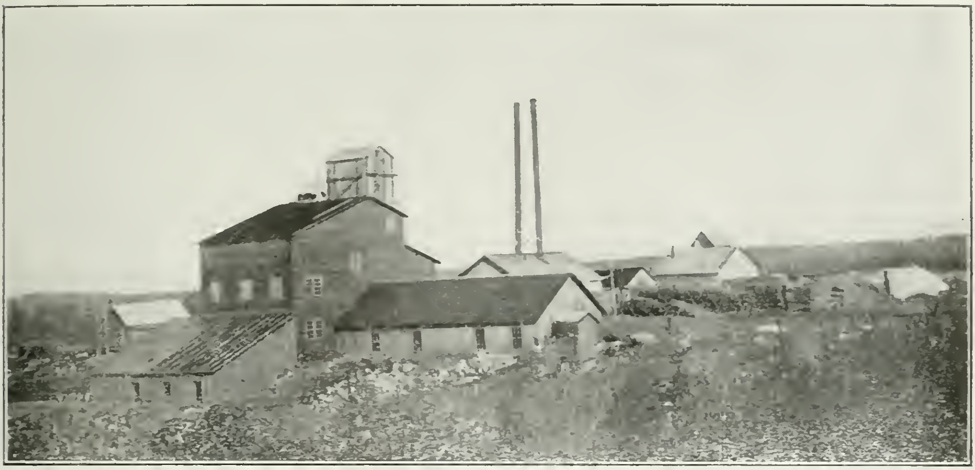
This property, situated about half a mile south of the Sultana mine, was re-opened in 1911. A shaft was sunk a depth of 50 feet, and 100 feet of drifting done at this level. The mine is in operation under the management of R. B. Nickerson.

Scramble Gold Mine

This property, located in 1894, is situated on lots 13 and 14 of the sixth concession, township of Jaffray, a few miles north of Kenora. After remaining idle for about thi teen years, work was resumed on this property the latter part of the year by Chas. Brent.

Allie Island

On claims staked for copper by T. W. Moore on Allie Island, about fourteen miles from Kenora, assessment work was done during the year. Several test pits have been sunk.



Stamp mill, St. Anthony gold mine, Sturgeon lake.

Camp buildings of St. Anthony gold mine.

Dryden Area

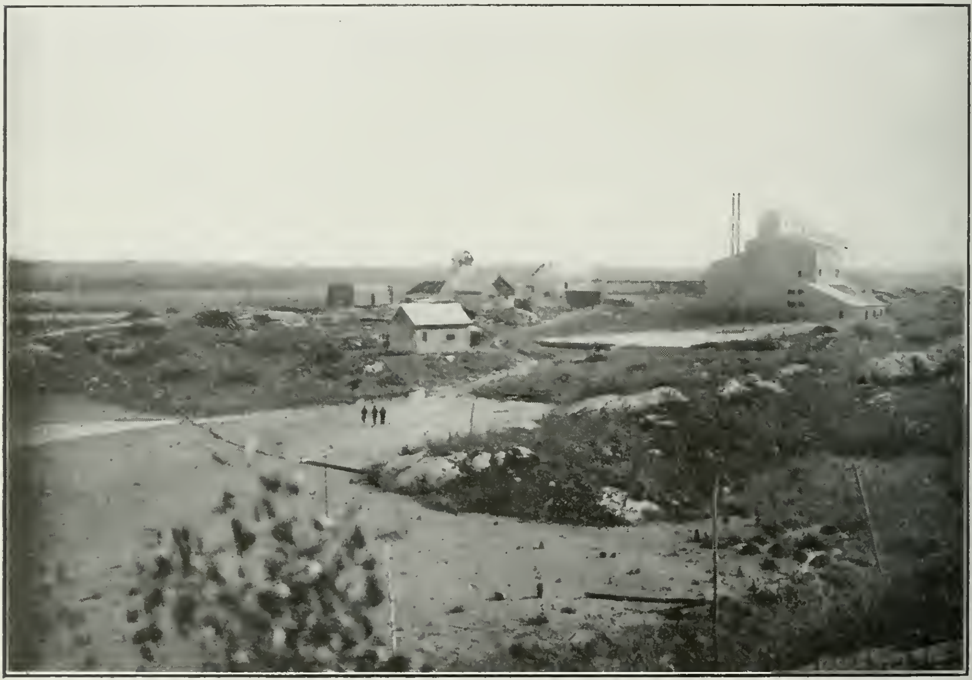
On a number of gold claims in this area, development work was carried on during 1911, but no extensive mining work was done. At the League mine, worked by the Shareholders' Protective League, Limited, the shaft was sunk to a depth of about 80 feet. Messrs. Hutchinson and McPhail, of Dryden, did some development work on claims in the township of Van Horne.

Upper Manitou Lake Area

Very little work was done in this area in 1911, and the properties were consequently not inspected. During the latter part of the year, work was resumed on the Laurentian gold mine, which had been idle for about two years. The Big Master gold mine was pumped out for an examination. Messrs. John Beck and Dryden Smith did some development work on a gold property known as the Last Chance.

Sturgeon Lake Area

Development work was carried on on a number of gold properties on Sturgeon Lake during the summer, but only the St. Anthony and the Rainbow were inspected.



St. Anthony gold mine.

St. Anthony

The Sturgeon Lake Development Company, under the management of J. Houston, have been actively engaged in mining on this property since March, 1911. Considerable development work had been done by the late owners, and a tonnage of ore stoped and milled. The ore milled came largely from the open cut, south of the main shaft. The latter is 100 feet deep, with drifts run north 200 feet, and south 400 feet. At about 100 feet south of the shaft on this level, a winze has been sunk 80 feet, and a cross-cut is being driven to the shaft, with the intention of raising. Stoping is being done on the vein north, and also south, of the shaft. The vein has been open-cut south of the shaft to the first level for a length of 150 feet. A cross-cut is being driven to the parallel vein, east of the shaft. This has a length of 160 feet. A cage has been installed.

The plant consists of two 100-h.p. boilers, compressor, 10-stamp mill, Hardinge pebble-mill, crusher, and hoist. A new power plant, consisting of boilers and compressor, is being installed.

The mill was put in operation in August, 1911. A road was built to the National Transcontinental Railway, a distance of about twelve miles, and supplies brought in over the road, after the close of navigation. About sixty men are employed.

Rainbow

On A.L. 499, formerly owned by T. K. Barnard, situated on an island about one-half mile from the Sturgeon Lake Hotel, a shaft has been sunk 50 feet, and 20 feet of drifting and cross-cutting done. There is no plant on the property.

Other Areas

Chimney

On H.W. 113, adjoining the townsite of Graham on the shore of Pelican lake, a pit has been sunk on a narrow quartz vein by J. Tingley. The management purposed installing a 2-stamp mill during the winter.

Quartz vein, St. Anthony gold mine.

Elizabeth

The Elizabeth mine is situated at the north end of Rice lake, four miles west of Steep Rock lake and two miles north of the Canadian Northern Railway, from a point five miles west of Atikokan Station. The mine was originally owned and operated by the Anglo-Canadian Gold Estate, Limited, but has not been worked for about ten years. It was re-opened during the latter part of 1911 by Mr. W. H. Nelson, and is being operated by him.

The old shaft was 240 feet in depth, with the first level at 65 feet. The present operators are working on this level.

The plant consists of two boilers, a 35-h.p. and a 70-h.p., a compressor, and hoist.

Northern Pyrites Mine

During 1911, the Northern Pyrites Company were actively engaged in development work, and, during the season of navigation, were steadily shipping ore by way of their aerial tram to the National Transcontinental railway, and thence to Fort William. No. 2 shaft, in the foot wall of the ore body, has been sunk to the third level. No. 1

Northern Pyrites mine, Vermilion lake.

Ore crushing plant, Northern Pyrites mine.

shaft was started in the hanging wall and sunk vertically to a point midway between the second and third levels, where it encountered the foot wall, which it followed to the third level. From No. 1 shaft in this wall, a cross-cut, 60 feet in length, has been driven across the ore body, and a drift run along the foot-wall side of the deposit for a distance of 200 feet towards No. 2 shaft. At No. 2 shaft a cross-cut has been driven to and across the ore-body, and drifts started on the ore. On the second level, the shafts have been connected, and the drift continued east to a distance of 400 feet from No. 2 shaft. No. 1 stope has been started east of the shaft. This stope is 70 feet in length by the width of the ore body. No. 2 stope is midway between the two shafts, and is 60 feet in length, which is the width of the ore body. This stope is started by first driving a cross-cut through the ore body, and then raising from intervals along the same. A floor with a thickness of at least 10 feet is left over the cross-cut, and these raises are used as chutes for drawing off the surplus broken ore as stoping progresses. The same principle is used in No. 1 stope, except that it is along the ore body, instead of across it. No new work has been done on the first level.

Atikokan Iron Mine

This mine was operated continuously during the year, but, at the time of inspection, in October, only twenty men were employed, chiefly in stripping and development work. At No. 1 tunnel, the open stope has been carried back east and west of the tunnel, a distance of 100 feet and 150 feet respectively, and the full width of the ore body. The work of stripping the ore body on the north side of the ridge, putting in pocket, and taking down wall rock, preparatory to open cutting, was in progress. The tunnel is being widened. No. 2 adit, 450 feet east of No. 1 tunnel, has been driven to the north wall of the north vein, a distance from the mouth of 140 feet. The south ore body has been open-cut for a length of 75 feet. No. 3 adit has been started 400 feet east of No. 2. The surface plant remains the same. Mr. F. Rodda is superintendent.

Atikokan Blast Furnace

The Atikokan Iron Company operate both the mine and the blast furnace. The blast furnace, located at Port Arthur, was in blast the greater part of 1911. It was closed down in October for the purpose of relining. Mr. J. D. Fraser is manager.

Port Arthur Silver Mines

As in 1910, but little work was done at these mines during 1911. The Three A mine, discovered in 1870 and worked for a few years, was reopened by Messrs. Stewart and Skene. This mine is on the north shore of Thunder bay, about 12 miles east of Port Arthur. The old workings were unwatered and about 200 feet of drifting and cross-cutting done on the first level to pick up the vein. Work was suspended here in October.

At Spar island, about 20 miles southwest of Port Arthur, R. A. Lockerby has been engaged in exploratory work for a Montreal syndicate. A shaft has been sunk about 75 feet, and work was still in progress in October, but was not inspected.

Quarries

Midway between Port Arthur and Fort William, and two miles from the lake, Messrs. Stewart and Hewitson are operating a stone quarry. They are chiefly producing crushed stone for concrete work and road material. A crushing plant has been erected at the quarry, and the crushed material is hauled by wagon to the place where it is used.

At Hawk lake station, Canadian Pacific railway, 25 miles east of Kenora, a granite quarry has been opened up. Stone from this quarry was used in building the court house at Kenora, and it is also being shipped to Winnipeg.

II.—SUDBURY AND THE NORTH SHORE

This is one of the most important mining areas in Ontario. In addition to producing most of the nickel used in the world, it yields also copper iron and gold. This area possesses, too, the advantage of splendid waterpowers, assuring a low cost for power which would otherwise be high if it were necessary to use coal. The power costs for this area range between $16 and $20 per horse power year. All the producing mines here are now using electric power obtained from near-by waterpowers. The principal power companies are: the Huronian Power Company of the Canadian Copper Company; the Lorne Power Company, a subsidiary company of the Mond Nickel Company; the Wahnapitae Power Company, which sells power to the Mond Nickel Company; the Canadian Exploration Company, the Dominion Nickel Copper Company and Moose Mountain, Limited; and on the east shore of Lake Superior, the Algoma Power Company, supplying power to the Helen and Magpie iron mines. Further power development is in progress by the Wahnapitae Power Company on the river of that name, about 10 miles below their present plant, and by the Lake Superior Corporation on the Magpie river, between the Helen and Magpie mines.

The nickel production comes from the mines operated by the Canadian Copper Company and the Mond Nickel Company. These companies have during the year begun development work on adjoining properties, called respectively the Frood and Frood Extension. The Dominion Nickel Copper Company carried on development work at their mine throughout the year. There was also considerable diamond drilling done on outlying properties by other companies.

Owing to the lessened demand for iron ore during 1911 the Moose Mountain mine shipped but little during the year. Work on the large concentrator was, however, begun, and the plant is now nearing completion. The Canadian Exploration Company at Long lake enlarged their mill, but, owing to lack of power, had but a small production. A power line has been built from the mine to the Wahnapitae Power Company's plant.

Sudbury was the starting point of a rush for gold into the West Shining Tree area. A large number of claims were staked during the latter part of the year. A winter road was cut into the camp and supplies hauled in for carrying on development work during the coming summer.

The main work being done in the Michipicoten area is at the Helen and Magpie mines. Shipments were continued from the Helen mine during the season of navigation. At the Magpie mine only development work underground is being done, on account of the necessity for roasting the ore. The first unit of the roasting plant is now under construction. The railway was completed to the mine during the summer. Diamond drilling is also being carried on at other properties in this area by the Lake Superior Corporation. Very little work was done on the gold properties during the year.

Canadian Copper Company

All the production of the Canadian Copper Company came from the Creighton, Crean Hill and No. 2 mines. Important changes have been carried out at the smelting plant, where basic converters have been substituted for acid converters, and two large reverberatory furnaces have been erected for treating the blast furnace flue dust, converter slag, and the green ore fines. The first of these furnaces was blown in in December, 1911.

An 8-hour day for all the workmen underground was adopted by the company the first part of 1912.

The chief officers of the company remain unchanged; Mr. A. P. Turner, president and general manager; Mr. John Lawson, general superintendent, and Mr. D. H. Browne, metallurgist.

Creighton

This mine is worked by two incline shafts 325 feet apart. No. 1 shaft has a dip of 59 degrees and is 300 feet deep. The part of the ore body served by this shaft has heretofore been worked by an open cut. This open cut on the surface has a maximum length of 650 feet and a maximum width of 400 feet, narrowing down to the third level, where its length is 300 feet and width 125 feet. The work of taking down the floor under the third level is now in progress. As the ore body dips to the north, it was found necessary to take down a large tonnage of rock off the hanging wall to provide for the safety of the workmen. No. 2 shaft has a dip of 46 degrees and is 500 feet deep, or a vertical depth of 350 feet to the fifth level, the deepest workings of the mine. The main workings served by this shaft are mined by the filling system, first inaugurated at the Crean Hill mine. This shaft also served for hoisting a considerable tonnage from the open cut. The main work at this shaft is on the third, fourth and fifth levels. On the third level there are two separate stopes, one 225 feet long and one 150 feet long. These stopes are 75 feet apart, but are along the strike of the ore body. The longer stope is, however, a part of the ore body that has been worked by open-cutting. On the fourth level similar stopes, but larger, have been opened up, and are being mined by the same method of back stoping and filling. The station at the fifth level has been cut, and the work of blocking out the ore bodies begun. An ore pocket has been built at the station at this level. The surface plant remains about the same. Owing to an accidental explosion, the thawing house for explosives at this mine was destroyed. A new thawing house has been erected, which embodies all the recognized safeguards for the prevention of accidents. Owing to the extreme cold of Northern Ontario winters it is necessary to have the heating pipes in the room in which the explosives are thawed. This may be a source of danger, but it seems impossible to avoid.

Mr. R. M. McAuley is superintendent, employing a force of 300 men.

Crean Hill

The main shaft at this mine has now reached the seventh level, a depth of 600 feet. Work is confined chiefly to the fifth and sixth levels, where the system of ore extraction is being followed described in former Reports. As the filling in these stopes is rock it is necessary to provide means for bringing part of this from the surface, where it is sorted from the ore. To accomplish this, raises were put through between the ore body and the shaft between the different levels. Three shifts of 8 hours each are worked at this mine, the men relieving each other at the working face.

Mr. T. Thoenen is superintendent, employing 150 men.

No, 2 Mine

This mine is the deepest operated by the Canadian Copper Company, the lowest level being at a vertical depth of 600 feet. Mining is being carried on, on the seventh and eighth levels. The ore body at this mine is chimney-like in form, being nearly vertical, and having a length of one and one-half times its width. The system of back stoping and filling adopted at the Creighton and Crean Hill mines is also used here. On the eighth level the section of the ore body is being cut. On the seventh the dry wall drifts have been completed, the ore has been broken down and the stope filled for 30 feet above the level.

Mr. J. Ovens is superintendent, employing a force of 100 men.

Frood Mine

At the Frood, or No. 3 mine, work was started again, no mining having been done since 1902. Several thousand feet of diamond drilling was accomplished during 1910 and 1911, and a large tonnage of ore blocked out. The new workings are situated west of the old shaft and open cut. Work was started on a 4-compartment shaft which has now reached a depth of 200 feet, where a station will be cut. A small plant has been used for this work, but it is proposed to instal a permanent plant during the present year. The company are also building a railway from Copper Cliff to the mine, which will be three miles in length. Mr. M. Pickard is superintendent, employing a force of 50 men.

Dill Quarry

The quartz quarry in the township of Dill has been operated continuously throughout the year, about 300 tons a day being shipped. The quartz is mined from an open pit about 225 feet long by 70 feet wide and 40 feet deep. This quartz is hoisted by means of derricks and dumped directly into railway cars, in which it is taken to Copper Cliff for use in the furnaces and converters.

The plant consists of two 125-h.p. boilers, a 6-drill compressor and hoists for each of the two derricks.

Quartz quarry at Dill, Canadian Copper Company.

Smelting Works

The blast furnace part of the works was in operation continuously throughout the year, and but little change was made in the plant. One of the changes made in the settlers was the introduction of an auxiliary tapping hole and spout, as a precaution against accidents. The most important change in the other parts of the plant was the introduction of basic converters and reverberatory furnaces. These are described fully by Mr. D. H. Browne in a paper entitled "Recent Improvements and Additions to the Smelting Plant of the Canadian Copper Company," read before the Canadian Mining Institute. Excerpts from this paper are here given.

These basic converters are 37 feet 2 inches long by 10 inches in diameter, outside measurement. They turn on four tread rings 12 feet in diameter. The stack or opening in the roof for the escape of gas is in the centre of the cylinder instead of at the end, as in the Garfield plant. There are 44 tuyeres, 1¼ inches in diameter and 7 inches apart. There are no tuyeres directly under the stack. The length inside the lining is 33 feet 3 inches. The bottom is 2 feet thick, the back or tuyere wall is 18 inches and the front 15 inches thick. The roof is a 12-inch arch. The brick directly around the tuyeres is 24 inches thick.

These converters have two openings or spouts in the front wall opposite to but above the tuyere line. The shell is turned down to pour slag and matte from these openings or turned back to blow by means of two wire ropes which surround the shell on either side of the central stack. These ropes are fastened to a hydraulic piston working in a horizontal cylinder, having a stroke of nine feet.

As the usual hydraulic equipment would not be suitable to the climate of Northern Ontario, oil is used instead of water, since oil remains fluid at low temperatures.

This is moved in the cylinders by air pressure. Two tanks are provided, one for regular use, one for emergency. These tanks are of $\frac{3}{4}$-inch steel, 4 feet in diameter by 15 feet high. Into these tanks a small amount of oil is pumped, and the space above the oil is filled with air at 75 lbs. pressure. An electrically driven pressure pump now forces more oil into the cylinders, compressing the air to 300 lbs. pressure. At this pressure the pump automatically stops. When it is desired to turn down the converter a valve is opened on the converter platform, allowing the oil to pass to one side or the other of the hydraulic cylinder, moving the piston and so by means of the rope tackle turning the converter as desired. In this operation the air in the tank above the oil expands and loses pressure. When the pressure in the tank falls to 200 lbs. the oil pump starts automatically pumping oil into the tank till the pressure rises to 300 lbs.

As the entire equipment of the plant is electrically driven it is manifest that if for any reason the power went off the line the converter blower would stop blowing air into the tuyeres. The matte would then run back through the tuyeres, as the mechanism for turning the converter down, being also electrically driven, would be useless. To avoid this a spare tank always contains oil under 300 lbs. pressure. This spare tank is connected to the hydraulic cylinder by a valve which is held closed by a solenoid brake. The fly wheel of the converter blower is of sufficient size to keep the engine turning over and delivering air for perhaps 15 to 20 seconds after the power goes off. The solenoid brake is actuated by the electric power, and the moment the power goes off the solenoid brake drops, opening the valve, and admitting oil to the proper side of the cylinder to turn the converter down.

It sometimes happens that a thunderstorm twenty-five miles from Copper Cliff will cut off the current on the power line. The safety device above described, being absolutely automatic and entirely separate from the regularly used turning device, has proved quite satisfactory.

The basic converter takes an initial charge of about 60 tons of furnace matte. About ten per cent. of quartz rock, previously dried, is dumped into the converter, and the blast is turned on. Blowing is done entirely by the clock. The charge is blown from one-half to three-quarters of an hour and is then turned down to skim slag. While the slag is being poured off, five or six tons of furnace matte is poured into the converter. After the slag is poured about three tons of quartz or siliceous ore and quartz are added and the shell is blown for another fixed time. The length of the blow, the amount of slag removed, the weight of matte added after each skim and the per cent. of flux required, are all factors of the grade of matte and have to be determined by experience.

The blowing and the addition of matte are kept up until there remains in the converter seventy or eighty tons of finished product. This may require from 300 to 400 tons of furnace matte and from 30 to 50 hours blowing time, depending on the matte grade. The finished matte is then cast into moulds, and the cycle of operations re-commences.

The basic converter has several advantages over the acid converter. The units are very much larger. This simplifies the problem of dealing with large quantities of matte. There is practically no material slopped out of the converter during the blow, and hence less furnace matte is required to produce a ton of bessemer matte. The slag made is lower in silica, which means economy of flux. The converter slag contains less copper-nickel than the acid converter slag; but since all the converter slag has to be re-treated, this of itself is not material. As a whole the operation of converting has been much simplified by the change.

In the year 1911 The Canadian Copper Company commenced the erection of two large reverberatory furnaces. The first of these was blown in at the end of December, 1911.

The furnaces built at Copper Cliff are 112 feet by 19 feet hearth area. The side walls are 27 inches thick. The roof is 20 inches for the first 35 feet near the coal burners and 15 inches thick for the rest of the way. The extreme height inside is 6 feet. The bottom is an inverted arch of magnesite brick, with a spring of 12 inches. The spring of the roof arch is 19 inches, one inch rise to the foot.

The foundation of these furnaces was made by building a trestle about 14 feet high, and pouring furnace slag from this, to build up within the outer walls a solid block of slag ten feet above the yard level. On this foundation the side walls of the reverberatory furnaces were built. Slag was poured inside these walls to form a hearth or furnace bottom about two feet thick. By this a solid mass of slag about 12 feet thick was formed under the furnace. Between the furnaces openings were formed by concrete retaining walls, so as to leave tunnels entering the slag foundation at the yard level and at either side of each furnace. Through these tunnels the melted converter slag is brought to the reverberatory and matte is taken back.

The hearth of the furnace is formed by levelling up the poured slag bottom with concrete so as to provide an inverted arch of the same curve as the magnesite brick lining. On this form one layer of fire brick was laid flat, 2½ inches thick. Over this 9 inch magnesite brick was laid. This brick hearth was laid in a mixture of ground magnesite and linseed oil. Expansion strips of wood were placed between every six courses. The expansion allowed is ¼-inch to the foot.

The side wall is of silica brick 18 inches thick. On this the roof rests. Inside this wall a flash wall of magnesite 9 inches thick is built. This does not support, but is brought close up to the roof. The tap hole is so placed as to retain 12 inches of matte in the hearth, so that the bottom is always protected by a pool of matte.

Slag is removed, not at the front of the furnace as is usually the case, but at either side of the furnace, where the side walls commence to narrow in, about 11 feet from the front of the furnace. The space at the front usually occupied by the slag door slopes up gradually from the hearth to form a straight outlet for the products of combustion. The area of the throat is about 27 square feet. The gases meet no obstacles whatever, but pass straight into a cross flue 6 feet by 9 feet, which is covered by cramps. This flue is 70 feet long, and leads to the main or dust chamber flue. The main flue is 15 feet by 19 feet by 177 feet, and connects with the stack. The stack is 17 feet 2 inches diameter at the bottom, 15 feet 4 inches diameter at the top, and 200 feet high.

At the fire end of the furnace two sets of charging bins are provided. These are used to drop flue dust, ore fines and other pulverized material into the furnaces. Each bin has five hoppers, discharging by slide gates through the roof.

The most interesting part about the reverberatory is the method of firing. Coal is dropped from the trestle into storage bins. Out of these bins it passes through a coal cracker on to a conveyor belt. This coal ½ inch in size, and under, is carried by this conveyor belt to the coal grinding room and dropped into a bin. From this bin it is fed by a screw conveyor to a Ruggles Coles dryer. The dry coal is elevated into bins, from which it drops into two Raymond impact pulverizers. This grinds the coal to the finest powder, most of it passing a 200 mesh screen. This pulverized coal is sucked up by a fan into a separator on top of this building, and passed by screw conveyors into the reverberatory building, and dropped into bins at the end of the furnaces. From these bins it is taken by five variable speed screw conveyors 4 inches in diameter. These deliver the coal into five burners, dropping it in front of nozzles which carry air from a fan. The air blast sends the coal into the furnace in the form of a cloud or spray of dust, which burns just like fuel oil. Each burner can be run independently, and the amount of coal or air can be varied at will.

The slag from the converter building is brought to the reverberatory furnace in ten-ton pots by a locomotive, which enters the tunnels between the furnaces. Through openings in the roofs of these tunnels the reverberatory cranes pick up the slag pots, and pour the slag through an opening in the roof into the furnace. The slag skull being left in the pot, the pot is set back on its truck in the tunnel, and reverberatory matte is tapped into it. This reverberatory matte is taken back by the locomotive to the converter building and charged into the basic converters.

Cobalt Silver Refining Plant

The Copper Cliff plant treated about 300 tons of cobalt silver ore per month during the year, largely high-grade. There has been but little change in the process. Refined silver, arsenic and cobalt-nickel hydrates are shipped.

The freight rate from Cobalt to Copper Cliff on ore having a value of:

1. Under $50.00 per ton, is $4.00 per ton.
2. $50.00 and under $100.00 per ton, is $5.20 per ton.
3. $100.00 and under $500.00 per ton, is $6.00 per ton.
4. $500.00 and over per ton, is $7.00 per ton.

The schedule of payment by the company for the ores f.o.b. Copper Cliff is as follows:

84	per cent. of silver	per ton of	ore when same assays	200 to 500	oz. silver,
85	"	"	"	500 to 600	"
87	"	"	"	600 to 800	"
90	"	"	"	800 to 1,000	"

92	per cent. of silver	per ton	of ore	when same assays	1,000 to 1,300 oz. silver.
93	"	"	"	"	1,300 to 1,600 "
93½	"	"	"	"	1,600 to 2,000 "
94½	"	"	"	"	2,000 to 2,500 "
95	"	"	"	"	2,500 to 3,000 "
95½	"	"	"	"	3,000 to 4,000 "
96	"	"	"	"	4,000 to 5,000 "
96½	"	"	"	"	5,000 and over.

Payment is made for 70 per cent. of the net proceeds according to the New York official quotation 30 days after sampling, and the balance in 60 days according to the same official quotation on that date.

Mond Nickel Company

This company shipped ore during the year from their Victoria and Garson mines to the smelter at Victoria Mines.

Development work was begun on the Frood Extension, a property adjoining the Frood mine of the Canadian Copper Company. Good progress has been made in the erection of the company's new smelter at Coniston, near Rumford Junction, 7 miles east of Sudbury. The railway tracks for use around the plant have been completed, as also the foundations for the main buildings of the plant.

The officers of the company are Mr. C. V. Corless, manager, and Mr. O. Hall, mine superintendent.

Victoria Mines

The main shaft at the mine has been sunk 200 feet since last Report and is now 1,560 feet in depth, by far the deepest workings in the Province. Work was carried on during the year on the fifth, eighth, ninth, tenth, eleventh, twelfth and thirteenth levels. On the fifth level an exploratory drift has been run east about 800 feet to an ore body that had been worked to a depth of 200 feet. The chief workings consist of two ore bodies 150 to 200 feet apart, dipping to the east. At the twelfth level the west body is 330 feet from the shaft and the east 630 feet. On account of the distance of the ore bodies from the shaft, levels are now run at intervals of 200 feet and the ore is stoped out in 100-foot sections. Stoping is being done on all the levels from the eighth to the twelfth.

Garson Mine

This mine now produces the bulk of the tonnage treated by the company. Work is being carried on on the first, second, third, fourth and sixth levels, and stoping done on all these levels. The ore bodies are irregular in outline and dip to the east, so that the workings extend over an area of 720 feet by 840 feet. As some of the stopes are narrow and others wide, no uniform system of stoping has been adopted. Some of the stopes are mined by back-stoping and filling; others by underhand stoping. A body of quartz was discovered underground and is being mined and shipped to the smelter. All the ore is at present hoisted in single-deck cages. Preparations are now under way for the introduction of skips having a capacity of four to five tons. This will necessitate a change in the head-frame and ore-sorting house.

An additional compressor has recently been installed. The power plant now consists of two Rand and one Sullivan 14-drill compressors, electrically driven. A transmission line from Victoria Mines to Garson is being erected.

Mr. A. Sharp is mine superintendent, employing 300 men.

Frood Extension Mine

The Mond Nickel Company purchased and began work on the property adjoining the Frood mine of the Canadian Copper Company. The ore body was first located by diamond drill. A 4-compartment shaft is at present being sunk and has now reached a depth of 150 feet. It is proposed to sink this shaft to a depth of 1,000 feet before any other work is done.

A power plant has been erected, consisting of two 100-h.p. boilers, 8-drill compressor, and double drum hoist.

Smelter

Operations were carried on at the smelter at Victoria Mines in a manner similar to former years, and no important changes were made. This smelter will be abandoned as soon as the new one at Coniston, near Rumford Junction, is completed.

Dominion Nickel Copper Company

This company have continued development work throughout the year. A main adit was driven from a point near the rock house into the hill, a distance of 440 feet. Drifts and cross-cuts were run from the adit, in all a distance of 1,200 feet. A 50-foot raise was driven from the end of the adit.

The surface plant remains the same. Electric power is obtained from the Wahnapitae Power Company.

Gold

Long Lake

Owing to lack of power the Canadian Exploration Company, owners of the Long Lake gold mine, did not carry on very extensive operations during the year. The mill, however, was enlarged by the addition of 10-stamps, and changes made in connection with the cyanide treatment of the ore.

The main shaft has been sunk to the 180-foot level and 60 feet of drifting done on this level.

A transmission line has been erected from the mine to the Wahnapitae Power Company's plant on the Wahnapitae river.

Mr. R. W. Brigstocke is manager and Geo. E. Cole, superintendent.

Iron

Moose Mountain

Owing to the decrease in the demand for iron ore, shipments from this mine ceased early in the spring of 1911, and no ore has since been shipped. As a result, no work was done in the mine, except development work. Work was, however, begun on a large concentrating plant for handling the low-grade iron ore. The Gröndal process for the magnetic concentration of the ore is to be used. It is expected that the plant will be ready for operation in June of this year.

Michipicoten Area

The only work of any magnitude done in this area during 1911 was by the Lake Superior Power Company in the development of their iron properties. The Algoma Central Railway Company have practically completed their line from Sault Ste. Marie to the main line of the Canadian Pacific at Hobon, with branches to the Helen and Magpie mines.

Helen Iron Mine

The production of hematite from this mine was in excess of the previous year, and, in addition, development work has been carried far enough ahead to assure steady shipments during the present season of navigation. No. 2 shaft has been sunk to the ninth level, 650 feet from the surface. The levels are run approximately 70 feet apart. The greater part of the production during 1911 came from the sixth and seventh levels. No. 2 shaft is a 2-compartment one to the sixth level, and a 4-compartment from the sixth to the bottom. A new method of mining has been adopted on the seventh level. This method follows somewhat the caving system used at some of the iron mines in Michigan. The main drift is driven to the extreme limit of the ore body. Sub-levels are then run at intervals of about 20 feet. These are blocked out by drifts into rectangles 20 feet by 40 feet or smaller. Raises are carried up at intervals of 20 to 30 feet, and ore is drawn therefrom. Above the seventh level, three of these sub-levels have been begun, and will be carried forward to block out ore for the summer shipments. The ore taken from development work during the winter has been stockpiled. On the eighth level, the station has been cut, and the main drift driven 350 feet, and No. 2 drift 150 feet. On the ninth level, the station has been cut. A system of washing the ore was installed during the year to reduce the sulphur content. Exploratory work has been carried on under Boyer lake from the fifth level of the mine.

Mr. R. W. Seelye is manager and Mr. A. Hasselbring general superintendent for the company in the Michipicoten area. Mr. A. A. Mackay is mine superintendent, employing 250 men.

Magpie Mine

The railway branch to the Magpie was completed in July, 1911, and development work at the mine and the erection of plant were thus facilitated. The main shaft has been sunk to a depth of 205 feet, with levels at 125 feet and 205 feet. On the 125-foot level, a cross-cut, 125 feet in length, has been driven from the shaft to the vein and across it. Drifts have been run on the vein southeast 400 feet and northwest 450 feet, and cross-cuts driven about every 100 feet across the vein. A raise has been put through to the surface from the southeast drift 300 feet from the shaft. On the 205-foot level, a cross-cut has been driven to the vein and drifting started.

The erection of a roasting furnace for the ore is in progress, and it is expected that one unit will be completed during the summer. An electrically driven compressor and hoist will be installed, and a steel head-frame erected. Cottages, sleeping and dining-rooms for the men, and a hospital have been built.

Blast Furnace, Sault Ste Marie

The Algoma Steel Company have in blast three furnaces, having a total output of about 800 tons of pig iron for 24 hours. The No. 3 furnace was blown in during 1911. Nos. 1 and 2 furnaces are smaller than No. 3, and are less modern in type. The total production of Helen mine ore is used in these furnaces, together with American ore. Coke is produced at the company's coke ovens, situated near the blast furnaces. The power plants for the production of power for the blast furnaces, open-hearth furnaces, rail mill and merchant mill, are all operated by blast-furnace gas. The new power plant consists of eight gas engines, four of which are directly connected with blowing engines, and four with generators, developing 1,500 kilowatts each. There are also a number of motor-generator sets for transforming the alternating current into direct current for use on the trolley lines, etc. A gas washing-house has been erected.

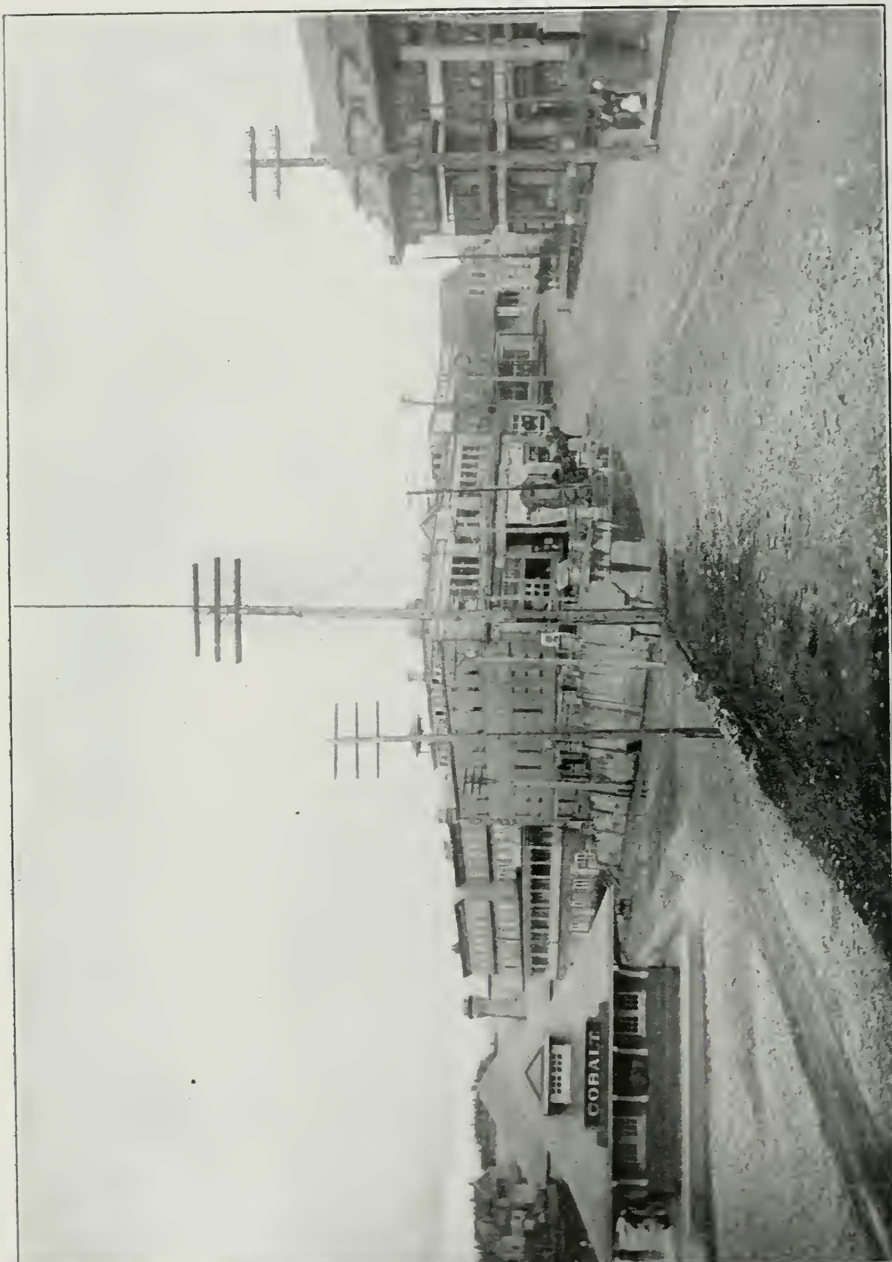
III.—TEMISKAMING

Cobalt and Vicinity

Cobalt's production of silver in 1911 again exceeded that of any previous year, the total yield being 31,507,880 ounces, compared with 30,651,417 ounces in 1910. The production came largely from the same mines as in 1910. A number of the small producing mines and prospects were not in operation during the year, but the increased price in silver for 1912 has stimulated a number of these to resume work. About the same number of men were employed during 1911, as in the preceding year, and the rate of wages remained the same.

Power

The power situation was satisfactory, with the exception of the months of February, March and April, 1911, when, owing to low water in the rivers, the power plants were unable to furnish the required amount of power. As a result, those mines with steam plants put them in commission, and the other mines operated at a reduced capacity. The shortage reduced the production of ore for those months, and consequently the year's



Central square, Cobalt.

output. Two companies now furnish the electric and air power to the mines of the camp. These are the British Canadian Power Company, with power plant on the Metabitchewan river, and the Northern Ontario Light and Power Company, with plants on the Montreal river at Hound and Ragged chutes. The latter company is a consolidation of the Cobalt Power Company and the Cobalt Hydraulic Power Company.

Concentration

Cobalt now has the largest concentrating mill, not only in Ontario, but in Canada, and also the largest number of mills in any single mining area in the Dominion. New mills were erected during 1911, and old ones enlarged. The following table gives a list of the mills, and the normal capacity of same, that have been erected in the Cobalt camp:—

Mill.	Capacity per day.	No. of stamps.	Remarks.
1. Beaver	60 tons.	Crushing by rolls.	
2. Buffalo	145 "	"	
3. Cobalt Central	75 "	"	Idle in 1911.
4. Cobalt Lake	65 "	20	
5. Colonial	25 "	10	
6. Coniagas	180 "	60	
7. Hudson Bay	60 "	20	
8. King Edward	30 "	10	Leased to City of Cobalt Mining Co
9. McKinley-Darragh-Savage.	150 "	30	
10. Nipissing	200 "	40	Not in operation in 1911.
11. Nipissing Reduction	50 "	Crushing by rolls.	Custom mill.
*12. Northern Customs	280 "	114	"
13. Nova Scotia	120 "	40	"
14. O'Brien	100 "	30	
15. Silver Cliff	75 "	Crushing by rolls.	
16. Temiskaming	115 "	40	
17. Trethewey	100 "	30	
	1,830	444 stamps.	

*Had capacity of 180 tons per day in 1911 with 74 stamps in operation. The additional stamps were put in in 1912.

Of the above mills, the Buffalo, Nipissing, Nova Scotia, and O'Brien use cyanidation, in conjunction with concentration. The Nipissing had a small mill in operation during 1911, treating high-grade ore. The Butters process is adopted in this mill, and consists of amalgamation and cyanidation.

In addition to these mills, the Cobalt Provincial, Crown Reserve, Kerr Lake, La Rose, and Savage mines have small plants for coarse concentration. These plants consist of picking belts, or tables, and jigs.

Smelting

Ontario smelters treated about 60 per cent. of the total number of ounces shipped from the Cobalt camp during 1911. These smelters are as follows:—

1. Canada Refining & Smelting Company, Orillia.
2. Canadian Copper Company, Copper Cliff.
3. Coniagas Reduction Company, Thorold.
4. Deloro Mining & Reduction Company, Deloro.

The foreign companies buying cobalt-silver ores were:—

1. American Smelting & Refining Company, New York.
2. Balbach Smelting & Refining Company, Newark, N.J.
3. Pennsylvania Smelting Company, Pittsburg, Pa.
4. United States Metals Refining Company, New York.
5. Beer, Sondheimer & Company, Frankfort-on-Main, Germany.
6. Government of Saxony, Saxony, Germany.

The freight rates and schedules of prices paid for ores by the smelters in Ontario are given on other pages of this Report.

Accidents

During 1911, there were nine fatal accidents in the Cobalt camp, causing the death of nine men. This shows a marked decrease, compared with 1910, when 20 men lost their lives while working in or about the Cobalt mines.

There were three men killed in the Gowganda area in 1911, and none in the Montreal river or South Lorrain areas. In these areas, in 1910, there were four men killed.

On June 1st, 1911, Mr. T. F. Sutherland was appointed Assistant Inspector of Mines. Mr. Sutherland's headquarters are at Cobalt, and he inspects the mines, not only of the Cobalt camp, but the outlying silver camps, and Porcupine. He also makes trips of inspection to mines in other parts of the Province, when necessary.

Other Silver Camps

Considerable work was done during the year at South Lorrain, Montreal River and Gowganda.

In South Lorrain, the principal shipper was the Wettlaufer mine, while a shipment was made from both the Keeley and the Bellellen. A 10-stamp mill has been erected at the Wettlauffer mine. On a number of other properties, development work was carried on throughout the year.

Since the Government has announced that a branch line will be built from the T. & N.O. railway at Charlton to Elk lake during 1912, there has been a revival of mining activity along the Montreal river. During 1911, there was a small shipment of ore from the Hitchcock property, but very little development work was done in the area.

In the Gowganda area, the Millerett and the Miller Lake:—O'Brien have shipped steadily, and a ton of ore was sent out from the Powerful mine. A 10-stamp mill was built and put in operation at the Millerett. The building of the Elk Lake branch will also assist this area.

Following is a brief description of the mines and more important prospects of Cobalt, South Lorrain, Montreal river and Gowganda that were in operation during 1911:—

Cobalt Silver Mines

Badger

Work during the year was confined chiefly to the Nos. 4 and 5 shafts. From the drift on the 75-foot level, 120 feet south-west of the shaft, a winze was sunk a depth of 100 feet, and 320 feet of drifting done at this level. The No. 5 shaft has been sunk to a depth of 344 feet, and at this depth a drift was run south-west 300 feet and a cross-cut driven from the end of this drift south, 140 feet to the south boundary of the property.

Bailey

The Bailey Cobalt Mines, Limited, have been working on the south-west quarter of the north half of lot 4 in the fourth concession of Coleman. Most of the work during the year has been done on the fourth level, which is at a depth of 232 feet. From the shaft, a drift has been run west 315 feet, where a cross-cut driven from a raise from this drift connects with a winze from the Cobalt Central workings.

A cross-cut has been driven from the main drift south-west 315 feet. This cross-cut intersects No. 4 vein, on which a drift has been run north-west 135 feet and south-east 90 feet. Three raises have been started on this vein.

The plant consists of a motor-driven compressor, hoist, and a 25-h.p. boiler for heating purposes, electric power being obtained from one of the local power companies.

Mr. Floyd Weed is manager.

Beaver

The Beaver mine situated on the north half of the north-west quarter of the north half of lot 1 in the third concession of Coleman is owned and operated by the Beaver Consolidated Mines, Limited, with an authorized capital of $2,000,000, the shares having a par value of $1.00. Mr. Frank L. Culver is president and general manager, Mr. H. E. Tremain, secretary-treasurer, and Mr. A. J. Hewitt, mine superintendent.

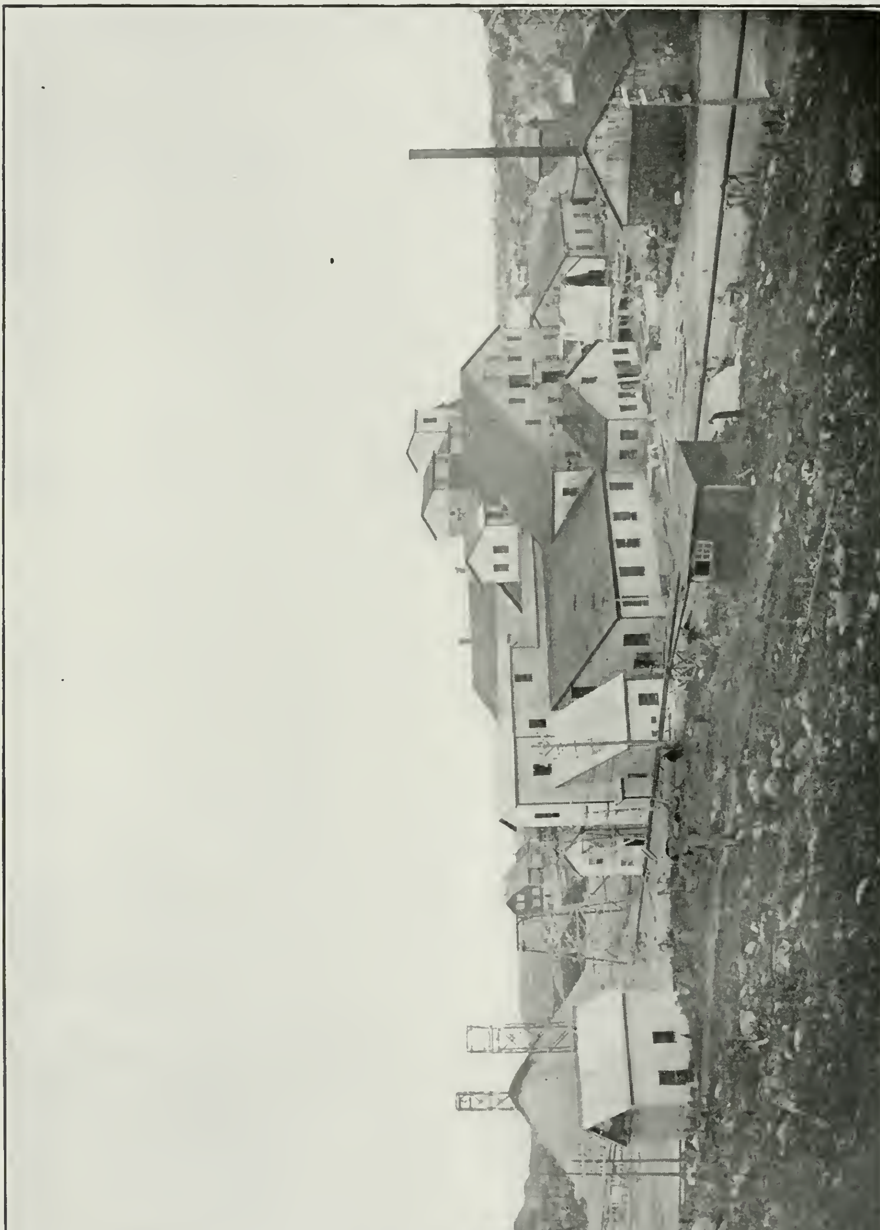
The plant consists of two 80-h.p. boilers, 12-drill compressor, hoist and concentrating mill. The mill was erected in 1911 and 1912, and has a capacity of about 60 tons per day. The crushing is done by crushers, rolls and pebble mills, and the method of concentration follows closely the practice adopted in the other mills of the camp. Electric power for driving the mill machinery and compressed air for the mine is obtained from one of the local power companies.

The main shaft has been sunk to a depth of 548 feet, with levels as follows: First level at 75 feet, second level at 200 feet, third at 250 feet, fourth at 300 feet, fifth at 350 feet, sixth at 400 feet, seventh at 460 feet, eighth at 530 feet. The same plan of development work has been followed from the second to the sixth levels. As the main shaft is near the southern line of the property, practically all the underground work is to the north of it. The drifts on the vein on the various levels are started from the main cross-cut about 75 feet east of the shaft, and run in a northerly direction for a distance of 450 feet. Stopes have been opened up on the several levels, and the levels connected by means of a winze, 210 feet north of the shaft. On the seventh level, the main drift north has been run 200 feet, and on the eighth level, the shaft station has been cut. The manager reports that 175 feet of sinking, 390 feet of raising, 807 feet of cross-cutting, 2,142 feet of drifting, and 4,214 cubic yards of stoping were done during the year.

Buffalo

This mine, situated on the townsite of Cobalt, is owned and operated by the Buffalo Mines, Limited, which has an authorized capital of $1,000,000, the shares having a par value of $1.00. Mr. Chas. L. Denison, of New York, is president, Mr. Geo. C. Miller, secretary-treasurer, and Mr. Tom R. Jones, mine superintendent. The company paid $1,377,000 in dividends to December 31st, 1911.

The plant consists of a 500-h.p. boiler, a 12-drill compressor, hoists at Nos. 4, 6, and 12 shafts, a concentrator having a daily capacity of 145 tons, and a cyanide plant. Compressed air and electric power are obtained from the Northern Ontario Light and Power Company. The ore bodies opened up are confined to two main systems of veins, about 550 feet apart, each having an easterly and westerly strike. On the northerly system, No. 5 and No. 6 shafts have been sunk to the second level, and the vein opened up on both levels from the easterly boundary of the property west to No. 6 shaft, a distance of 560 feet. The southerly vein series has been opened up on four levels at depths of 80 feet, 150 feet, 225 feet and 300 feet. A cross-cut has been driven from No. 4 shaft to No. 6 shaft on the first and third levels, and all ore from the southerly veins trammed to No. 6 shaft, where it is hoisted to the mill. The southerly vein system has been opened up on the first three levels for a length of about 700 feet. The No. 12 shaft is sunk to the fourth level, and the vein on the level developed for 300 feet. Ore has been blocked out in all these stopes and partially broken down. The total underground work done at the mine to April 30th, 1912, is 1,019 feet of sinking, 10,185 feet of drifting, and 47,215 cubic yards of stoping.



Concentrating mill, Buffalo silver mine, Cobalt.

The same system of concentration is in vogue in the mill as has been outlined in former reports. Some additions have been made to the mill by putting in a Dorr thickener and additional slime tables. The cyanide plant is fully equipped with agitating tanks and precipitating boxes, and the tailings from the slime tables are re-treated here. From 45 tons of mill rock, about one ton of concentrates is obtained.

Casey Cobalt

This property, situated on the southeast quarter of the south half of lot 5, in the first concession of Casey, about 10 miles northeast of the town of New Liskeard, is controlled by the Casey Cobalt Silver Mining Company, Limited, with an authorized capital of $100,000.

The power plant consists of two 40-h.p. boilers, a straight line compressor and hoist. A larger power plant is now being installed.

The shaft has been sunk on the vein, which dips to the southeast at an angle of 70 degrees, to the depth of 260 feet, with levels at 33 feet, 100 feet, 160 feet, 210 feet and 260 feet. Work done during the year was confined mainly to the 210-foot and 260-foot levels. On the 210-foot level, drifts were run northeast 60 feet, and southwest 100 feet. Just north of the shaft is a cross-cut 190 feet in length, and from the drift southeast of the shaft a cross-cut west 140 feet, where a new vein was encountered. On this vein 185 feet of drifting has been done, and a new shaft started. On the 260-foot level, a cross-cut was driven west 100 feet, and 225 feet of drifting done on the vein. A raise was also put through to the 210-foot level. Several car-loads of low-grade ore were shipped to the Northern Customs Concentrator at Cobalt for treatment.

Chambers-Ferland

This property, situated to the north and west of the town of Cobalt, comprises 124 acres, practically surrounding the La Rose and La Rose Extension, and is owned and operated by the Chambers-Ferland Mining Company, Limited, with an authorized capital of $2,500,000, the shares having a par value of $1.00. Mr. A. Ferland is president, Mr. Alex. Fasken, Toronto, secretary-treasurer, and Mr. B. W. Yorick, manager.

Mining work during the year has been confined to No. 1 shaft, which was sunk on the continuation of No. 10 vein of the La Rose. The shaft is 160 feet deep, with levels at 42 feet, 93 feet and 150 feet. The length of the vein lying between the La Rose and O'Brien mines is 180 feet. Some work has been done on two other veins encountered underground.

City of Cobalt

This property consists of about 40 acres of the townsite of Cobalt, of which the City of Cobalt Mining Company, Limited, have a 99-year lease from the Temiskaming and Northern Ontario Railway Commission, and pay 25 per cent. royalty to the latter. Mr. R. T. Shillington is president, and Mr. J. A. McVichie mine superintendent. The authorized capital is $1,500,000, with shares of a par value of $1.00. The company have paid $139,312.42 in dividends.

The main shaft is 340 feet in depth, with levels at 65 feet, 137 feet, 200 feet, 265 feet and 330 feet. The work during the year has been confined to the lower levels, where a number of exploratory drifts and cross-cuts have been run. One drift on the 200-foot level has been run northerly to the Coniagas boundary, a distance of 500 feet. On the 265-foot level about 1,800 feet of drifting and cross-cutting has been done, and on the 330-foot level 700 feet.

The company have leased the King Edward mill and are treating their low-grade ore there.

Cobalt Lake

The bed of Cobalt lake and 33 feet of the road allowance on the east shore of the lake were purchased from the Ontario Government in December, 1906, and the Cobalt Lake Mining Company, incorporated, with an authorized capital of $5,000,000,000, with shares of a par value of $1.00, to take over and operate the property. Sir Henry Pellatt is president, and Mr. M. B. R. Gordon manager.

Mining work was carried on during the year through No. 4 and No. 6 shafts. From the 154-foot level of No. 4 shaft a drift was started to connect with a drift from the No. 6 shaft, in order to provide an auxiliary exit to both workings. Owing to loose ground encountered it was decided to abandon this drift and sink the shaft to another level. The work of sinking this shaft is now in progress.

No. 6 shaft at the south end of the lake is 143 feet deep. A drift was run west along the McKinley-Darragh's north boundary about 450 feet, where an incline winze was sunk to a depth of 110 feet. From this level a drift is being run north to No. 4 shaft to provide an auxiliary exit. Another drift has been run northwest to the Station Grounds property. Drifting has been done on the veins encountered, and stopes carried up on the veins between the fourth and second levels. A winze has been sunk from the fourth level a depth of 50 feet.

A 20-stamp mill was erected during the year near the No. 6 shaft. The ore is dumped from the bucket into a skip at the shaft mouth and hauled to the top of the mill, where it passes over a bumping table, and after being hand-sorted it goes to crushers and over trommels. The trommels separate it into three sizes, which are jigged. The tailings from the jigs are recrushed in the 20-stamp mill and the product classified. The sands are concentrated on Deister sand tables and the middlings from the tables re-ground in a tube mill. The product from the tube mill is again classified and the sands treated on Deister sand tables, and the slimes on vanners and slime tables.

Both electric and air power for mine and mill are obtained from one of the power companies.

Cobalt Provincial

The Cobalt Provincial Mining Company carried on their underground work during the year from No. 2 shaft. This shaft has been sunk a deptn of 300 feet, with levels at 100 feet, 175 feet, 215 feet, and 300 feet. On the first level 150 feet of drifting was done, on the second level 280 feet, and a cross-cut driven south 300 feet, and northwest towards No. 1 shaft 600 feet. On the third level a drift was run 180 feet east and west of the shaft, and on the fourth level 150 feet of drifting and cross-cutting done. Stopes have been opened up on the vein on the different levels.

An ore-sorting plant has been erected, containing picking table, jigs, and Wilfley table.

Cobalt Station Grounds

The Cobalt Station Grounds Mining Company, Limited, are operating under lease from the Temiskaming and Northern Ontario Railway Commission two parcels of ground on the townsite of Cobalt. One parcel is the mining rights extending under the right of way from just south of the Right of Way Mining Company's shaft at the north to near the McKinley-Darragh mine on the south, including the station grounds. The other parcel consists of two town lots, Nos. 388 and 389. Mr. T. A. Beament, of Ottawa, is president of the company, which has an authorized capital of 500,000 shares, of a par value of $1.00.

Very little work was done during the year. The shaft south of the station is 150 feet deep. Some drifting was done under contract by the Cobalt Lake Mining Company from their fourth level, No. 6 shaft.

Cobalt Townsite

This property is operated by the Cobalt Townsite Mining Company, Limited, with an authorized capital of $100,000, which holds a 99-year lease from the Temiskaming & Northern Ontario Railway Commission of the south 38 acres of the townsite of Cobalt. Mr. W. R. P. Parker, of Toronto, is president, and Mr. A. C. Bailey, superintendent.

The Colonial silver mine, Cobalt.

The work done during the year was confined mainly to the northern part of the property, where No. 1 shaft has been sunk a depth of 200 feet, with levels at 100 feet and 200 feet. Connection has been made on the 100-foot level with No. 2 shaft 525 feet west of No. 1. From No. 2 shaft drifts have been run south 180 feet and west 200 feet. From No. 1 shaft a main drift has been run southwest 400 feet, from which a number of other drifts and cross-cuts have been run. Raises have been put through to the surface at a number of places on the veins. On the second level drifts and cross-cuts have been driven, conforming with the development work on the first level. Some work has also been done on a vein near the south end of the lot. This work is being done from the Right of Way workings.

An ore-sorting house has been erected, and a contract made with the Northern Customs Concentrator Limited, for handling the low-grade ore. Over 12,000 tons were treated at the concentrator during 1911.

Colonial

This property is situated on the southwest quarter of the south half of lot 3 in the sixth concession of Coleman, and is operated by the Colonial Mining Company, Limited, which have an authorized capital of 100,000 shares, of a par value of $1.00. The Colonial Silver Mines, Limited, incorporated under the laws of the State of Maine, own 99,995 shares of the Colonial Mining Company. This company have an authorized capital of 1,200,000 shares, each share having a par value of $5.00. Mr. C. B. Kingsley is mine manager.

Most of the mining work has been carried on from the adit, about 100 feet from the mill. At 240 feet from the mouth of the adit a drift has been run east, and from this drift a winze sunk 140 feet. This winze is used as the main hoisting shaft, and most of the work was done during the year on the 140-foot level of the winze. On this level a drift was run west 300 feet and east 350 feet. A cross-cut was driven south from near the shaft 325 feet, and another cross-cut driven from the easterly end of the drift northwest 300 feet and southeast 125 feet. A winze was also sunk from near this easterly end of the drift a depth of 70 feet and 200 feet of drifting done at the lower level.

The 10-stamp mill has a capacity of 25 tons per day, and the general system of water concentration used throughout the camp is followed.

Coniagas

This property consists of 40 acres situated on the townsite of Cobalt, and is owned by the Coniagas Mines, Limited, which have an authorized capital of $4,000,000, with shares having a par value of $5.00. Mr. R. W. Leonard is president and general manager, and Mr. R. P. Rogers mine manager.

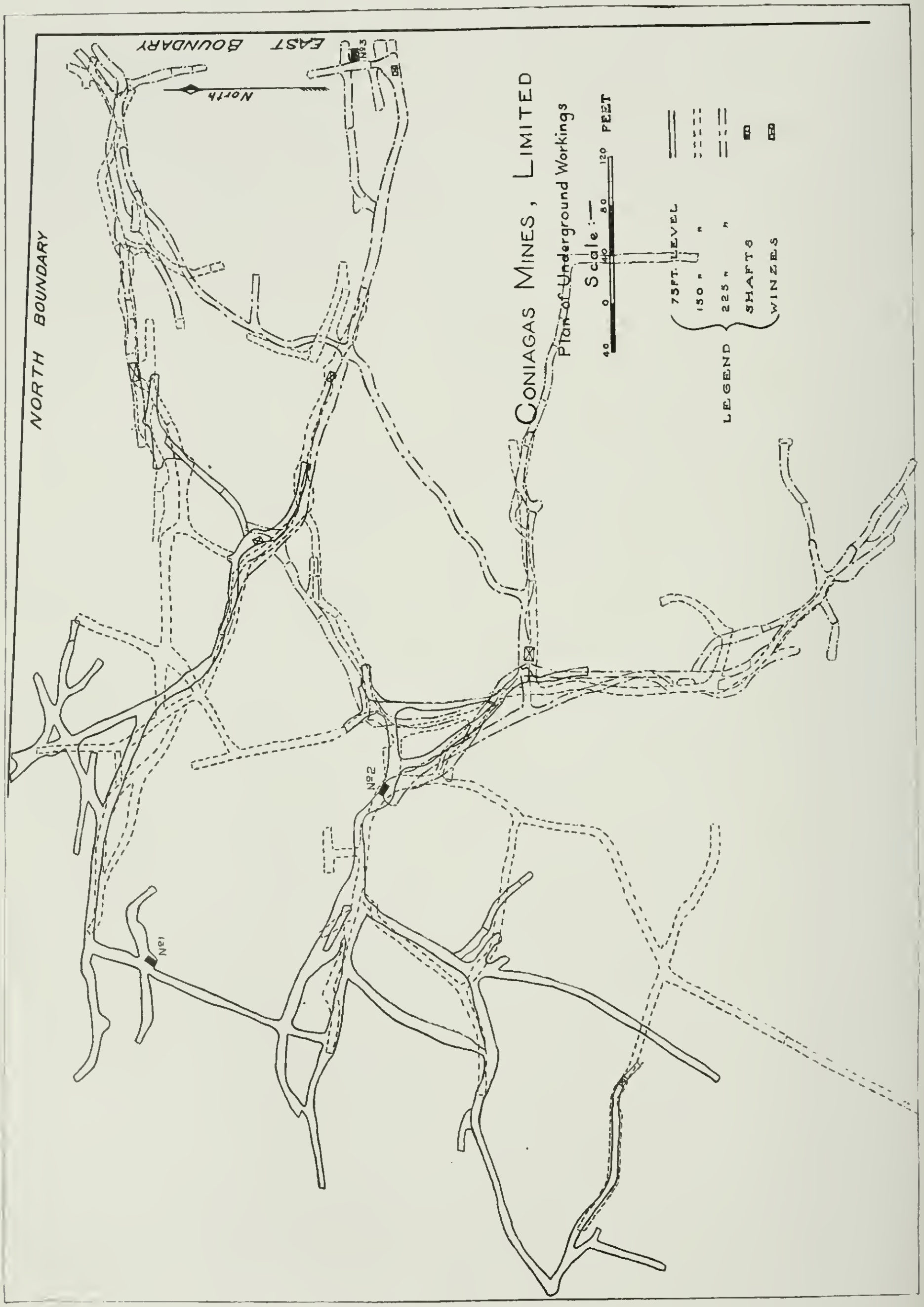
Development work was carried on during the year from the No. 2 shaft, which is 225 feet in depth, with levels at 75 feet, 150 feet and 225 feet. Most of the work done was on the second and third levels, where drifts have been run on the veins and the ore blocked out. Most of the veins strike east and west, though there are others branching from these main veins. One of the main veins is southeast by northwest, and a drift has been run on this to a point 400 feet south of the main shaft. No underground work has as yet been done on the southerly portion of the lot. The manager reports that during 1911 the underground work done consisted of 71 feet of sinking, 3,335 feet of drifting, 811 feet of cross-cutting, 20 feet of winzes, 184 feet of raises, and 40,304 tons of ore stoped.

The accompanying plan shows the underground development work to December 31st, 1911.

An average of 180 tons per day is now being treated in the 60-stamp concentrating mill, which is the second largest mill in the camp. The system of concentration is as formerly described.

Mr. F. D. Reid is mill superintendent.

Coniagas silver mine Cobalt.


CONIAGAS MINES, LIMITED
Plan of Underground Workings
Scale:—
40 0 40 80 120 FEET
LEGEND
75FT. LEVEL
150 " "
225 " "
SHAFTS
WINZES
NORTH BOUNDARY
EAST BOUNDARY
North
No 1
No 2
No 3

Crown Reserve

The bed of Kerr lake, with the exception of mining claims J.B. 9, 10 and 11, in all 23 acres, was acquired by the Crown Reserve Mining Company, Limited, from the Ontario Government in December, 1906. The Company have an authorized capital of 2,000,000 shares of $1.00 par value each. Col. John Carson, of Montreal, is president, Mr. James Cooper, secretary-treasurer, and Mr. S. W. Cohen, general manager.

The company produced to December 31st, 1911, 12,512,377 ounces of silver, and paid in dividends $3,714,509.40.

The general manager's report shows that 548 feet of sinking and raising, 2,642 feet of drifting, 1,600 feet of cross-cutting, and 215,746 cubic feet of stoping, have been done during the year. The main shaft is now a depth of 300 feet, with levels every 100 feet. A winze has been sunk on the Carson vein from the third level to a depth of 220 feet, with a level run at a depth of 150 feet, where 125 feet of drifting has been done.

A large part of the ore has been produced from the Carson vein which has been opened up for its full length of 285 feet on both the first and second levels and also for some distance on the third level. The following veins have also been producers: Nos. 2, 8, 9, 14, 17, 17a, 23, 24, 28 and 29. The ground has been explored by cross-cuts driven north and east on both the first and second levels. The east drift on the second level is 965 feet in length and was driven along the north boundary of the Kerr lake line.

The ore is roughly sorted underground, hoisted separately, and delivered into separate bins. The low-grade is then crushed, sized and treated in two Richards pulsating jigs. The fine material is reground by rolls and treated on a Wilfley table.

During the year the company contracted with the Nova Scotia Mining Company to treat their milling ore at the rate of 75 tons per day. An aerial tramway was constructed from the Crown Reserve to the Nova Scotia.

A drift is being driven from the 450-foot level of the Silver Leaf shaft north of the lake to connect with the winze sunk below the 300-foot level.

Drummond

This mine comprises the northwest quarter of the north half of lot 2 in the fourth concession and the southwest quarter of the south half of lot 2 in the third concession of Coleman, and is owned by the Drummond Mines, Limited. The stock of this company is privately owned and no annual report of earnings is published. Mr. R. W. Brigstocke is mine manager.

Mining work was carried on during 1911 from Nos. 1 and 5 shafts. At No. 1 shaft 155 feet of drifting, 160 feet of cross-cutting and 30 feet of raising was done. The principal work was from No. 5 shaft near the southern boundary of the south lot. Here, 1,150 feet of drifting, 235 feet of cross-cutting and 45 feet of raising was accomplished.

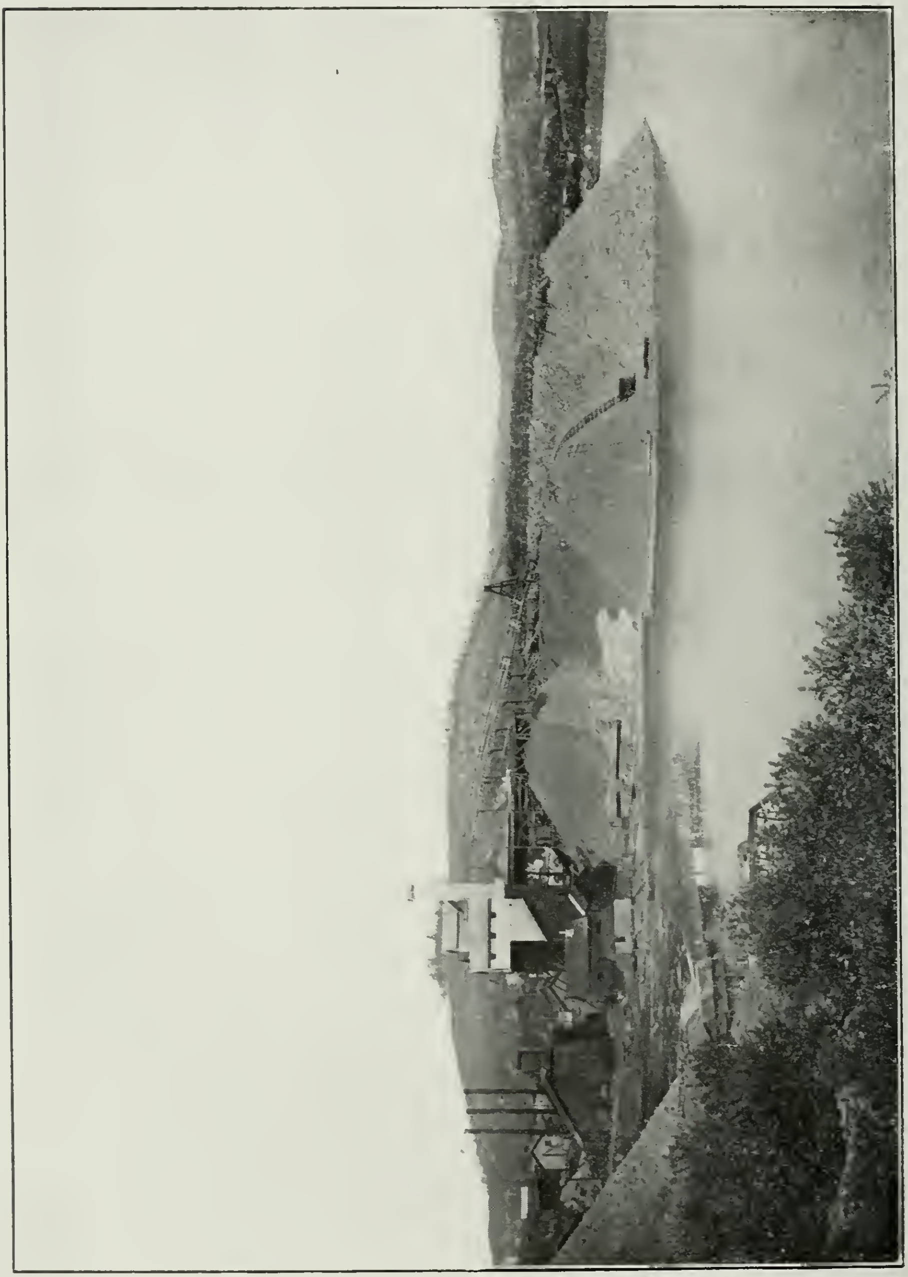
The company have recently entered into a contract with the Northern Customs Concentrators, Limited, for treating their low-grade ore.

Gould

The Gould Consolidated Mines, Limited, are working a lease from the Peterson Lake Silver Cobalt Mining Company on Cart lake. The mine was closed part of the year. One shaft has been deepened to the 100-foot level, where cross-cuts were driven north and south 100 feet respectively.

Green-Meehan

This mine has been taken over by the W. S. M. K. Mining Company and work was carried on during part of the year. On the 100-foot level 130 feet of cross-cutting was done and on the 200-foot level 130 feet of drifting and 140 feet of cross-cutting. A winze was sunk 33 feet.



Crown Reserve silver mine, Cobalt.

Hargrave

The Hargrave Silver Mines, Limited, acquired the two 40-acre claims described as the southwest quarter of the north half of lot 2, in the fourth concession, and the northwest quarter of the south half of lot 3 in the fourth concession of Coleman through the purchase of the interests of the White Silver Company, and an arrangement was made with the Ontario Government to pay a royalty on all ore produced. The company have an authorized capital of $2,500,000. Mr. W. N. Ferguson of Toronto is president, Mr. R. D. Moorhead, secretary-treasurer, and Mr. E. V. Neelands, manager. The company secure power from one of the local power companies.

No. 1 shaft, on the north end of the east lot, is 125 feet in depth. No. 3 shaft, on the north end of the south lot, is 375 feet in depth with a winze from one of the drifts on the lower level 50 feet. An exploratory drift was run north on the 375-foot level along the east boundary of the Kerr lake mine, a distance of 950 feet. A connection from this drift to the drift south on the 125-foot level of No. 1 shaft was made by a raise. The drift from No. 1 shaft has been run south 500 feet. An intermediate level 300 feet in length at a depth of 315 feet was run between the north drift from No. 3 shaft and the south drift from No. 1 shaft, and some stoping done.

Hudson Bay

This property consists of 340 acres, situated in the township of Coleman, and is owned by the Hudson Bay Mines, Limited. The company was formerly known as the Temiskaming and Hudson Bay Mining Company with an authorized capitalization of $25,000, shares having a par value of $1.00, and 7,761 shares having been issued. At the annual meeting of the shareholders held in New Liskeard September 27th, 1909, a transfer of the Coleman properties of the Temiskaming and Hudson Bay Mining Company to the Hudson Bay Mines, Limited, for a consideration of 3,000,000 shares of the capital stock was authorized. The Hudson Bay Mines, Limited, have a capitalization of 3,500,000 shares of a par value of $1.00 each, and of this amount 500,000 shares are in the treasury. The directors of this, the pioneer company of the Cobalt camp, are as follows: Geo. A. Taylor, president; A. A. McKelvie, vice-president; S. T. K. McEwen, S. S. Ritchie, D. M. Ferguson, John Dunkin, T. McCamus, directors; F. L. Hutchinson, secretary-treasurer; A. H. Brown, manager. The company originally owned the Silver Queen mine, which was sold for $810,000. The first dividend was declared of 200 per cent. on November 6th, 1905. The total dividends paid by the company to December 31st, 1911, are $1,916,058.76.

The power plant consists of two 80-h.p. boilers, a 15-drill compressor, hoist and electric light plant, and a 20-stamp concentrating mill. Both electric and air power are now being obtained from the power companies.

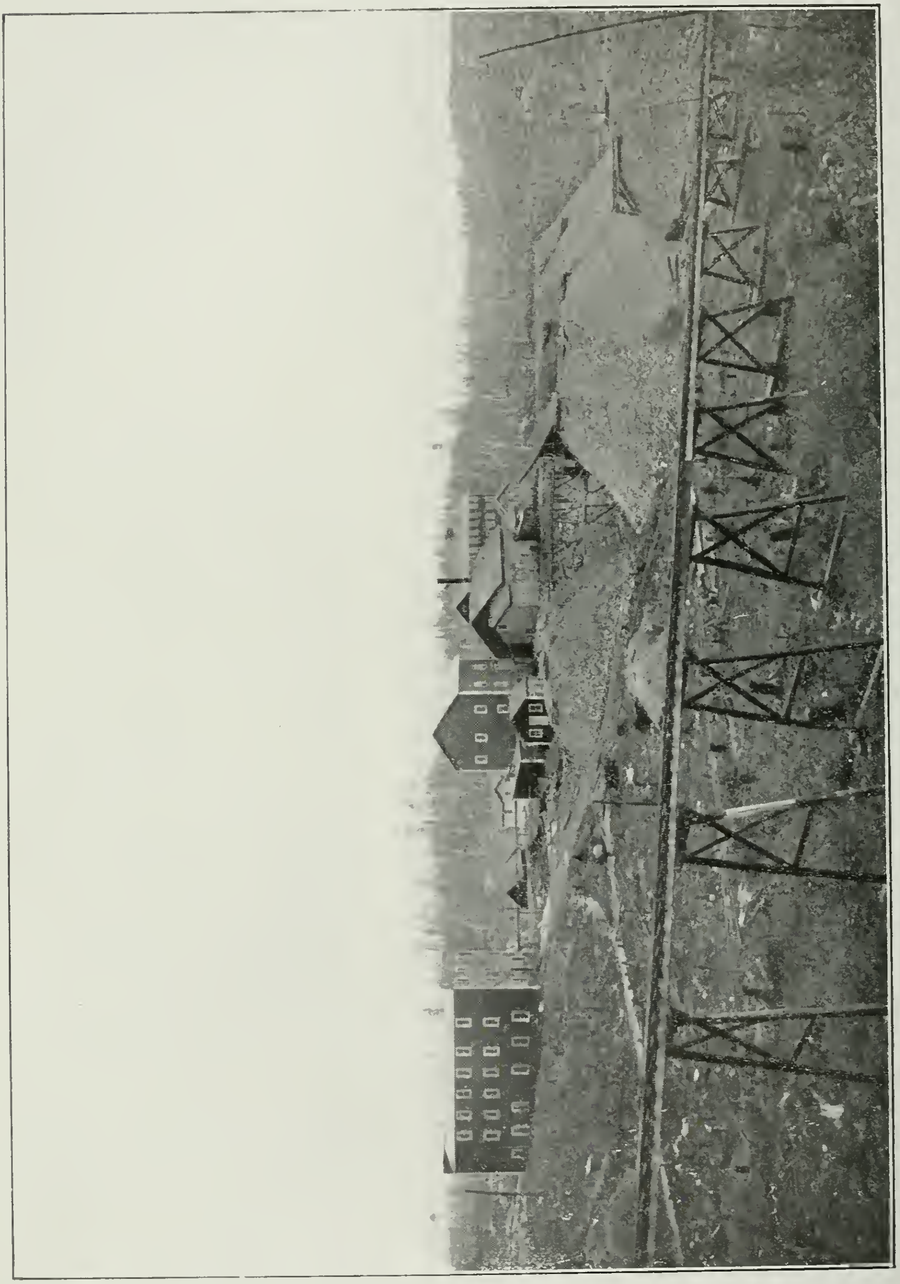
The Cobalt property, on which all the work has been done during the year, adjoins the Trethewey mine to the north.

The main shaft is now 200 feet in depth with winze sunk 80 feet below the level. Levels have been run at depths of 60 feet, 100 feet, 150 feet and 200 feet. Most of the development work during the year has been done on the third level, where prospect drifts were run north along the east boundary of the claim. Some stoping was also done on the ore blocked out, and the mill run continuously.

The mill is situated to the north of the mine on the slope of the hill, and the ore is hoisted in cars on the cage and dumped into bins at the shaft, and then trammed to the mill. Here it receives very similar treatment to the general scheme outlined for water concentration. Crushing is done by a 20-stamp battery crushing to 20-mesh. The mill has a capacity of about 60 tons per 24 hours.

Kerr Lake

This mine is situated on the northwest part of lot 4 in the fourth concession of Coleman and is operated by the Kerr Lake Mining Company, Limited, which has an authorized capital of $40,000. The capital stock of the company is held by the Kerr Lake Mining Company of New York, with an authorized capital of 600,000 shares of a par value of $5.00 each. Mr. Edward Steindler is president, Mr. J. H. Susman, secretary-treasurer,



Hudson Bay silver mine.

and Mr. Robt. Livermore, manager. The company have paid in dividends to shareholders up to August 31st, 1911, the sum of $3,330,000.

The manager reports that during their last fiscal year the following development work was done: Drifting, 4,441.2 feet; cross-cutting, 2,252.6 feet; raising, 685 feet; winzes, 207 feet; or a total of 7,585.8 feet; and the total development work on the property as 21,946 feet.

Most of the mining work during the year was done on the north end of the property from No. 7 shaft, although stoping was continued on No. 3 vein at the south end. The manager's report shows that the production for the year came from 15 veins, 13 of these being at the north end of the property and partially under Kerr lake.

An ore sorting plant was built during the year. This consists of a bumping table for hand sorting, trommels and jigs. A contract was also made with the Nova Scotia Mining Company for milling the low-grade ore, and an aerial tram was constructed to the property. Owing to the failure of the Nova Scotia Mining Company only a few thousand tons were treated.

La Rose Consolidated

The LaRose Consolidated Mines Company, Limited, own all the stock of the LaRose Mines, Limited, the Lawson Mines, Limited, the Violet Mining Company, and 7,262 shares of the University Mines, Limited. The properties are as follows:—

LaRose Mines, Limited.

LaRose (J. S. 14)	37 acres.
LaRose Extension	36 "
Princess	17 "
Fisher	20 "
Eplett	20 "
Silver Hill	93.5 "

University Mines, Limited.

University	56 acres.

Violet Mining Company.

Violet	40 acres.

Lawson Mining Company.

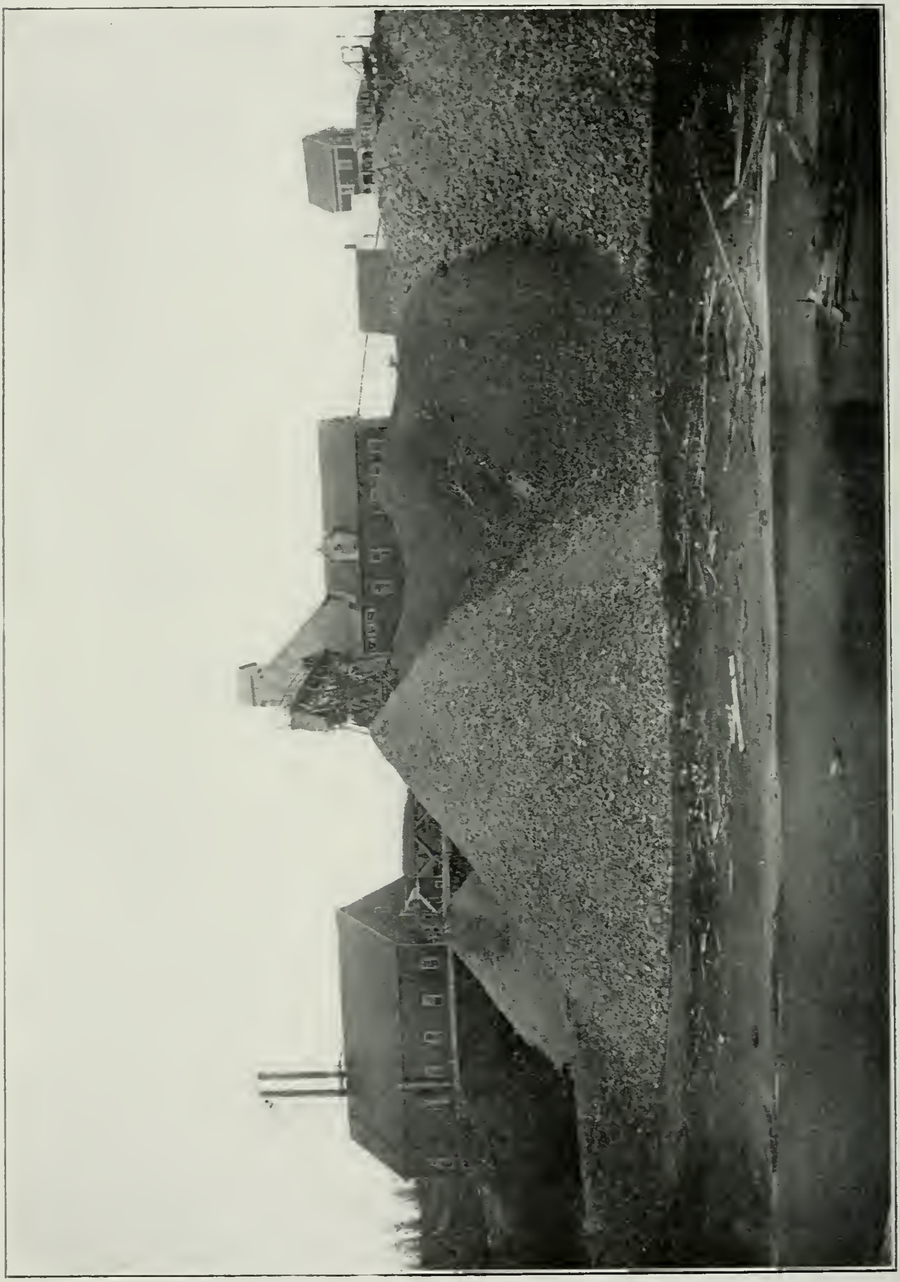
Lawson	40 acres.
	359.5 acres.

The company have an authorized capitalization of 1,500,000 shares of a par value of $5.00. Mr. D. Lorne McGibbon is president, and Mr. R. B. Watson general manager.

La Rose Mines, Limited

According to the report of the general manager the La Rose Mines, Limited, have produced to December 31st, 1911, 14,902,595.09 ounces of silver, and paid in dividends to former and present owners $3,719,862.72. During the fiscal period from December 31st, 1910, to December 31st, 1911, the shipments amounted to 4,092,709.33 ounces of a net value of $2,014,391.49, or an average of 897.25 ounces per ton of ore. The total cost of production for this period was 19.20 cents per ounce.

La Rose.—At the La Rose mine during this period there were 152.5 feet of shaft sunk; 2,064 feet of drifts run; 3,136.5 feet of cross-cuts driven; 285.5 feet of raising and 7,972 cubic yards of stoping. Mining work is carried on chiefly through the main shaft,



Kerr Lake silver mine, Cobalt.

which is 250 feet in depth, with main levels at 62 feet, 157 feet and 240 feet, and the No. 3 shaft which is 240 feet in depth with levels at 62 feet, 157 feet and 236 feet. Very little stoping was done on the main vein during the year, the production having been derived from the west vein, No. 3, McDonald, and the mill rock on dumps.

Owing to the fault running nearly parallel to the main La Rose vein, the conglomerate to the west has been found to extend to a lower level than that part of the property that has been productive. A winze is therefore being sunk from the 240-foot level with the object of exploring this conglomerate near the Keewatin contact. The winze is now 250 feet in depth.

There were produced from the La Rose during 1911, 1,439,112.68 ounces of silver.

The company have a contract with the Northern Customs Concentrator, Limited, for milling their low-grade ores. During the year, 36,264.491 dry tons were milled, having an average value of 22.04 ounces per ton. From this there were produced 1,146.166 dry tons of concentrates containing 602,539.82 ounces. The net value of these concentrates was $280,738.60, and the cost of concentration $109,515.65, giving a profit to the La Rose Mines, Limited, of $171,222.95. The average extraction in the mill was 75.37 per cent., and the ratio of concentration 1 to 31.7.

Princess.—At the Princess mine during the year, 60 feet of sinking was done; 554.5 feet of drifts run; 1,268.5 feet of cross-cuts driven; 47 feet of raising and 3,578 cubic yards of stoping. The production from the mine was 429,014.12 ounces. The main shaft remains at the same depth, but a winze was sunk from the main drift, second level, 320 feet southeast of the shaft, a depth of 60 feet and 460 feet of drifting and cross-cutting done. Cross-cuts have been driven south from the shaft on the second level and from the east drift distances of 500 feet.

Lawson.—At the Lawson during the year the underground work consisted of 148.5 feet of sinking; 1,353.5 feet of drifting; 1,295 feet of cross-cutting; 352.5 feet of raising and 3,578 cubic yards of stoping. The production from the Lawson during the same period was 1,221,130.64 ounces of silver.

The main shaft was sunk to the 185-foot level and a new level at the No. 8 shaft opened up at a depth of 300 feet. On No. 9 vein, to the west side of the property, a winze has been sunk from the 75-foot level a depth of 60 feet. The greater part of the development work was done on the 185-foot level of the main shaft, there now being 2,400 feet of drifts and cross-cuts on this level.

Violet.—The old shaft on the Violet was unwatered and 201 feet of cross-cutting done on the 100-foot level.

Fisher-Eplett.—These claims are situated north of the Beaver in the southern part of Coleman. About 15,000 feet of trenching was done and a shaft sunk to a depth of 150 feet.

University.—No work was done during the year.

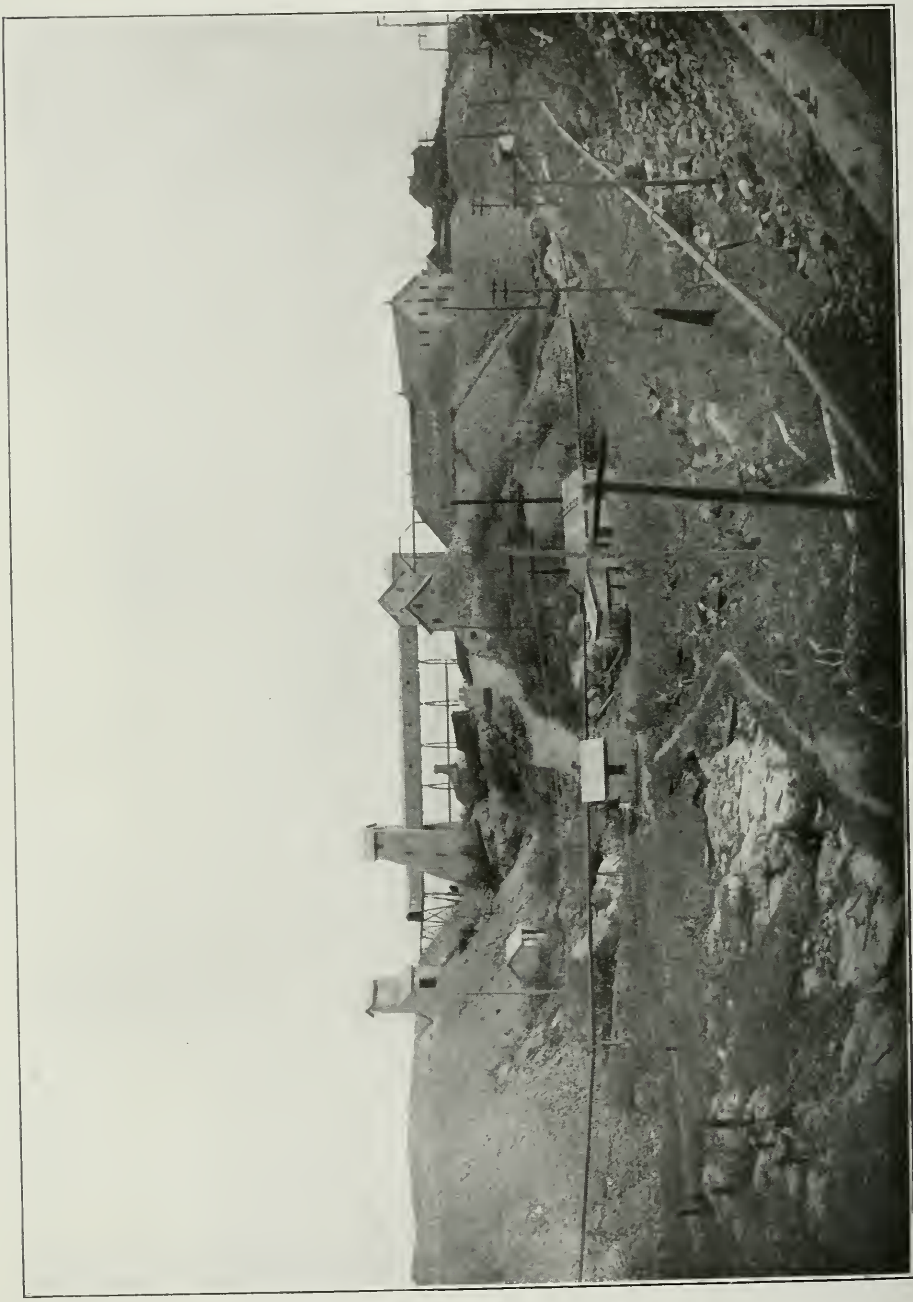
Lumsden

This property, situated on the west half of the northeast quarter of the north half of lot 2 in the third concession of Coleman, was being worked part of the year by the Lumsden Mining Company. The main shaft is 400 feet deep, with some drifting on the 100-foot level, 175-foot level, and 400-foot level. The shaft was sunk in the Keewatin formation for the first 312 feet, where diabase was encountered.

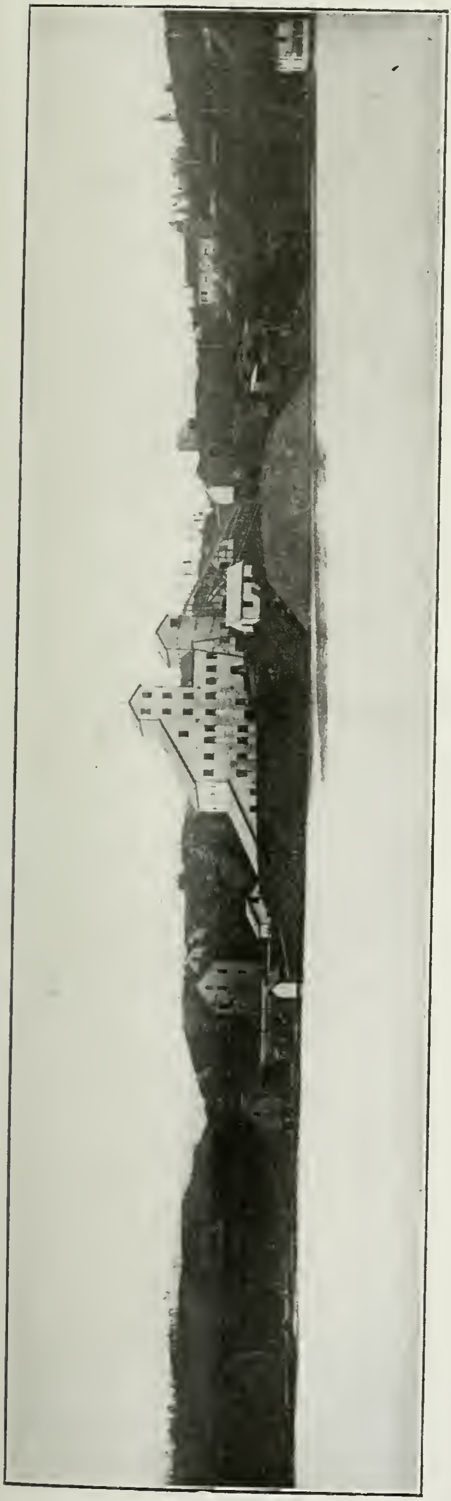
Mr. John Lumsden, of Ottawa, is president, and Mr. F. I. Daniels, manager.

McKinley-Darragh-Savage

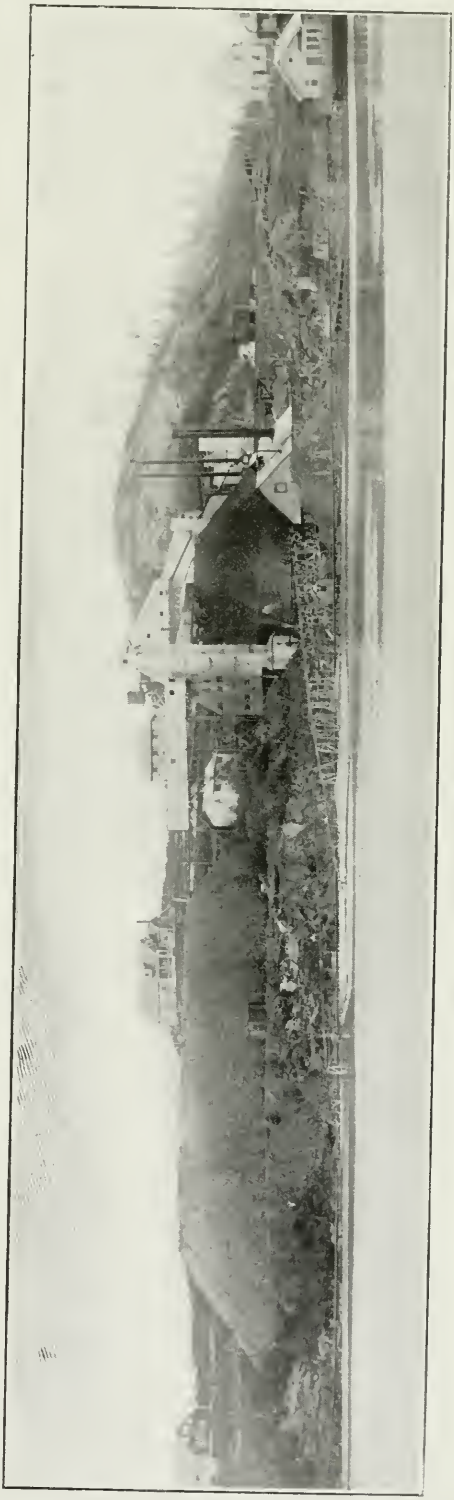
The McKinley-Darragh-Savage Mines of Cobalt, Limited, own and operate the McKinley-Darragh mine at the south end of Cobalt lake, and the Savage mine on lot 3 in the third concession of Coleman, consisting of 42 acres. The company have a capital of 2,500,000 shares, of a par value of $1.00. Mr. C. A. Masten, of Toronto, is president, Mr Thos. W. Finucane, of Rochester, vice-president, and Mr. T. R. Finucane,



Lawson silver mine, Cobalt.

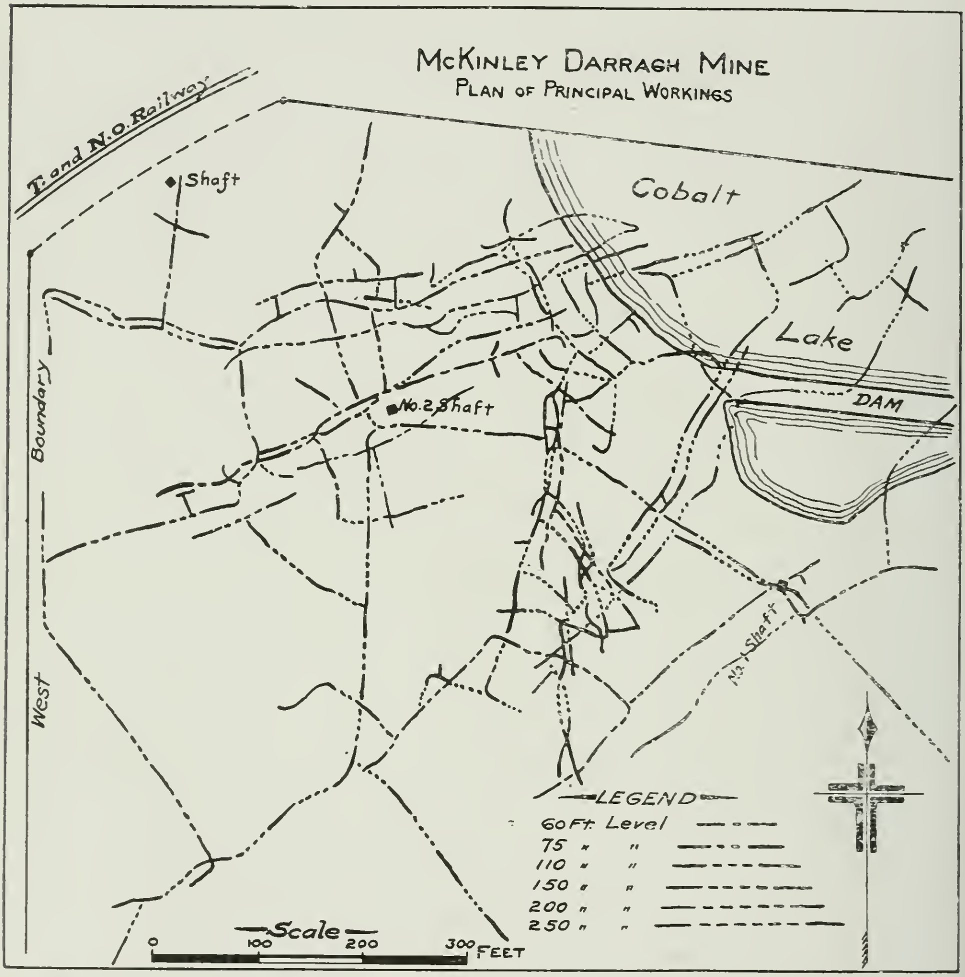


Concentrating mill, Cobalt Lake silver mine, Cobalt.



McKinley-Darragh silver mine, Cobalt.

manager. The company have paid in dividends up to January 1st, 1912, the sum of $2,156,770.88. The total number of ounces of silver recovered at both mines to the above date is 8,052,793.



McKinley-Darragh.—The following table from the directors' report shows the footage advance on the different levels throughout the year and the tonnage taken from the stopes:—

Level.	Drifts.	Cross-cuts.	Raises.	Stopes.
Feet.	Feet.	Feet.	Feet.	Tons.
60	....	....	....	538
75	36.5	54.5	35.5	427
110	304	131.5	128.5	10,426
150	909.5	716	215.5	4,728
200	203.5	162.5	133.5	1,739
230	218.5	....	....	1,162
250	489.5	1386	126.5	2,538
Total.......	2,161.5	2,450.5	639.5	21,558

The total underground footage to January 1st, 1912, is 20,066 feet. The accompanying plan shows the extent of the underground operations, the irregularity of the strike and occurrences and the necessity for extensive exploratory work.

There were recovered 2,043,578 ounces of silver during the year, at a cost of 17.52 cents per ounce.

Savage.—The recovery of silver from the Savage during the year is reported as 610,599 ounces, costing 20.39 cents per ounce.

Four shafts have been sunk to the following depths: No. 1 shaft, 85 feet; No. 2 shaft, 112 feet; No. 3 shaft, 140 feet; No. 4 shaft, 140 feet. A winze was sunk a depth of 50 feet on No. 10 vein near No. 1 shaft, and about 75 feet of drifting done from the bottom of this winze.

The annual report shows that 1,095 feet of drifting, 1,306 feet of cross-cutting 185 feet of raising, 107 feet of sinking, were done, and 14,703 tons of ore stoped during the year. The total underground footage to January 1st, 1912, is 5,955 feet.

The ore-sorting plant at the Savage mine was in operation during the year. This plant consists of crushers, trommels, picking-belt, jigs and sand table. The low-grade ore is put on the dump for future treatment.

McKinley-Darragh Mill.—The mill was run steadily throughout the year and treated 145.91 tons per day, or 46,497 tons during the year. The ore to the mill averages 39.685 ounces, and 1,653,595 ounces of silver were recovered.

Meteor

The Meteor Mining Company were engaged in development work on the northeast quarter of the north half of lot 5 in the fourth concession of Coleman. An adit was driven east a distance of 250 feet and a shaft sunk from the adit level a depth of 104 feet, with 150 feet of drifting and 144 feet of cross-cutting on the 100-foot level. An incline shaft was also sunk from the southwest side of Diabase Mountain, following the contact between the diabase and slate, a depth of 250 feet, and cross-cuts were driven north 190 feet and south 260 feet.

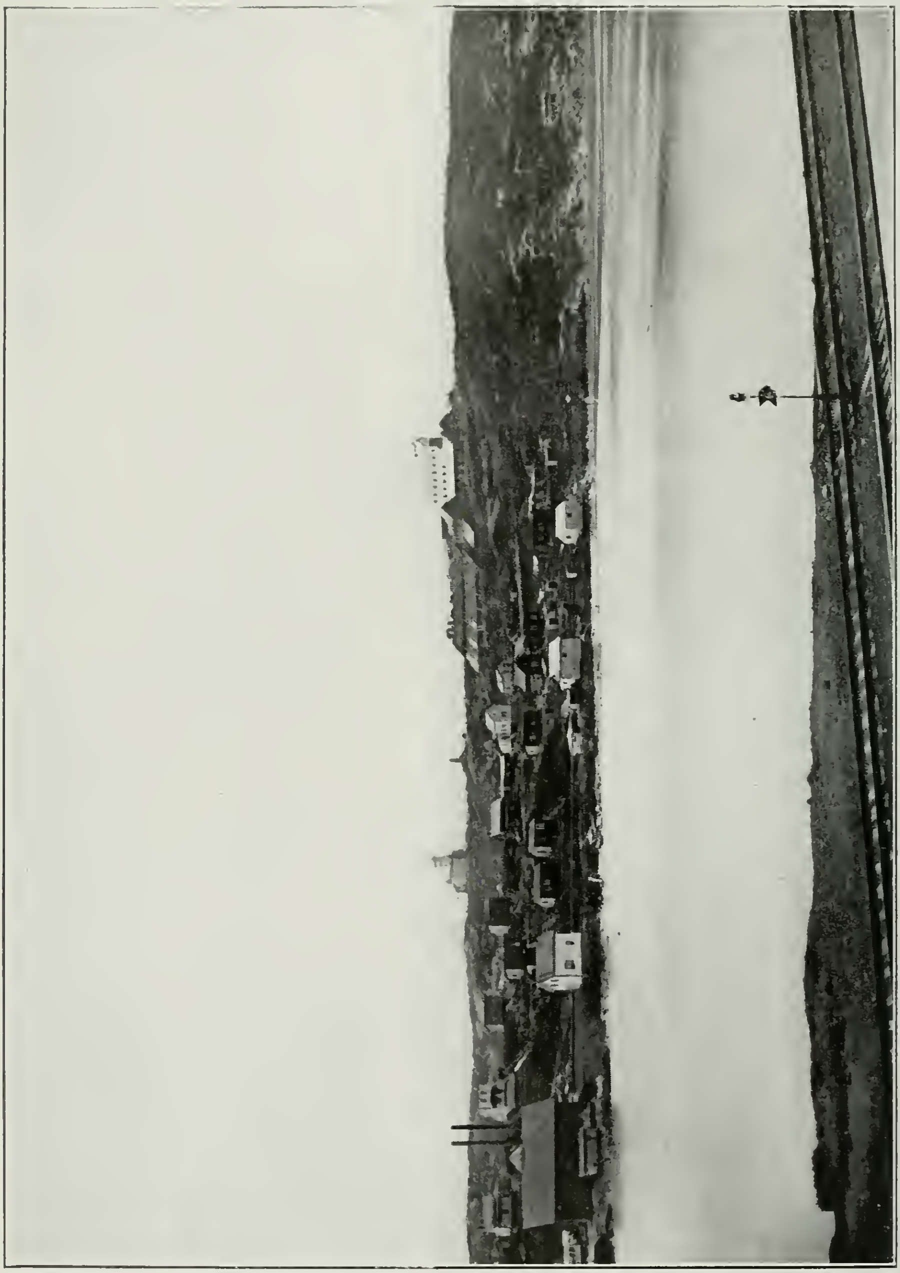
Nipissing

The Nipissing Mining Company, with an authorized capital of $250,000, own and operate 846 acres in the township of Coleman, principally situated in the producing area. Mr. David Fasken, of Toronto, is president, Mr. R. B. Watson, general manager, and Mr. Hugh Park, manager. The Nipissing Mines Company is a holding company, owning all the stock of the Nipissing Mining Company, and has an authorized capital of $6,000,000, with shares of a par value of $5.00. Mr. E. P. Earle, New York, is president, and Mr. Richard T. Greene, secretary. The operating company commenced paying dividends in 1905, and have, up to December 31st, 1911, paid $7,850,930.49 in dividends. The silver production for 1911 was 5,197,042.14 ounces, at a cost of 13.95 cents per ounce, and the total production to December 31st, 1911, has been 23,023,312.92 ounces, for which the company have received from the smelter, $11,820,620.84.

The general manager's report for the year 1911 shows the work done to be distributed as follows:—

Shaft No.	Drifting.	Cross-cutting.	Raising.	Sinking.	Total.
12				18 feet.	18 feet
28	193 feet	269.5 feet.			462.5 "
63	279 "	910.5 "	223.5 feet.		1,413 "
64	627 "	341 "	150 "	75 feet.	1,193 "
73	419 "	878.5 "	215.5 "	87.5 "	1,600.5 "
80	714.5"	752.5 "	252 "		1,719 "
122	707.5"	254 "	313 "		1,274.5 "
127	582.5"	84.5 "	54 "		721 "
141	153	48 "			201 "
150		63.5 "		115.5 feet.	179 "
Total	3,675.5"	3,602 "	1,208 "	296 "	8,781.5 "

Stoping .... 13,841 cubic yards.



Part of east shore of Cobalt lake, showing concentrating mill of Nipissing silver mine.

The principal producing veins were Nos. 63, 64, 73, 80, 100 and 122. The shaft on vein 63, from which is also worked veins 82 and 108, remains the same depth, namely, 219 feet. The production from these veins was 712,930 ounces. The shaft on vein 64 is 270 feet in depth, with a winze 74 feet deep at a point 550 feet east of the shaft. The vein has been opened up for a length of 900 feet. A cross-cut was driven south on the second level, connecting with vein 73. The production during the year was 833,485 ounces. The shaft on vein 73 has been made the central working shaft for working the vein to the north of the town. It is now connected underground with veins 80 and 100, 600 feet south, and vein 64, 1,100 feet north. A new sorting plant, in which are bumping tables and jigs, has been erected at this shaft, through which all the ore from veins 64, 73, 80 and 100 is hoisted and here treated. The shaft is now 247 feet in depth, with levels at 79 feet, 167 feet and 247 feet. The lower level has been opened during the year. The year's production from veins 73, 80 and 100 was 3,142,198 ounces. The shaft on vein 122 is 168 feet in depth, and on this level drifts have been run east 500 feet and west 200 feet.

The hydraulic equipment was not delivered in time to be set up during the summer, and as a result no prospecting by means of the hydraulic plant was accomplished during the year. The plant was installed during the winter and will be used during the summer of 1912. The equipment consists of a 600-h.p. motor and a turbine pump. This system of prospecting was attempted by this company in its early days, but, owing to insufficient power, it was abandoned. The larger equipment will doubtless be successful in removing the overburden.

A prospect shaft was sunk to a depth of 115 feet near the Savage property, and about 65 feet of a cross-cut driven. The surface prospecting force completed 13.7 miles of trenches during the year.

Low-grade ore from shaft 63 was treated at the customs plant of the Nipissing Reduction Company. The results were as follows:—

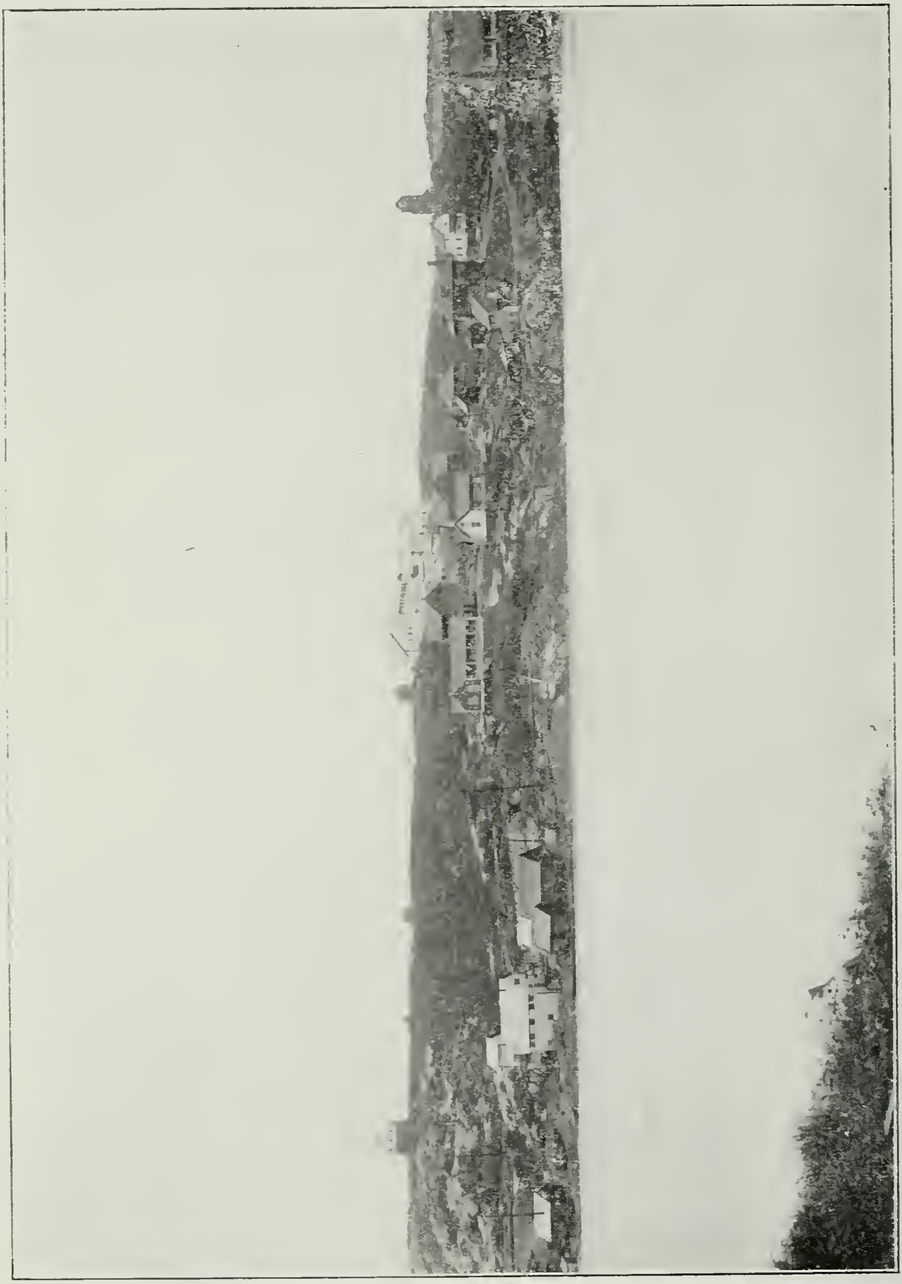
Weight of dry ore	14,766.5 tons.
Silver contents of ore	329,417.2 ounces.
Total silver in concentrates	241,902.60 ounces.
Net value of concentrates	$117,843.92
Cost to Nipissing Mining Company	$45,576.52
Profit to Nipissing Mining Company	$72,267.40
Extraction	73.43 per cent.
Ratio of concentration	70.8 to 1.

The company's mill for treating high-grade ore was started February 1st, 1911, and is now handling the entire product of the mine. The process was devised by Charles Butters, and his assistant, G. H. Clevenger, and consists essentially of amalgamation in cyanide solution in a tube mill. The residue undergoes the regular cyanide treatment. A refinery was also erected, and the whole product of the mill is shipped as fine bullion.

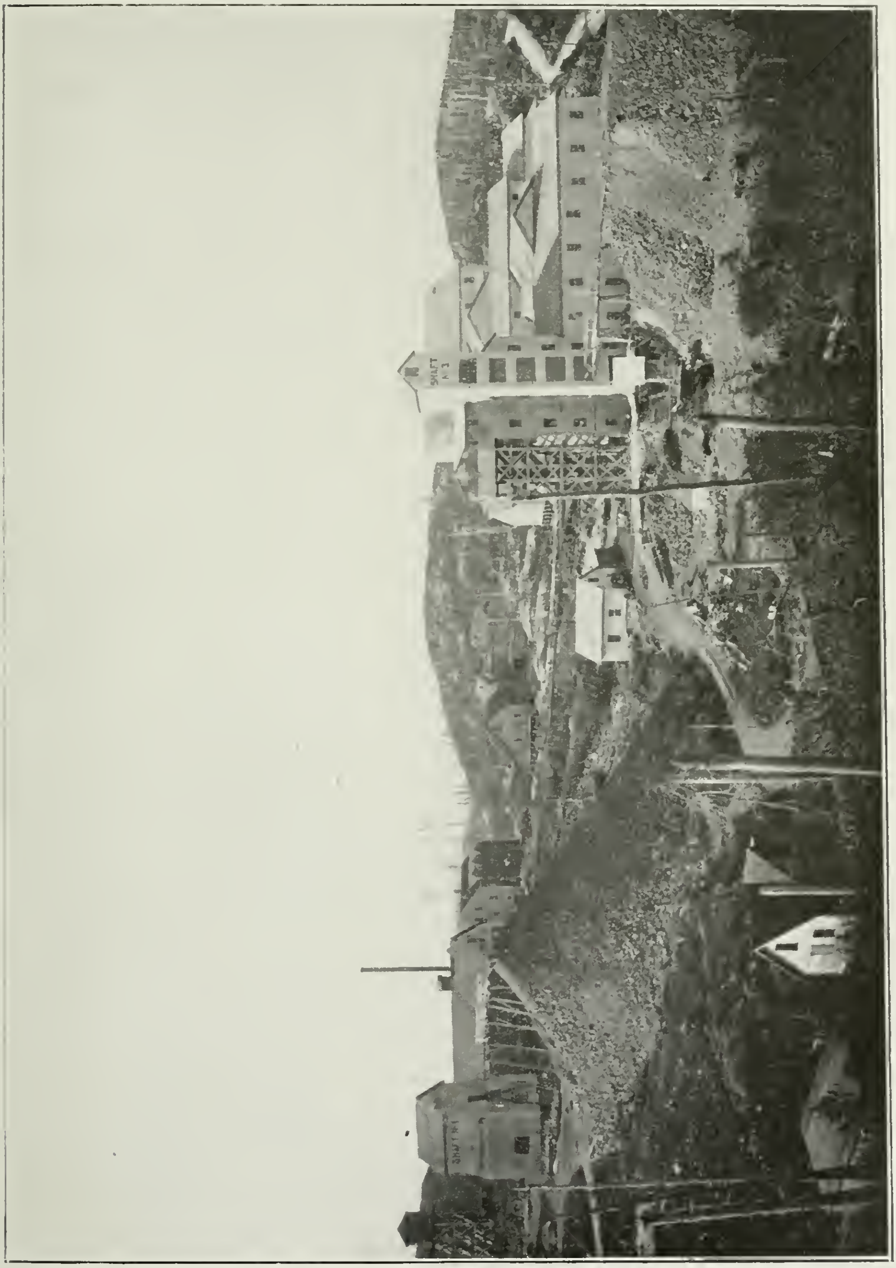
A new low-grade mill to treat 200 tons per day is now under construction. The ore will be transported to the mill by aerial tramways, where the coarse ore will be removed on a picking belt and the fines jigged. The tailings will be crushed in cyanide solution by 40 stamps of 1,500 lbs. each, and then go to four tube mills, 6 feet in diameter by 20 feet long, where the ore will be reduced to 200-mesh. After tube-milling the pulp will be subjected to amalgamation and the usual agitation in cyanide solution will follow. Precipitation by zinc dust will be carried out in a Merrill filter. The concentrates and precipitates will be further treated at the high-grade mill.

Nova Scotia

Very little underground work was accomplished during the year. The mill was enlarged bringing the number of stamps up to 40. Contracts were made with the Crown Reserve and Kerr Lake Mining Companies for treating their low-grade ore, and



Part of east shore of Cobalt lake, showing high grade mill of Nipissing mine.



Nova Scotia silver mine, showing shaft houses and concentrating mill.

an aerial tram was erected for conveying the ore from these properties to the Nova Scotia. Operations were, however, not successful, and the mill was closed down early in 1912, and the property sold.

O'Brien

This property, formerly known as Mining Location R.L. 403, is situated east of and adjoining the LaRose mine. It is owned and operated by Mr. M. J. O'Brien.

The power plant consists of three 100-h.p. boilers, a 20-drill compressor and hoists, with small boilers at each of the shafts. Both electric and air power is now being obtained from the power companies, but the plant is kept in reserve. A 30-stamp concentrating mill has been in operation since the latter part of 1909.

A new 3-compartment shaft has been sunk at a point about 200 feet from the mill a depth of 325 feet. This shaft has been connected with No. 1 and No. 6 shafts, and it is proposed to hoist all the ore from these veins through this shaft. No. 1 shaft is 1,000 feet west of the main shaft, and is 300 feet deep, with levels at 50 feet, 100 feet, 150 feet, 200 feet and 300 feet. The connection to the main shaft is on the 200-foot level of No. 1 shaft. Considerable stoping has been done above the third level. No. 6 shaft is 240 feet in depth, and has levels at 75 feet, 150 feet and 225 feet. Drifts have been extended east and west from the shaft on each level and stoping done. The second level is connected with the main shaft by a cross-cut north, joining by a winze with the west drift from No. 16 shaft. A cross-cut has also been run from the 250-foot level, and a connection made with No. 16 drift about 800 feet northeast. No. 2 shaft, south of No. 1 shaft, is 235 feet deep, with levels at 65 feet, 165 feet and 225 feet. Considerable drifting has been done on each level and stoping begun. No. 14 shaft is 185 feet deep, with levels at 110 feet and 180 feet. On both levels drifting and cross-cutting have been done. On the 115-foot level of No. 16 shaft a drift has been run west 400 feet. About 400 feet of drifting has also been done on the No. 16 vein, 70 feet east of the shaft.

At the mill, as at the Nova Scotia, cyanide treatment has been adopted. The ore is first crushed by a gyratory crusher and passes over trommels. The trommels separate it into three sizes, which are jigged. The tails from the jigs are crushed in a 30-stamp mill and the product classified, the slimes going direct to a Dorr thickener and the sands reground in two Hardinge mills and treated on Deister tables, the tailings being returned to the classifier. The pulp from the thickener is then run into Pachuca agitators and subjected to the cyanide solution. After agitation, the product is pumped through a Moore filter press and the solution run to precipitation tanks.

An electric tramway has been built from No. 1 and No. 6 shafts to the mill, to handle the ore that is hoisted and also to move the milling dumps.

Ophir

On the east half of the northeast quarter of the north half of lot 2 in the second concession of Coleman the Ophir Cobalt Mines, Limited, of which Mr. E. P. Rowe is managing director, have been engaged in prospecting and development work. A shaft has been sunk to a depth of 300 feet, and levels run at 100 feet, 180 feet and 300 feet. On the first level 80 feet of drifting has been done. On the second level 300 feet of drifting and 200 feet of cross-cutting have been done south of the shaft, and 375 feet of drifting and 60 feet of cross-cutting north of the shaft. On the third level a drift has been run north 140 feet, and cross-cuts driven west 240 feet and east 170 feet.

The plant consists of a 100-h.p. boiler, 6-drill compressor, and hoist.

Peterson Lake

The property of the Peterson Lake Silver Cobalt Mining Company, Limited, consists of about 200 acres, made up of the bed of Peterson lake and 33 feet of the road allowance around the lake. Sir Henry Pellatt is president, Mr. G. F. Morrison, secretary-treasurer, and Mr. M. B. R. Gordon, manager. The company have cancelled all the leases except that of the Kerry Mining Company and the Gould Consolidated Mining

O'Brien Silver Mine, Cobalt.

Company. The company are now working what was formerly known as the Little Nipissing mine, the lease of the Little Nipissing Mining Company having been cancelled.

The main shaft is 160 feet in depth, with levels at 100 feet and 155 feet. On the 155-foot level, at a point 450 feet east of the shaft, a winze has been sunk 120 feet, with levels at 70 feet and 120 feet. Drifting and some stoping have been done on both these levels, but during 1911 the work was confined chiefly to the lower level, where a drift was begun to connect with the main shaft and was driven to within 75 feet of it. A drift was also run east, where another winze was sunk 55 feet. This level is at a total depth from the surface of 330 feet, and 300 feet of drilling and cross-cutting have been done.

Right of Way

The Right of Way Mining Company in 1906 purchased the mining rights of the Temiskaming and Northern Ontario Railway Commission from Mileage 101 to 104 (excepting the west shore of Cobalt lake). This company was capitalized for $500,000, with shares of a par value of $1.00, and paid in dividends to October 1st, 1909, $324,643.93. The Right of Way Mines, Limited, was incorporated September, 1909, with an authorized capital of $2,000,000, to take over the assets of the Right of Way Mining Company, and 1,000,000 shares of the Cobalt Merger, Limited, who own 92 acres immediately south of the Hargrave mine. The new company distributed 1,500,000 shares amongst the shareholders of the old company on the basis of three shares for one share, and 185,500 shares for the Cobalt Merger shares, leaving 314,500 shares in the treasury.

The president of the new company is Mr. Geo. Goodwin, secretary-treasurer, Mr. E. A. Larmouth, and superintendent, Mr. R. F. Taylor.

All work during the year has been confined to the No. 3 and No. 4 shafts, west of the Princess and McKinley-Darragh mines, the former being 75 feet and the latter 120 feet deep. A cross-cut has been driven from No. 3 shaft south 350 feet, and north 375 feet, where No. 2 vein was encountered. A winze was sunk on this vein a depth of 45 feet. Drifts were run on the vein on both levels and stoping done. The cross-cut was further extended 400 feet to No. 5 vein, where the No. 4 shaft has been sunk to the 120-foot level. Drifts were run on No. 5 vein on both levels, and on the second level a cross-cut driven north 100 feet. On the first level the cross-cut has been extended north a further distance of 200 feet, cutting veins 6 and 7, on which some drifting has been done. About 300 feet of drifting was done on the Right of Way property, from the 85-foot level of the Little Nipissing shaft on J.B. 2.

Seneca-Superior

The Seneca-Superior Silver Mines, Limited, have taken over the leases on Peterson and Cart lakes formerly held by the Kerry Mining Company. No. 1 shaft on Cart lake is 100 feet deep, and 300 feet of drifting and cross-cutting has been done at this level. No. 2 shaft on Peterson lake is 200 feet deep, with levels at 125 feet and 200 feet. On the second level a cross-cut has been driven south 350 feet, and a winze sunk from this level at a point 190 feet south of the shaft a depth of 112 feet. Drifts have been run on veins encountered in cross-cuts distances of 250, 75, and 150 feet respectively. The mine was in operation only part of the year.

Silver Cliff

This property, consisting of the southeast quarter of the south half of lot 3 in the sixth concession of Coleman, and owned by the Silver Cliff Mining Company, Limited, was taken over by the present owners in June, 1909. The company have an authorized capital of $2,000,000, with shares of a par value of $1.00. Mr. A. R. Peacock is president.

The mine and mill were operated part of the year, but all work has now ceased. The last work done by the company was to sink a shaft on the shore of Cross lake a depth of 140 feet and cross-cut east and west distances of 100 feet. The other part of the property was developed by means of an adit driven into the hill a distance of 340 feet. Drifts were run from this adit on the veins encountered. Over 3,000 feet of development work was done.

Sutherland

On the southeast quarter of the north half of lot 5 in the first concession of the township of Bucke, the Sutherland Cobalt Silver Mines, Limited, have sunk a shaft a depth of 125 feet.

A small plant was erected, consisting of a 50 and a 60-h.p. boiler, a 3-drill compressor and hoist.

Temiskaming

This property, consisting of the south half of the northeast quarter and the west half of the southwest quarter of the north half of lot 1 in the third concession of Coleman, is owned by the Temiskaming Mining Company, which have an authorized capital of 2,500,000 shares, of the par value of $1.00. Mr. Burr E. Cartwright is president, Mr. Alex. Fasken, secretary-treasurer, and Mr. Norman R. Fisher, general manager. The dividends paid to December 31st, 1911, amount to $1,009,155.56. The production of the mine for 1911 was 1,213,754 ounces, costing 29.8 cents per ounce to produce; and for the total period since commencement of operations, 5,191,393 ounces.

The plant consists of four 100-h.p. boilers, an 18-drill compressor, a double-drum first-motion hoist and an electric light plant. The company now secure their electric and air power from the British Canadian Power Company. Their main hoisting shaft is equipped with a 60-foot steel head-frame. A 40-stamp concentrating mill and ore-sorting house are also in operation.

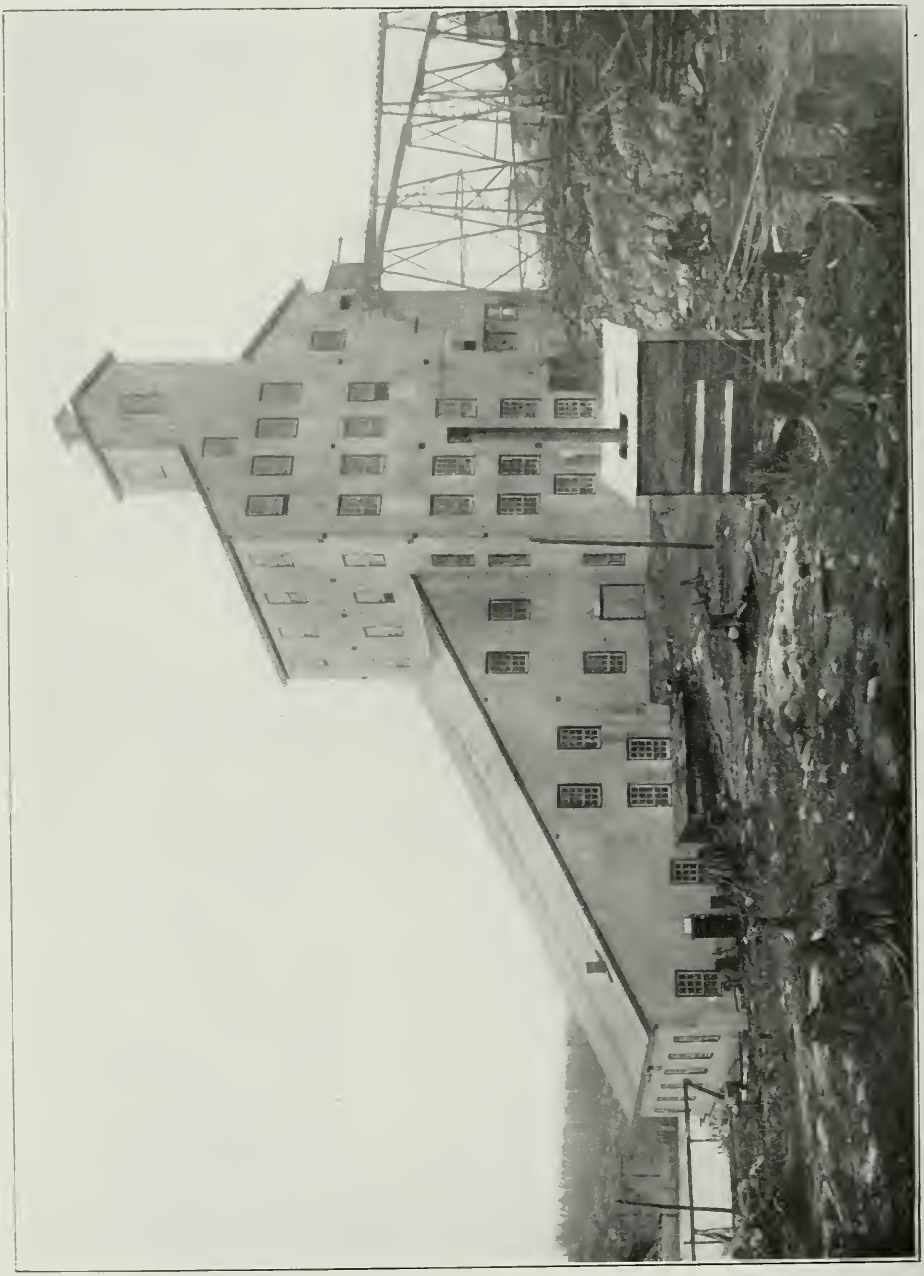
The main 3-compartment shaft is 628 feet in depth, being the deepest shaft in the Cobalt camp. The mining work during the year was made up as follows: shaft sinking, 112 feet; winzes, 193.2 feet; raises, 160.6 feet; drifting, 2,184.2 feet; cross-cutting, 936 feet; and 6,935 cubic yards of stoping. The total lineal footage of work done underground since the commencement of operations amounts to 12,810 feet, and the stoping to 22,224 cubic yards. The main levels now being worked are at depths of 200 feet, 300 feet, 400 feet, 450 feet, 500 feet, and 575 feet. From a winze 360 feet south of the shaft a sub-level was driven at a depth of 450 feet. The main shaft is connected with the No. 1 shaft on the 200-foot level. The main drift, north and south, exclusive of drifts and cross-cuts on other veins, is 650 feet on the 300-foot level, 600 feet on the 400-foot level, 600 feet on the 500-foot level, and 400 feet on the 575-foot level. A cross-cut is being run east on the 575-foot level, it being the intention to continue this to the eastern boundary of the claim, a distance of 800 feet.

The company did some development work during the year on their Peterson claim in the township of Bucke near North Cobalt. A shaft was sunk 53 feet and 93 feet of cross-cutting was done.

The concentrating mill was erected on the northeast corner of the property the latter part of 1909. The mine ore is first hand-sorted and crushed at the ore-sorting house at the shaft and delivered to bins, from which it is carried by aerial tramway to the storage bins at the mill. It is then sized by trommels and treated in three Richards jigs. The finer product is classified, the sands treated on three James sand tables and the overflow on two James slime tables. The tailings from the jigs and tables are dewatered and recrushed by 40-stamps using a .069-inch slot screen, then classified, the sands being treated on eight James and one Deister tables, and the overflow on nine James and one Deister slime tables. The middlings from the sand tables are classified and retreated.

Trethewey

This property is owned and operated by the Tretheway Silver-Cobalt Mine, Limited, of which Mr. Alex. M. Hay is president and Mr. Chas. A. McConnell manager. The company have an authorized capital of 2,000,000 shares of a par value of $1.00. Only 1,000,000



Concentrating mill, Trethewey silver mine, Cobalt.

shares have as yet been issued and $200,000 paid in dividends during 1911. The total dividends paid by the company, exclusive of the original owner's profits, amount to $761,998.50. During 1911, 770,838 ounces of silver were produced, yielding $372,622.45.

The development work done during the year is as follows:—

Drifts and cross-cuts	2,801 feet.
Raises and winzes	168 feet.
Shafts	102 feet.
Total	3,071 feet.

The total development work done to date amounts to 14,348 feet.

No. 2 shaft is the main hoisting shaft for the southern part of the property, and from this shaft there is a tramway to the mill. This shaft is 250 feet deep and connected with No. 1 and No. 3 shafts. From the 100-foot level of No. 2 shaft a cross-cut has been driven north about 760 feet, where a vein was cut and a raise put through to the surface. This raise is to be used as a hoisting shaft, from which this vein will be developed. No. 4 shaft is at the north end of the property, 140 feet from the Hudson Bay boundary, and is 200 feet in depth. Work is being done on both the 150-foot and the 200-foot levels.

The concentrating mill is located on the west side of the hill, about midway between No. 1 and No. 4 shafts. The ore passes over a picking table, is then crushed and sized by a trommel and treated in four jigs. The tailings are recrushed in a 30-stamp mill. After being classified the sands are treated on seven James tables and the slimes on nine James slime tables.

Northern Customs Mill

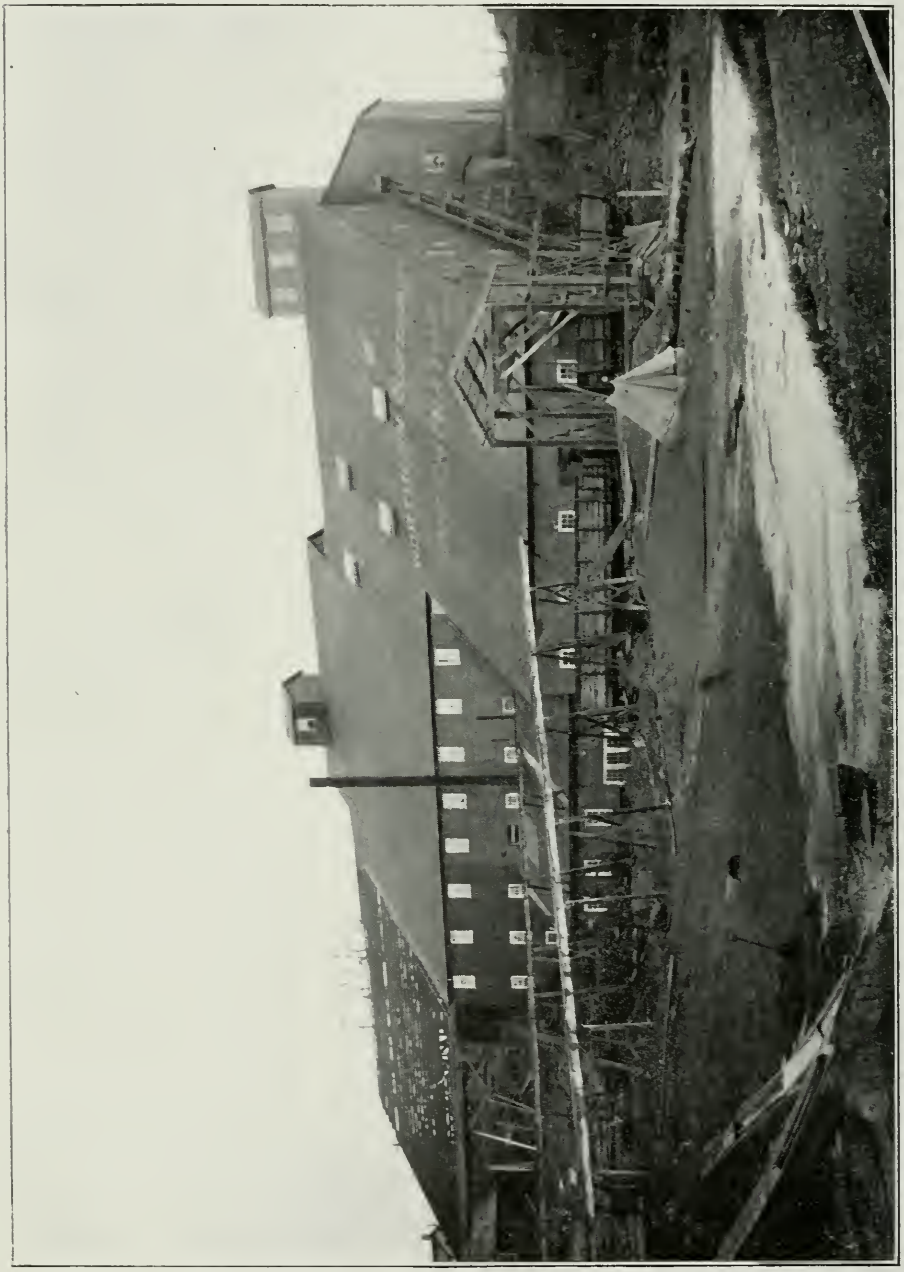
The Northern Customs Concentrator, Limited, is an independent company, operating a custom concentrating mill for treating low-grade silver ores. The company has an authorized capital of $250,000. Mr. A. J. Young is president, Mr. F. J. Bourne, consulting engineer, and Mr. M. F. Fairlie, superintendent. The mill is situated on the townsite of Cobalt, south of the railway station.

The company have a contract with the LaRose Mines, Limited; City of Cobalt Mining Company, Limited; the Cobalt Townsite Mining Company, Limited, and the Drummond Mines, Limited, for treating their low-grade ore. The ore averages from 20 to 30 ounces per ton, and a saving of from 75 to 80 per cent. of the silver contents is made. All the ore is weighed when entering the mill, so that the tonnage treated is accurately known. Electric power for driving the mill machinery is obtained from the British Canadian Power Company. This is the largest concentrating mill in the Cobalt camp, having now a capacity of about 280 tons per 24 hours. The company either treat the ore at a rate per ton, or pay for a specified percentage of the silver saved. The company recently added to their capacity, having now one hundred and ten 1,250-pound stamps and four Nissen stamps.

The ore is first passed through a Gates crusher, and then sent to rolls, where it is reduced to a ¾-inch product. From the rolls it goes through a Vezin sampler and then through a trommel. The different trommel products, except the fines, are sent to the jigs. The fines go to a classifier, and the fine product from this goes direct to the Wilfley tables, while the coarse is recrushed by the stamps along with the jig tailings The stamps crush to about 16-mesh. The stamp product is classified, the sands going to the Wilfley tables and the overflow to Callow tanks and then to vanners. The tailings from the vanners again go to a classifier, and the spigot discharge to waste, while the slimes are led over canvas tables.

Nipissing Reduction Mill

The custom plant of the Nipissing Reduction Company, Limited, situated on the Nipissing property, near the Kendall shaft, has a contract with the Nipissing Mining Company for treating the low-grade ores from vein 63 (Kendall).



Northern Customs concentrator, Cobalt.

The method of concentration at this mill is crushing by a series of rolls and jigging the products after each crushing, then regrinding in a Hardinge mill, and classifying and treating the sands on two Wilfley and eight James tables, and the slimes on six slime tables.

South Lorrain

Alice Lorrain

On mining claim R.L. 467 the Alice Lorrain Mines, Limited, have sunk a shaft a depth of 75 feet. No machinery has been installed.

Bellellen

On claim R.L. 470 the Bellellen Silver Mines, Limited, have carried on considerable development work. No. 1 shaft is 80 feet deep, with 144 feet and 114 feet of drifting north and south of the shaft on the 80-foot level; some stoping has been done. No. 2 shaft is 100 feet deep, with 200 feet of drifting and cross-cutting at the 100-foot level.

The plant consists of a 20-h.p. boiler and hoist.

Frontier

The Frontier Mining Company did some development work on their property near Loon lake during 1911. A shaft has been sunk 80 feet and 50 feet of drifting done at this level.

King George

Active development work was carried on during 1911 on claims H.R. 110 and 170. The main shaft has been sunk a depth of 272 feet, with 30 feet of cross-cutting at the 250-foot level.

The power plant consists of a 5-drill compressor, driven by a 75-h.p. motor, and a hoist. Electric power is obtained from the British Canadian Power Company.

Montrose

Work on R.L. 459 was carried on part of the year by the Montrose Cobalt Mining Company. A shaft was sunk a depth of 110 feet.

Sharp Lake

On claim B.C. 100 the Sharp Lake Mines, Limited, have sunk a shaft a depth of 50 feet. At the 50-foot level a drift has been run south 145 feet and east 60 feet.

Wettlaufer

The Wettlaufer is the largest and hitherto the only steady producer in South Lorrain. It is owned and operated by the Wettlaufer Lorrain Silver Mines, Limited, which have an authorized capital of 1,500,000 shares, of a par value of $1.00, and have paid $450,000 in dividends to June 1st, 1912.

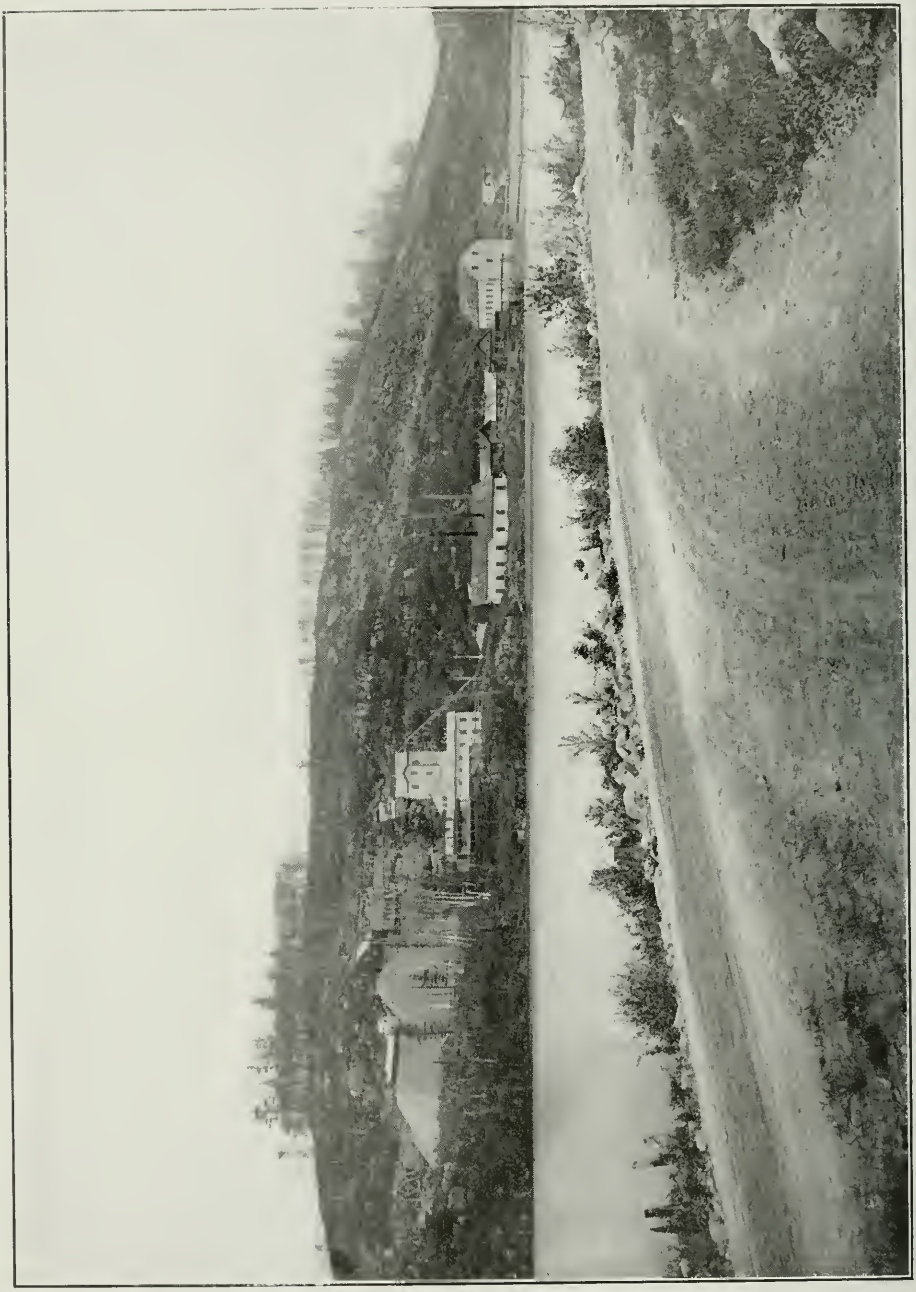
On the advent of electric power to the camp from the British Canadian Power Company, a new plant was installed, consisting of a 12-drill compressor, driven by a 200-h.p. motor. A 30-ton concentrating mill has been erected.

The main shaft has been sunk to the fourth level, a depth of 250 feet. Levels have been run at depths of 65 feet, 140 feet, 185 feet and 250 feet. The vein has been developed for a length of about 500 feet, the drifts on each level having been run approximately this distance. A winze was sunk at a point 210 feet southwest of the shaft from the fourth to the fifth level, and a drift run south 160 feet and north 70 feet.

Mr. Halstead Lindsley is mine manager.

Elk Lake Area

There were very few properties on which mining operations were carried on during 1911. A few that were worked for a short time are not mentioned in this Report.



Penn Canadian silver mine (Cobalt Central), showing road built of broken diabase.

Donaldson

This property is known as T.R. 531, situated in the township of James, and the work is under the direction of Mr. H. L. Donaldson. A small plant, consisting of a 25-h.p. boiler and hoist, has been erected. A shaft has been sunk 110 feet and 17 feet of drifting done.

Hitchcock

Work was recently begun on the Hitchcock property, situated on lot 11 in the third concession of the township of Tudhope. A new plant was erected during the winter, consisting of two 60-h.p. boilers, a 6-drill compressor and hoist. A shaft has been sunk 70 feet.

Moose Horn

The Moose Horn Mines, Limited, were engaged part of the year in mining work on the north half of the north half of lot 4 in the fifth concession of James. The main shaft remains at the same depth of 125 feet, with several hundred feet of drifting done at the level.

Lucky Godfrey

The Lucky Godfrey Cobalt Mines, Limited, did some work on claims J.S. 202 to 207, in the townships of James and Willet. In addition to prospecting on the surface a shaft was sunk 100 feet, a drift run west 68 feet and cross-cuts driven north and south 120 feet.

Gowganda Area

The Millerett and Miller Lake-O'Brien mines were steady producers during 1911. On a number of other properties development work was in progress.

Calcite Lake

Near Calcite lake, in the township of Lawson, the Calcite Lake Mining Company were engaged in development work, with Mr. E. H. York, superintendent.

The power plant consists of one 30 and one 50-h.p. boiler, a 3-drill compressor and hoist. A shaft has been sunk to a depth of 275 feet, with levels at 100 feet, 150 feet, 200 feet, and 270 feet. About 400 feet of drifting and cross-cutting has been done.

Hudson Bay

The Hudson Bay Mining Company have been developing a property near Hanging Stone lake, south of Gowganda lake. A plant has been erected consisting of two 50-h.p. boilers, one 12-h.p. boiler, a 3-drill compressor and hoist.

A shaft has been sunk 110 feet and some drifting done at the 80-foot level.

Chicago-Gowganda

The Chicago-Gowganda Mines Company, Limited, have been carrying on development work on claim M.R. 3794, Shillington township. The main shaft is 185 feet deep, with levels at 75 feet and 171 feet. On the first level a cross-cut has been run north 47 feet and 94 feet of drifting done. On the second level a cross-cut has been driven north 40 feet and 23 feet of drifting done.

Mann

There was but little work done by the Mann Mines, Limited, during 1911. Preparations were being made early in 1912 for resuming operations.

Millerett

The Millerett Silver Mining Company have been the largest shipper in the Gowganda and Elk lake areas. The first work done was driving an adit on the vein. This has a length of 275 feet, and 200 feet of the vein above the adit has been stoped to within

10 feet of the surface. The vein dips to the west at an angle of about 65 degrees. Shaft No. 1 is sunk vertically near the mouth of the adit to a depth of 83 feet. The level is at 70 feet, and drifts have been run southwest 175 feet and northeast 120 feet, and then north 550 feet to No. 7 shaft. A raise has been put through from this level to the adit level, and stoping carried on from each side of the raise. At a point in the drift 150 feet southwest of the shaft a winze has been sunk 60 feet, and 120 feet of drifting and 50 feet of cross-cutting done from this winze level. From the adit level a cross-cut was driven west to No. 2 vein.

No. 3 shaft has been sunk 56 feet, and 196 feet of drifting done at the 50-foot level.

No. 7 shaft is 210 feet deep, with levels at 70 feet, 150 feet, and 210 feet. The drift from No. 1 shaft connects with this shaft on the first level. On the second level 500 feet of drifting and cross-cutting has been done, and on the third level 150 feet. Some stoping has been done on both the second and the third level.

No. 9 shaft is 33 feet deep, with 170 feet of drifting done.

A new plant, consisting of three 80-h.p. boilers and a 12-drill compressor, was installed during the winter, and a 10-stamp concentrating mill erected.

Mr. G. M. Colvocoresses is mine manager.

The Millerett mill has adopted much the same principle of concentrating as is applied in the concentrating mills at Cobalt. The ore is first passed over a picking table, then through a Blake crusher, over trommels and to jigs. The jig tailings are then recrushed to 10-mesh by ten 1,250-lb. stamps, and the product is classified, the sands going to two Deister tables and the overflow to a Callow tank. The table tailings are reground in a Hardinge pebble mill, and classified, the sands going to two Deisters and the overflow to a Callow tank. The product from the tank is treated on a James table and then on canvas tables, and the tailings run to waste. The mill has a capacity of about 30 tons per day.

Miller Lake-O'Brien

This mine is the second largest shipper in the Gowganda area. The plant consists of two 50-h.p. boilers, two 100-h.p. boilers a 6-drill compressor and two hoists.

The main shaft is now 250 feet in depth, with levels at 60 feet, 90 feet, 140 feet, 200 feet and 250 feet. The work during 1911 has been chiefly on the three lower levels. On the third level 450 feet of drifting has been done and stoping carried on for 200 feet along the vein. On the fourth level 150 feet of drifting was done, and on the fifth 300 feet. A winze connects the third, fourth and fifth levels. A stope has been started south of the main shaft.

Northern

On what was formerly known as the Morrison claims, near Miller lake, the Northern Mining Company have sunk a shaft 95 feet and drifted 175 feet at the 90-foot level.

Powerful

The Powerful Mining Company have been engaged developing a property near Calcite lake. The plant consists of an 80-h.p. boiler and a 3-drill compressor. An adit 700 feet in length has been run and 250 feet of drifting and cross-cutting done.

South Bay

Work was started late in the year by the South Bay Mining Company of Gowganda on claims H.F. 225 and H.S. 123 and 124 in the township of Milner, south of Gowganda lake. No plant has as yet been erected, the mining work being done by hand. A shaft 45 feet in depth has been sunk.

Larder Lake Gold Area

An inspection of this area was made in September, 1911, at which date but little mining work was in progress.

Canadian Tonapah

On claims J.S. 127 and 128, in the township of McVittie, the Canadian Tonapah Company were doing a little work. Prospect shafts were sunk to depths of 14 and 30 feet.

The plant consists of a 25-h.p. boiler, engine, and 3-stamp mill.

Goldfields

Work was carried on by the Goldfields, Limited, on the property formerly known as the Harris-Maxwell. The shaft was sunk a depth of 110 feet, and a cross-cut run 20 feet on the 100-foot level.

A 30-stamp mill is being erected. A power plant for developing electricity is being installed at Ravens falls, which will be used for operating the machinery at the mine.

Reddick

The Dr. Reddick Larder Lake Mines, Limited, were operating their property part of the year. The mining work done to date consists of a shaft 80 feet deep, with 400 feet of drifts and cross-cuts at this level.

The plant consists of three boilers of 15 25, and 60 h.p. capacity, a 3-drill compressor, hoist, crusher and 20-stamp mill.

Swastika Gold Area

There was considerable activity in this area during 1911. A large number of claims were staked and assessment work performed. Two properties on which extensive development work was carried on were the Lucky Cross and Swastika.

Lucky Cross

The Lucky Cross Mines, Limited, own three claims in the township of Teck, situated south of and adjoining the Swastika townsite. A shaft has been sunk a depth of 100 feet, with cross-cuts driven west 216 feet, east 220 feet, northeast 170 feet, and 155 feet of drifting done on veins encountered.

A plant consisting of a 125-h.p. boiler, 6-drill compressor and hoist has been erected.

Swastika

The property of the Swastika Mining Company, Limited, consists of three patented claims in the township of Otto and two patented claims in the township of Teck, comprising 200 acres. They hold in addition mining claims 16,358 and 16,359 in the township of Otto, and 12,619, 16,418 and 16,419 in the township of Teck, containing 165 acres. The greater part of the development work has been done on what was known as claim R.S.C. 204 in the unsurveyed part of the township of Teck, and on claim 9,592 in the township of Otto. Both of these claims are on the northeast end of Otto lake and about one-third of a mile from Swastika station, T. & N. O. railway. The company have an authorized capital of 2,000,000 shares, of a par value of $1.00. Dr. M. Steele is president, Mr. Jas. Clark, Toronto, secretary-treasurer, and Mr. John Redington, manager.

The extent of underground workings, as shown by the manager's report, both for the year 1911 and total work accomplished, is as follows:—

Class of work.	Level.	During 1911.	Total to Dec. 31, 1911.
Sinking		229 feet.	424 feet
Raising		185 "	185 "
Drifting	35-foot.	35 "	70 "
"	100 "	501 "	501 "
"	200 "	93 "	93 "
Cross-cutting	35 "		342 "
"	100 "	351 "	491 "
"	200 "	287 "	287 "
Total		1,681 "	2,393 "

The depth of the main shaft is 320 feet, with station cut at the 300-foot level, and 175 feet of drifting done at this level.

The power plant consists of two 125-h.p. Jenckes return tubular boilers, a 9-drill compressor, a double drum hoist and an electric light plant.

A 5-stamp mill was erected in the early part of 1911, and 520 tons of ore milled.

Munro Township

Several gold mining companies were engaged in prospecting work during the summer of 1911 in the townships of Munro and Guibord. The only properties on which underground work was being done at the date of inspection were the American Eagle and Gold Pyramid.

American Eagle

This property is situated on lot 10 in the first concession of Munro, and is operated by the American Eagle Mining Company. A shaft has been sunk 70 feet, and 30 feet of drifting and 65 feet of cross-cutting done.

The plant consists of two 50-h.p. boilers, a 6-drill compressor, a hoist and a Tremain stamp.

Gold Pyramid

On lots 11 and 12, in the sixth concession of Guibord, the Gold Pyramid Mining Company of Larder Lake, Limited, did some work during 1911. Two prospect shafts were sunk to depths of 27 and 32 feet.

The plant consists of a 60-h.p. boiler, a 5-stamp mill and an engine for driving the same.

Porcupine Gold Area

Development work was carried on by a large number of companies in the Porcupine area during 1911. The disastrous fire of July 10th, 1911, caused a great loss of life and destruction of property, and gave a number of the mining companies a severe setback. As the Temiskaming and Northern Ontario railway had just completed their line to the camp, it was possible to get in supplies and equipment, and a speedy recovery from the effects of the fire was made. Delay, however, was occasioned to the large operators, the Dome Mines, Limited, and the Hollinger Mines, Limited, in the erection of their mills, so that little gold was produced by these companies during the year.

As the geology of the area and a description of the principal mines are given by Mr. A. G. Burrows in another part of this volume, a brief account of the operating mines and prospects only will be given here.

Apex

The Apex Porcupine Mines, Limited, carried on development work on parts of lots 6 and 7 in the first concession of Tisdale. Two shafts were sunk to depths of 55 and 62 feet.

The plant consists of two 60-h.p. boilers, an 8-drill compressor and two hoists.

Armstrong-McGibbon

Mining claims M.E. 60 and 61 in the township of Deloro are being developed by the Armstrong-McGibbon syndicate.

No. 1 shaft has been sunk 40 feet, and 17 feet of drifting done; No. 2 shaft, 45 feet, with 52 feet of cross-cutting; and No. 4 shaft, 45 feet, with 32 feet of cross-cutting.

Cartwright

On part of lot 1 in the first concession of Mountjoy, Mr. B. Cartwright and associates have been carrying on development work. A shaft has been sunk 50 feet, and 30 feet of cross-cutting done.

Crown-Chartered

The Crown Chartered Gold Mining Company of Porcupine Lake, Limited, have an authorized capital of 2,000,000 shares, of a par value of $1.00. Work was confined during the year to the Davidson claim in the township of Tisdale, and was under the supervision of Mr. C. F. Dike. The plant consists of a 20-h.p. boiler and hoist.

The main shaft is 147 feet deep, with level at 100 feet. On this level a cross-cut was driven northwesterly 125 feet, and drifts run on the vein east and west from the cross-cut distances of 100 feet and 75 feet. Cross-cuts were driven from the end of these drifts distances of 20 feet and 35 feet.

Dobie

On the north half of the south half of lot 1 in the fifth concession of Tisdale, the Dobie Mines, Limited, were working during the year. Two shafts were sunk to a depth of 100 feet and 50 feet, and 200 feet of drifting done from the 100-foot level of the deeper shaft. The plant consists of one 60- and one 30-h.p. boiler, a 3-drill compressor and hoist.

Dome

The properties of the Dome Mines, Limited, are situated on the north half of lot 4 in the first concession of Tisdale. Development work underground has been carried on at the 45-foot, 100-foot and 200-foot levels. A change was made in the system of hoisting from the 45-foot level by running an incline shaft 250 feet in length at an angle of about 10 degrees from near the mill to this level. The mine cars will be drawn by mules from the various working places underground to the bottom of the incline, from which place they are hauled up the incline to the rock-house. The 45-foot level is being blocked out into rectangles 100 feet by 160 feet and raises put through to the surface every 50 feet along these drifts and cross-cuts. The ore will be underhand stoped from the surface to these raises. There has been about 1,200 feet of drifting and cross-cutting done on this level. On the 100-foot level, 200 feet of drifting and cross-cutting has been done and 175 feet on the 200-foot level.

The 40-stamp mill was nearly completed when it was destroyed by fire in July, 1911. Rebuilding was at once begun, and the new mill was completed in March, 1912. The superstructure of this mill, as well as of the power plant, is of structural steel and brick. The method of treatment of the ore is similar to that adopted in the mill destroyed. The mill was designed and erected by the Merrill Metallurgical Company. Preliminary crushing is accomplished by two gyratory crushers. The crushed ore is carried by belt conveyors to forty 1,250-pound stamps crushing to 8-mesh, and then passed over amalgamating plates to four Dorr classifiers. It is then reground in four tube mills and again passed over the amalgamating plates. The pulp is then conveyed to the concentration cones, three Dorr thickeners and four Pachuca agitators. From the tanks the product is passed through Dorr thickeners to Merrill slime presses. The gold in the solution will be precipitated by the Merrill zinc dust process. It is expected that the mill will have a capacity of 300 tons of ore per day. The machinery in the mill is motor-driven throughout.

The power plant consists of seven 150-h.p. Babcock & Wilcox boilers. four 300-k.w. generators (each driven by a Robb engine), a 12-drill compressor and double drum hoist.

Mr. A. Monel is president of the company and Mr. R. M. Meek general superintendent.

Dome Extension

The property, owned and operated by the Dome Extension Mines, Limited, is situated east of and adjoining the Dome mine. Captain Anchor is superintendent.

The shaft is 222 in depth with levels at 100 feet and 200 feet. On the first level a cross-cut has been driven north 90 feet and on the second level 250 feet. Drifts have been run east and west, on the second level. 180 feet and 130 feet respectively.

No. 4 shaft is 380 feet distant from No. 1 and is 100 feet in depth. At this depth a cross-cut was driven south 120 feet and 140 feet of drifting done.

The plant consists of two 80-h.p. boilers, an 8-drill compressor and hoist.

Dome Lake

The Dome Lake Mining Company are carrying on mining work on part of lot 6 in the first concession of Tisdale, under the supervision of Mr. J. F. McKenzie.

Two shafts have been sunk to depths of 60 feet and 50 feet, and 160 feet of drifting done in the former shaft and 30 feet in the latter.

The plant consists of a 25-h.p. boiler and hoist.

North Dome

On parts of lots 3 and 4 in the first concession of Tisdale the North Dome Mining Company are carrying on development work. Two shafts have been sunk to a depth of 60 feet each. At No. 1 shaft 250 feet of drifting has been done, and at No. 2 shaft 180 feet of drifting and cross-cutting.

The plant consists of an 80- and a 30-h.p. boiler, a 6-drill compressor and hoist.

Preston Dome East

The Preston East Dome Mining Company were carrying on work on both the Preston and the East Dome claims.

An incline shaft was sunk 50 feet and some drifting done.

The plant consists of a 30-h.p. boiler and hoist. Mr. S. Thorne was in charge of operations.

West Dome

The West Dome Mines, Limited, have been developing two claims to the west of and adjoining the Dome. Four shafts have been sunk. No. 1 shaft is 123 feet in depth with 204 feet of drifting on the 105-foot level. No. 2 shaft is 28 feet, No. 3 shaft 114 feet, and No. 4 shaft 76 feet deep.

The plant consists of two 60-h.p. boilers, a 6-drill compressor and hoist.

This company lost all their buildings and plant and nearly all their men in the Porcupine fire.

Foley-O'Brian

Work was carried on by the Foley-O'Brian Mining Company until July, 1911, when all work ceased. Two shafts were sunk to depths of 100 feet and 200 feet, and a few hundred feet of drifting done.

Gold Reef

The Porcupine Gold Reef Mining Company, Limited, with a capital of $1,000,000, were carrying on development work on parts of lots 9 and 10 in the fifth concession of Whitney. Two shafts have been sunk to depths of 25 feet and 38 feet.

Jupiter

The Jupiter Mines, Limited, have been developing a property on the north shore of Pearl lake. Mr. R. W. Brigstocke is manager, and Mr. J. H. Rattray superintendent.

No 1 shaft is 100 feet deep and connected with No. 1B shaft, 170 feet southwest, on this level. A cross-cut has also been driven north from the shaft 130 feet. No. 1B shaft is 200 feet in depth, and on this level 350 feet of drifting has been done. No. 2 shaft on the east side of the claim is 300 feet deep, and 125 feet of drifting has been done on both the 200-foot and 300-foot levels.

The plant consists of two 40-h.p. boilers, a 4-drill compressor and three hoists.

Hollinger

The Hollinger Mines, Limited, have an authorized capital of $3,000,000, divided into 600,000 shares of a par value of $5.00. Mr. Noah A. Timmins is president, Mr. D. A. Dunlap, secretary-treasurer, and Mr. P. A. Robbins, general manager.

The holdings of the company consist of four 40-acre claims comprising the east half of the north half and the northeast quarter of the south half of lot 11, and the northwest quarter of the south half of lot 10 in the second concession of Tisdale.

The company lost all their surface plant and buildings by fire on May 19th, 1911. This included the 30-stamp mill which was partly erected. A 4-compartment shaft has been sunk on claim 13,156 to the 200-foot level. All the ore will be trammed underground to this shaft and hoisted to the crusher station located at the collar of the shaft. This crusher station will consist of a gyratory crusher, revolving screen and fine jaw crusher. The ore will be conveyed from here to the top of the mill by belt conveyor.

The manager reports the total underground work done to December 31st, 1911, to be as follows:—

Shafts	366	feet.
Winzes	127	"
Raises	82	"
Drifts, 100-foot level	1,289	"
Drifts, 200-foot level	370	"
Cross-cuts, 100-foot level	1,233	"
Cross-cuts, 200-foot level	250	"
Total	3,717	"

The power plant consists of a 15-drill compressor electrically driven, and a double drum electric hoist. New shops, change house for the underground men, assay office and transformer station have been erected. The sleep camps and boarding house are being erected in the town of Timmins.

The process as decided for treatment of the ore is as follows:—

1. Coarse grinding.
2. Stamping in cyanide solution.
3. Tube milling.
4. Concentration followed by amalgamation of concentrates.
5. Cyanide treatment of both gangue and concentrate residues.

The apparatus being installed in the mill is as follows:—

1 Gyratory crusher.
1 jaw crusher.
Sampling plant.
40- 1,500-pound stamps.
4 Dorr classifiers.
4 Spitzkasten.
40 Deister slime tables.
4 Dorr pulp thickeners.
4 Trent agitators.
2 Moore filters.
2 Merrill clarifying presses.
2 Merrill precipitation presses.
4 Tube mills.
Pumps, amalgamating pans and settlers.

The mill will be motor-driven throughout, power being obtained from the Porcupine Power Company.

Hollinger Reserve

The Hollinger Reserve Mining Company were engaged the latter part of the year in diamond drilling on claims Nos. 44, 45 and 46 in the township of Ogden under the supervision of Mr. W. Evans.

Hughes

On parts of lot 10 in the fourth concession of Whitney the Hughes Porcupine Mines, Limited, were carrying on development work. A shaft 50 feet in depth has been sunk, and a cross-cut 45 feet in length driven.

The plant consists of a 25-h.p. boiler and a hoist.

Imperial

On mining claims H.R. 950 and 951 in the township of Deloro, the Imperial Gold Mining Company, Limited, were carrying on development work during part of 1911. A shaft has been sunk a depth of 100 feet and a 150-foot cross-cut driven.

The plant consists of a 60-h.p. boiler and hoist.

Iroquois

On parts of lot 9 in the first concession of Whitney the Iroquois Porcupine Mining Company were engaged in prospecting and development work. Two shafts were sunk to depths of 40 and 25 feet.

The plant consists of a 30-h.p. boiler and hoist.

La Palme

The La Palme Mining Company did some work on parts of lots 4 and 5 in the fifth concession of Whitney. A shaft was sunk a depth of 45 feet.

Little Pet

On mining claim H. R. 907 in the township of Deloro, the Little Pet Mining Company have sunk a shaft to a depth of 95 feet and done about 100 feet of drifting. The plant consists of two 60-h.p. boilers, a 7-drill compressor and hoist.

Moneta

On parts of lot 12 in the first and second concessions of Tisdale the Moneta Mines, Limited, have been diamond-drilling and shaft-sinking. The shaft is sunk to a depth of 100 feet.

The plant consists of a 6-drill compressor driven by a 100-h.p. motor and two hoists.

McEnaney

The Crown Reserve Mining Company have been carrying on development work on the McEnaney claim, which adjoins the Hollinger on the south. No. 1 shaft has been sunk 60 feet, No. 2 shaft 300 feet with 70 feet of cross-cutting on the 100-foot level and 140 feet of drifting on the 200-foot level. No. 3 shaft is 100 feet deep with 80 feet of drifting, and No. 4 shaft 100 feet deep with 240 feet of drifting.

The plant consists of a motor-driven compressor and hoists.

McIntyre

The McIntyre Porcupine Mines, Limited, have carried on extensive development work on a 40-acre claim at the west end of Pearl lake. No. 1 shaft on the southwest corner of the claim has been sunk 200 feet, with levels at 100 feet and 200 feet. On the first level 140 feet of drifting and 140 feet of cross-cutting was done, and on the second level 320 feet of drifting and 340 feet of cross-cutting. No. 4 shaft, near the southeast corner of the claim, is 200 feet deep, with 250 feet of drifting and 120 feet of cross-cutting at the 200-foot level. No. 2 shaft on the west side of the claim is 75 feet deep, with 170 feet of drifting and cross-cutting at the level. No. 5 shaft, 360 feet east of No. 2, is 200 feet deep with 100 feet of drifting at the lower level. No. 3 shaft, near the north side of the claim, is 75 feet deep with 150 feet of drifting and 75 feet of cross-cutting. A 10-stamp mill has been erected near No. 1 shaft and milling was commenced in February, 1912. The ore is first put through a crusher, then goes to stamps and is passed over amalgamating plates. It is then concentrated, the concentrates being stored for further treatment.

The power plant consists of three 60-h.p. boilers, a 12-drill compressor, built for operating by steam or motor, and hoists at each of the shafts.

Mulholland

On part of lot 10 in the fifth concession of Whitney the Mulholland Mines, Limited, have been carrying on development work under the supervision of Mr. D. Allen.

A shaft has been sunk to a depth of 100 feet and 285 feet of drifting and 140 feet of cross-cutting done at the above depth. The plant consists of a 25-h.p. boiler and hoist.

Ontario Porcupine

On claim No. 13,042, consisting of the southeast quarter of the south half of lot 8 in the third concession of Tisdale, east of Pearl lake, the Ontario Porcupine Goldfields Development Company, Limited, have sunk a shaft to the depth of 150 feet. Cross-cuts were run north 430 feet and south 275 feet at the 150-foot level. On this claim a plant was erected consisting of two 60-h.p. boilers, 6-drill compressor and hoist.

Pearl Lake

The Pearl Lake Gold Mines, Limited, have during the year carried on mining work on the east half of the south half of lot 10 in the third concession and on the north half of the south half of lot 9 in the third concession of Tisdale. Most of the work has been done on the south 40 acres of lot 10 to the north of Pearl lake. No. 2 shaft has been sunk 50 feet and No. B shaft 100 feet with 200 feet of drifting at the 100-foot level. A main 3-compartment shaft is being sunk and has reached a depth of 400 feet.

The power plant consists of a 12-drill compressor, electrically driven, and a double drum hoist.

Plenaurum

The Plenaurum Mines, Limited, have taken over the Armstrong-Booth claims, consisting of the west half and northeast quarter of the south half of lot 8, the north half of the south half of lot 7, and the west half of the south half of lot 6 in the third concession of Tisdale. Two shafts have been sunk on the southwest quarter of the south half of lot 8 to a depth of 200 feet each. A drift has been run north from No. 1 shaft 325 feet, south 75 feet, and east 140 feet. From No. 2 shaft a drift has been run northwest towards No. 1 shaft 250 feet.

The power plant consists of a 9-drill compressor, electrically driven, and two hoists. Mr. C. E. Watson is manager.

Rea

The Rea Consolidated Gold Mines, Limited, carried on mining work on the south half of lots 5 and 6 in the fourth concession of Tisdale. The main shaft has been sunk 400 feet with levels opened up at 200 feet, 300 feet and 400 feet. On the 200-foot level drifts have been run northeast 125 feet and southwest 260 feet. From the southwest drift a cross-cut was run northwest 275 feet. The Eakin shaft, 130 feet west of the main shaft, connects with this level. On the 300-foot level drifts have been run northeast 120 feet and southwest 110 feet and a cross-cut driven northwest 80 feet. On the 400-foot level a cross-cut was run northwest 80 feet and considerable diamond drilling done.

The plant consists of two 60-h.p. boilers, a 6-drill compressor and hoist.

Scottish Ontario

On the southeast quarter of the south half of lot 11 in the fifth concession of Whitney the Scottish Ontario Gold Mining Company have sunk a shaft a depth of 90 feet. On the 80-foot level the cross-cut has been driven 160 feet and 260 feet of drifting done on a vein encountered 50 feet north of the shaft.

Smith Veteran

Under superintendent D. Allen the Smith Veteran Mines, Limited have been carrying on development work. A shaft was sunk 55 feet and 40 feet of drifting and 124 feet of cross-cutting done at this level.

The plant consists of a 25-h.p. boiler and hoist.

Standard

On claims H. R. 908 and M. E. 15 in the township of Deloro the Standard Gold Mines, Limited, have been carrying on development work. One shaft has been sunk 83 feet and 40 feet of a cross-cut driven. Some diamond drilling has also been done.

The plant consists of a 20-h.p. boiler and hoist.

Three Nations

Near Three Nations lake on lot 5 in the fifth concession of Whitney the Three Nations Gold Mining Company have been carrying on prospecting work. Considerable stripping has been done and a shaft sunk 37 feet.

Vipond

The Vipond Porcupine Mines Company Limited have been developing the southeast quarter of the south half of lot 10 in the second concession and the northeast quarter of the north half of lot 10 in the first cocession of Tisdale. The main shaft has been sunk a depth of 200 feet with levels at 100 feet and 200 feet. On the first level 380 feet of drifting has been done on the main vein and about 250 feet of cross-cuttng. On the second level a cross-cut has been driven northwest from the shaft 80 feet and southeast 120 feet. On the vein 170 feet of drifting has been done.

An new plant has been installed, consisting of a 9-drill compressor driven by a 150-h.p. motor and hoist.

The test mill was destroyed by the Porcupine fire. A new mill of about 100-ton capacity per day is being erected and is expected to be completed by July 1st, 1912.

Mr. C. H. Poirier is manager.

IV.—EASTERN ONTARIO

But little change was noted in the mining industry in Eastern Ontario during the last year. About the same number of properties were being worked, yielding practically the same production. Work was resumed at the Cordova gold mine in Peterborough county after having been closed for eight years. The Mayo iron mine at Bessemer was reopened by the Canada Iron Mines, Limited, who are building a concentrator at Trenton for treating ore from the Mayo, Coe Hill and Blairton mines.

A mill for the grinding of feldspar was erected one and a half miles from Parham Station, Kingston and Pembroke railway, by the Suroff Feldspar Mining and Milling Company, the feldspar to be obtained from the company's properties on Bob's lake. Shipments of crude feldspar to the United States from the Richardson mine continued steadily throughout the year.

Other minerals produced were corundum, iron pyrites, mica, graphite, talc and zinc. The production of marble, building stone, crushed stone and limestone for the manufacture of cement shows an increase.

Iron

Ledyard Mine

The Buffalo Union Furnace Company, with head office in Buffalo, started work on the Ledyard mine on lot 19 in the first concession of Belmont in the county of Peterborough, the latter part of the year, and a shaft was sunk a depth of 100 feet. A plant consisting of two boilers of a capacity of 80-h.p. and 45-h.p., a small straight line compressor and hoist, has been erected.

Mr. Frank Platto is superintendent, employing 20 workmen.

Mayo

The Mayo mine at Bessemer, formerly owned by the Mineral Range Iron Mining Company, and closed down since May, 1910, has been taken over by the Canada Iron Mines, Limited, and work was begun in April, 1912.

The old No. 4 workings have been unwatered. The shaft is being sunk and drifting done on the 110-foot level.

A new plant, consisting of two 150-h.p. boilers, a 20-drill compressor and double-drum hoist, has been installed.

Orton

Work was begun early in 1912 on the Orton mine in Hastings county. The work being done consists of stripping, trenching and test-pitting.

Wilbur

The Exploration Syndicate of America ceased all work at the Wilbur mine in August, 1911. Stoping had been carried on in the No. 1 shaft and the upper part of the ore body open-cut. Another shaft northeast of No. 1 was re-opened and timbered to a depth of 80 feet, where drifts were run north and south distances of 100 feet respectively.

Cordova Gold Mine

The old Belmont mine was re-opened in 1911, after being closed for eight years, and is being worked by the Cordova Mines, Limited. Nos. 1, 3, and 7 shafts have been pumped out and work begun. No. 1 shaft is 400 feet deep with levels at 60 feet, 100 feet, 200 feet, 300 feet and 400 feet. Most of the work was formerly done on the 300-foot and 400-foot levels, where 450 feet and 550 feet of drifting were done respectively in addition to the stoping. No. 3 shaft is 440 feet in depth with levels at 85 feet, 185 feet, 285 feet, and 385 feet. Considerable stoping was done above the third level and on the fourth level 400 feet of drifting. The new work is being confined to the fourth level. No. 7 shaft is 135 feet deep with level at 85 feet. Some new work has been done on this level.

The 30-stamp mill on the property has been renovated and put in operation.

Mr. P. Kirkegaard is managing director.

Iron Pyrites

Sulphide

The main shaft at this mine is now down to the sixth level, a depth of 575 feet. Mining work is being carried on at the first, fourth and sixth levels. On the first level, north vein, stoping is being done. On the fourth level 300 feet of drifting has been done on the south vein, a cross-cut driven to the north vein 120 feet and 360 feet of drifts run on the north vein. A raise has also been put through to the third level on this vein and stoping begun. On the fifth level 180 feet of drifting has been done on the south vein, 225 feet on the north vein, and connected by a cross-cut 120 feet in length. On the sixth level a drift was run east 75 feet from the shaft and a cross-cut driven to the north vein, where 75 feet of drifting has also been done.

At the acid plant additional machinery is being installed for crushing the ore. The new units of the plant have been completed, and sulphuric, nitric and hydrochloric acids are produced.

Mr. W. H. DuBlois is superintendent for the owners, the Nichols Chemical Company.

Craig

On the Craig property, situated about one-half mile west of the Sulphide mine, the shaft has been sunk a depth of 300 feet, following the dip of the ore. Stoping has been carried on at both the 100-foot and 200-foot levels. On the 200-foot level drifts have been run east 100 feet and west 50 feet. East of the shaft on this level the ore body has been opened up for a width of about 30 feet and a raise started. A raise for the purpose of ventilation from the first level to the surface has been begun.

The plant and equipment remain the same as described in the last Report of the Bureau of Mines.

Queensboro

Work has been carried on continuously by the Canadian Sulphur Ore Company on the northeast quarter of lot 9 in the tenth concession of Madoc. The main shaft is 180 feet deep, but no work is being done in it. Another shaft about 400 feet distant is 100 feet deep, with drifts run east 25 feet and west 80 feet. This shaft was sunk on the ore body, and the ore is being mined by open-cut methods. The company purpose building an aerial tramway from the mine to the railroad two miles distant.

Mr. John Harris is superintendent, employing 30 men. Thirty tons of ore per day are being shipped.

Olden Zinc

The Olden zinc mine, owned by Messrs. Richardson, of Kingston, was worked part of the year under superintendent S. Hunter. The shaft on the vein northwest of the old workings was sunk to a depth of 150 feet, and a new shaft east of the old power house sunk 50 feet. A new plant was installed, consisting of two 100-h.p. boilers and a 14-drill compressor.

Feldspar

Richardson Mine

This mine, owned and operated by the Kingston Feldspar and Mining Company, is still the largest shipper of feldspar in the Province. The feldspar is mined by open-cut work, and the only change recorded during the year was the enlarging of the area of the workings, there being no increase in the depth. Considerable capping of gneiss is being removed from both the northeast and northwest sides of the deposit. This will make accessible a large body of feldspar. A large tonnage of quartz in the central part of the deposit was also removed. The system of transportation from the mine to the railway remains the same, with the exception of the enlargement of the scows on the lakes.

Mr. M. J. Flynn is superintendent, employing 50 men.

Reynolds

The Kingston Feldspar and Mining Company began work on lot 1 in the thirteenth concession of Portland township in 1911. The feldspar mined was taken from an open pit 60 feet long, 30 feet wide by 10 feet deep. A 20-h.p. boiler and hoist are used and 16 men employed.

Card

This mine is also operated by the Kingston Feldspar and Mining Company, and the feldspar has been mined from an open pit 250 feet long, 25 feet wide and 25 feet deep. A cable haulage-way was erected the latter part of the year and a new double drum hoist for operating buckets on it.

Suroff

The Suroff Feldspar Mining and Milling Company have constructed a mill for the grinding of feldspar one and a-half miles from Parham station on the Kingston and Pembroke railway. Some work was also done on the company's mining properties on Bob's lake.

Mr. A. Morton is the mill superintendent.

Talc

Henderson Mine

This mine is being operated under lease by Mr. S. Wellington, who employs 15 men. The main shaft has been sunk a depth of 185 feet, with levels at 120 feet and 185 feet. On the 120-foot level a drift has been run east 400 feet, and the ore body open-cut for a length of 150 feet to the level. All mining work is now confined to the 185-foot level, where a drift has been run east 300 feet. This level is being worked by the square set method. In beginning this system on the level a line is chosen at right angles to the longitudinal axis of the deposit, and a room driven across the deposit the width of one set of timbers and the square sets put in. A slice is then taken across the deposit on top of these sets and another set of timbers put in. This is carried through to within 20 feet of the level above and another slice taken alongside of the first row of sets, the talc extracted and square sets put in place as in the first set. Care is taken to put in the set as soon as there is space for it. The greater part of the ore is sold to Geo. H. Gillespie and Company, who operate a mill for grinding talc at the railway station, Madoc.

Gillespie Mill

This mill, owned and operated by Geo. H. Gillespie and Company, was run continuously throughout the year. The mill was enlarged the latter part of the year to a capacity of from 25 to 30 tons per day.

Canadian Talc and Silicate Company

This company have opened up a mine and built a mill for the grinding of talc about two miles north of Eldorado, in the county of Hastings. A shaft has been sunk 75 feet and a drift run east 100 feet. A mill with a capacity of about five tons per day has been erected.

A power plant consisting of a 70-h.p. boiler, engine for driving mill machinery and hoist, has been installed.

Mr. C. J. Jones is president of the company, and R. M. Phillips superintendent. The company's head office is at the McKinnon Building, Toronto.

Mica

There was a decrease in the production of mica during 1911 compared with the preceding year. The prices were very good, but no new properties of importance were opened up.

Lacey

This mine, owned by the Loughborough Mining Company, continues to be the main producer of mica in the Province. Operations have been carried on continuously in the main workings since 1900. Prior to that considerable work was done in a pit about 300 feet distant from the present workings.

During the summer months all work is confined to the open cut, which has now reached a depth of 90 feet, with an area at the surface of 75 feet by 100 feet. Work is carried on during the winter on a parallel body about 100 feet south of main workings and at a depth of 140 feet. This stope has been enlarged and drifts extended an additional 50 feet to the northeast.

Mr. G. W. McNaughton is manager.

Bob's Lake

On the west side of Bob's lake, in Frontenac county, Messrs. Stoness and Kent carried on mining operations during the year. The mica is mainly produced by open-cutting the veins to depths from 50 to 75 feet. The mica is shipped to Kingston, where it is cleaned and thin-split.

Birch Lake Syndicate

Near Birch lake, Loughborough township, the Birch Lake Syndicate, of which Mr. A. Martin is manager, have been prospecting for mica. Several test pits have been sunk up to 40 feet in depth and some mica produced.

Silver Queen

On lot 13 in the fifth concession of Burgess township Mr. Edward Smith has continued operations. The old workings have been abandoned and several test pits sunk up to 30 feet in depth on different parts of the property.

Some shipments of feldspar were also made from the same property.

Other Mica Properties

Mr. G. E. Allard has been prospecting for mica in the township of Loughborough. Mr. J. A. Stewart, of Perth, also did some prospecting on the northwest side of Otty lake.

Mica Trimming Works

The same firms are engaged in trimming and thin-splitting mica in Ottawa, as reported last year, namely: General Electric Company; Laurentide Mica Company; Eugene Munsell & Company; Wallingford Mining & Mica Company; Mr. R. Blackburn; Mr. S. O. Filion; Mr. N. Holland; and in Kingston, Kent Bros.

Graphite

Black Donald

The Black Donald Graphite Company operated their mill all year, and the mine during the summer months, when sufficient crude material was produced for the year's operation of the mill. The heading in the open pit was advanced 25 feet and the pit timbered. The refined graphite is hauled to Calabogie, a distance of 12 miles, for shipment.

Mr. R. F. Bunting is manager, and Mr. Geo. W. Stewart superintendent.

McConnell

The mill at Port Elmsley and the mine three miles distant, owned by the Globe Refining Company, were worked until August, 1911, when operations were suspended. The shaft at the mine was then 90 feet deep, with drifts east 125 feet and west 100 feet from the shaft.

Wilberforce

The Virginia Graphite Company completed their mill at Wilberforce. Some graphite was mined from their quarry near the mill and a quantity shipped from a property near Maynooth on the Central Ontario railway. The equipment of the mill consists of two 125-h.p. boilers, an 18 by 48-inch Corliss engine, a crusher, rolls, screens, and nine separators. The concentration is by a dry process.

Mr. H. G. Tonkin is manager.

Manufacturers' Corundum Mines

The Manufacturers' Corundum Company continue to operate the mine and mills of the Canada Corundum Company and the Ashland Emery and Corundum Company. The same system of working both the mines and mills is followed as described in former Reports of the Bureau of Mines. All the mining is still done by open-cut work, and these open cuts have been deepened and enlarged and new pits opened.

Mr. D. A. Brebner is managing director.

Deloro Silver Refinery

The Deloro Mining & Reduction Company, with works at Deloro two miles from Marmora station, Central Ontario railway, continued the work of smelting cobalt-silver ores throughout the year. The freight rates from Cobalt to Marmora station on ore have a value of:—

1. Under \$50 per ton	\$5.60
2. \$50 and under \$100 per ton	6.80
3. \$100 and under \$500 per ton	8.20
4. \$500 and over per ton	9.60

The schedule of payment for the ores f.o.b. Marmora station is as follows:—The company pay for the best assay value of the ore, less a smelting charge of \$25 per ton and a refining charge of (1) ¾ of a cent per ounce of silver contents on ore assaying 3,000 ounces and over per ton; (2) 1 cent per ounce of silver contents on ore assaying from 2,000 to 3,000 ounces per ton; and (3) 1½ cents per ounce of silver contents on ore assaying less than 2,000 ounces per ton. Payment is made for 75 per cent. of the net proceeds, according to Messrs. Handy & Harman's New York quotation, 30 days after completion of sampling, and the balance in 90 days according to the same company's quotation on that date.

Mr. S. B. Wright is manager.

Limestone Quarries

Lehigh

The Canada Cement Company quarry limestone at Point Anne, six miles from Belleville, for use in manufacturing cement at their Lehigh and Belleville plants. The quarry has a depth of 30 feet and an area of 700 feet by 350 feet. A steam shovel is used in the quarry for loading the broken rock. A spur was built from the quarry, which adjoins the Lehigh plant, to the Belleville plant for hauling the limestone. A hoisting and loading station was also erected. The company employ 50 men in the quarry.

Point Anne

The Point Anne Quarries, Limited, were engaged during the whole of the season of navigation in mining, crushing and shipping limestone. The quarry is located between the Lehigh and Belleville plants of the Canada Cement Company. It is still very shallow, and the rock when broken is loaded by a steam shovel into cars, which are hauled by horses to the crushing plant, where the rock is crushed and graded.

Mr. A. G. Bennett is superintendent, employing 50 men.

Burnt River

Britnell and Company, of Toronto, continued to work their quarry near Burnt River, in the township of Somerville, during the summer months. Building stone and crushed rock are shipped to Toronto.

Preneveau

About five miles east of Havelock the Ontario Rock Company are opening up a quarry of diabase. The rock is to be used in the macadamizing of roads. A crushing plant is being erected, and a spur from the Canadian Pacific railway built.

Brick Works

Don Valley

At the Don Valley Brick Works, situated in the valley of the Don river, just outside of Toronto, both clay and shale are quarried and used in the manufacture of brick. The clay overlies the shale and has a thickness of about 50 feet. The shale quarry is 35 feet in depth and 150 feet in diameter, the pit being circular in area. The clay is loaded into cars by a steam shovel.

Mr. Robt. Davies is manager, employing 30 men in the quarry.

Other Brick Works

The following companies are engaged in excavating clay for the manufacture of brick in the eastern part of the City of Toronto:—

A. H. Wagstaff & Company, 362 Greenwood Avenue.

Bell Bros. & Company, 368 Greenwood Avenue.

Isaac Price, Greenwood Avenue.
Standard Brick Company, Greenwood Avenue.
J. Logan, 473 Greenwood Avenue.
Ashbridge Brick Company, Greenwood Avenue.
Morley Walker, Greenwood Avenue.
Morley & Ashbridge, Greenwood Avenue.
John Price, Greenwood Avenue.
Thos. Sawden, Leslie Street.
Jos. Russell, Greenwood and Blake Avenues.

Deseronto Blast Furnace

The Standard Iron Company have been operating a charcoal furnace at Deseronto. About 60 tons of pig iron are produced per day and 60 men employed.

Major Peuchen, of Toronto, is president, and Mr. R. H. Watson superintendent.

V.—SOUTHWESTERN ONTARIO

This area, although mainly agricultural in character, contributes largely to the mineral wealth of the Province. The occurrence here of oil, natural gas and salt has created large industries. A considerable number of industries located here owe their success to the accessibility of mineral deposits. The abundance of cheap electric power has been an inducement to locate in this area to those companies who derive their material from other places, such as the Coniagas Reduction Company, Thorold, the Canada Refining & Smelting Company, Orillia, and others. The mining of gypsum in the valley of the Grand river, and the quarrying of limestone for the manufacture of cement, lime and building stone are all important industries.

Canada Refining and Smelting Company

The Canada Refining and Smelting Company, with works at Orillia, are engaged in the treatment of cobalt-silver ores. The capacity of the plant has been doubled during the year, and is now about 300 tons per month. The company produce refined silver, white arsenic (As_2O_3), and cobalt and nickel hydrates.

The freight rate from Cobalt to Orillia on ore having a value of:—

1. Under $50 per ton is $4.20 per ton.
2. $50 and under $100 per ton is $5.40 per ton.
3. $100 and under $500 per ton is $6.20 per ton.
4. $500 and over per ton is $7 per ton.

The schedule of payments by the company for the ores f.o.b. Orillia, according to commercial assay, is as follows:—

84	per cent.	of silver	when	same assays	200	oz. and over	per ton.
86	"	"	"	"	300	"	"
89	"	"	"	"	500	"	"
91	"	"	"	"	750	"	"
93	"	"	"	"	1,000	"	"
93½	"	"	"	"	1,500	"	"
94½	"	"	"	"	2,000	"	"
95	"	"	"	"	2,500	"	"

less a refining charge of (1) ½ cent per oz. on ores containing less than 3,000 oz. per ton; (2) ¾ cent per oz. on ores containing less than 1,500 oz. per ton; and (3) a smelting charge of $10 per ton in addition on ores containing less than 1,000 oz. per ton.

Payment is made according to New York official quotation for 75 per cent. of amount 30 days after sampling report, and the balance in 90 days according to the same quotation on that date.

Mr. W. F. Almy is manager.

Coniagas Reduction Company

The Coniagas Reduction Company at Thorold produce refined silver, arsenic, and cobalt and nickel oxide from the cobalt-silver ores of Cobalt.

The freight rate from Cobalt to Thorold on ore having a value of

1. Under $50.00 per ton is $4.80 per ton.
2. $50.00 and under $100.00 per ton is $6.00 per ton.
3. $100.00 and under $500.00 per ton is $7.00 per ton.
4. $500.00 and over per ton is $8.00 per ton.

The schedule of payment by the company for the ores f.o.b. Thorold according to commercial assay is as follows:—

55	per cent. for	50 oz. and	proportionate	increase in	percentage up to
73	"	200 oz.	"	"	"
78	"	300 oz.	"	"	"
84	"	500 oz.	"	"	"
91½	"	1,000 oz.	"	"	"
92½	"	1,500 oz.	"	"	"
93½	"	2,000 oz.	"	"	"
95	"	3,000 oz. and over.			

Payment is made according to Messrs. Handy and Harman's New York quotation for 75 per cent. of amount 30 days after sampling report, and the balance in 90 days according to the same company's quotation on that date. The sampling charges are to be paid by the vendor.

Mr. R. L. Peek is superintendent.

Blast Furnaces

Hamilton

The Steel Company of Canada, successors to the Hamilton Steel and Iron Company, have two furnaces in blast at Hamilton, and produce about 500 tons of pig iron per 24 hours. Most of the iron ore used is obtained from Michigan and Minnesota.

Mr. R. Hobson is president, and Mr. H. H. Champ treasurer.

Canada Iron Corporation

The blast furnace of the Canada Iron Corporation at Midland has been in blast all year, and has produced from 200 to 300 tons of pig iron per day. Most of the ore used is obtained from the mines of Michigan and Minnesota. Limestone for flux is obtained from the company's quarry in the township of Tay, Simcoe county.

Gypsum

The Alabastine Company and the Crown Gypsum Company have been mining gypsum in the vicinity of Caledonia during the year. Both companies have mills for grinding. The lower grades of material are used in the cement industry, and the higher grades in the manufacture of alabastine, stucco and ornamental work.

The Alabastine Company

This company's mine is situated about three-eighths of a mile north of the town of Caledonia on lot 10 of the first range west of the Hamilton and Port Dover Road in the township of Seneca. The body of gypsum being mined occurs at a depth of 80 feet and the material is hoisted through the incline shaft. An air shaft, in which is the ladderway for the men, is 725 feet northwest of the mouth of the incline shaft. The mine is worked by the room and pillar method. In the new workings a regular plan is followed, a pillar 10 feet in width being left between each of the rooms, which are 18 feet wide. The workings now extend over an area of 300 feet by 300 feet.

The mill is situated about 75 feet from the mouth of the incline shaft. The gypsum is crushed, calcined, and prepared for shipment.

Carson

The Alabastine Company also work the Carson mine, about three miles south of Caledonia, for white gypsum. This mine is operated by incline shaft, and the distance from the mouth of the incline to the working face is 750 feet. The system of mining being used here is similar to that in the mine worked by the company at Caledonia, except that the waste is used for filling the worked-out rooms.

Crown Gypsum Company

This mine, situated one-half mile from York, on the south side of the Grand river, in Oneida township, was worked during the year. The same system of mining is followed as already described, the only difference in the underground workings from year to year being the increase in the area worked out. This mine produces a white gypsum of good grade.

The product is shipped by the company's narrow-guage railway to Lythmore station, Michigan Central railway, where the mill for grinding is located.

Zinc

On lot 31 in the third concession east, township of Albermarle, Bruce county, five miles northwest of Wiarton, the Albermarle Zinc Company did some prospecting. Several test pits were sunk to depths of from 5 to 20 feet. The zinc occurs as blende in Guelph limestone.

Quarries

There are many quarries in this part of Ontario which operate only during the summer months. The larger quarries were inspected, but a number of the smaller ones, on account of being worked so short a time, were not visited. There is as a rule considerable carelessness shown at quarries, particularly in the handling of explosives. Proper magazines are not provided for the storage of explosives, and there is a lack of safe and efficient thawing houses. It has been observed that where properties are not worked continuously there is frequently a lack of care in safeguarding employees. The provisions of the Mining Act for the protection of workmen apply equally to the quarries as well as to the mines, and must be observed.

Port Credit

At the works of the Port Credit Brick Company shale is employed in the manufacture of brick. This quarry is a large open pit, with walls about 15 feet in height and about 400 feet in diameter. The broken shale is loaded into cars by means of a steam shovel.

Battle's Quarry

Near Thorold, Joseph Battle operates a limestone quarry. The plant consists of a 60-h.p. boiler, crusher and screens. A force of 40 men are employed.

Cartmell

One and a half miles west of Thorold, Mr. Wm. Cartmell had a force of six men employed in a quarry. His plant consists of a 12-h.p. boiler, hoist and derrick.

Christie, Henderson and Company,

On the east half of lot 4 in the fifth concession of Nassagaweya township, county of Halton, a limestone quarry is being worked by Christie, Henderson and Company. The rock is used both for building stone and concrete work. A 14-h.p. boiler supplies steam for the crushing plant.

Clifton Sand, Gravel and Construction Company

This company are engaged chiefly in the excavation of sand and gravel. The pit is located at Stamford.

Hagersville

The Hagersville Contracting Company's limestone quarry on lot 14 in the thirteenth concession of Walpole township, Haldimand county, was worked last year. The material produced is used largely as a flux and in road-building. A crushing plant has been erected with crushers and screens.

Mr. D. C. Ingles is manager, employing 60 men.

Doolittle and Wilcox

Doolittle and Wilcox, Limited, operate a quarry for the production of crushed limestone on lots 11 to 14 in the first concession of the township of West Flamboro, near Dundas. The quarry is on the top of a hill and the crushing plant on the side, discharging into bins over the railway siding. The quarry has a length of 800 feet by 400 feet in width by about 18 feet in depth. The broken rock is loaded into cars by a steam shovel. These cars are hauled by locomotives to the crushing plant. The rock passes through one large and three small crushers, is screened, and carried by conveyor belt to the bins. All the crushers are driven by electricity.

Mr. Jas. D. Small is superintendent; employing 100 men.

Empire Limestone Company

At Sherkston, in the township of Humberstone, the Empire Limestone Company operate a limestone quarry.

The plant consists of a 150-h.p. boiler, compressor, 5 locomotives, 4 steam shovels and a crushing plant.

The quarry is worked as a large open pit, the limestone being loaded by steam shovels into cars, which are hauled by the company's locomotives to the crushing plant and then loaded on railway cars for shipment. Work is carried on during all the year and 160 men are employed.

Grantham

On lot 15 in the tenth concession of Grantham the Grantham Stone Quarries are being worked part of the year, by Mr. H. C. Ball, with a small force of men.

The company have a small plant, consisting of a 20-h.p. boiler and an engine for driving the crusher.

Michigan Central

At Hagersville the Michigan Central Railway Company operate a limestone quarry for part of the year. No work was being done when inspected in 1911.

The plant consists of two 150-h.p. boilers, a 6-drill compressor and crushers.

Power City

The Power City Stone Company operate a quarry of limestone at St. Davids, employing 30 men.

The plant consists of two 20-h.p. boilers, three electric motors, one Gates crusher and an electric motor for hauling rock from the quarry to the crusher.

Queenston

At St. Davids the Queenston Quarry Company, Limited, employ 50 men in operating a limestone quarry. Most of the rock quarried is crushed and used in concrete work or for road metal.

The plant consists of two 24-h.p. boilers, a 3-drill compressor and crusher.

Robertson

On lot 7 in the fourth concession of the township of Nassagaweya, D. Robertson Company, Limited, are quarrying limestone to be used for the manufacture of lime. The company have three lime kilns and employ 50 workmen.

Standard

At Beachville the Standard White Lime Company quarry limestone for the manufacture of lime. The company have five lime kilns and employ 40 workmen.

St. Mary's

At St. Mary's limestone is being quarried at the St. Mary's Horse Shoe quarry for use in concrete work.

The plant consists of two boilers of 25-h.p. and 100-h.p. capacity respectively. Steam drills are used in drilling, and the rock is crushed by a No. 6 Austin crusher and two No. 3 Gates crushers. A 125-h.p. engine operates the crushing machinery.

Toronto Lime Company

At Limehouse on lot 22 in the fifth concession of Esquesing, the Toronto Lime Company are quarrying limestone for the manufacture of lime.

Thames Quarry Company

The Thames Quarry Company quarry limestone at St. Mary's, for use chiefly in concrete work and road material. Electric power is used for operating the two crushers and for hoisting.

Wentworth

At Vinemount on lot 4, in the fifth concession of Saltfleet, the Wentworth Quarry Company, Limited, are quarrying limestone for use as building material and for concrete work and road metal.

The plant consists of a 25-h.p. boiler, gas engine and crushers. A steam shovel is used for loading the broken rock into cars, which are hauled to the mill for crushing.

Walker

On lots 31 and 32, Thorold town line, township of Stanford, Messrs. Walker Bros. employ eight workmen in the quarrying of limestone. The rock is used chiefly for building material.

Oliver and Webster

Messrs. Oliver and Webster operate a limestone quarry on the east side of the town of Owen Sound, and ship both building and crushed stone, the former chiefly to Toronto. The quarries are from 12 to 20 feet deep, and the one at present being worked is over an acre in area. Derricks and horse whims are used for hoisting the material. The crushing plant consists of a gyratory crusher, elevator, trommels and bins. Power is obtained from two small boilers, which are being replaced by electricity.

Hazelton

Adjoining the quarry of Messrs. Oliver and Webster, Owen Sound, Mr. Chas. Hazelton is engaged in quarrying limestone for building stone, which is shipped chiefly to Toronto. The quarry is from 15 to 20 feet in depth. The limestone occurs in beds from 3 to 6 inches thick.

Brown

Mr. Oliver Brown operates a quarry and lime kiln to the west of the town of Owen Sound. The quarry walls are not more than 10 to 15 feet high, and the rock is hauled by carts and dumped into the kiln. Wood is used for firing.

Chalmers

South of Brown's lime kiln, on the west side of Owen Sound, Mr. D. Chalmers operates a quarry and lime kiln. The kiln is about 200 yards from the quarry and on the hillside. The broken limestone is hauled in carts and dumped into the mouth of the kiln.

GOLDFIELDS OF LAKE OF THE WOODS, MANITOU AND DRYDEN

By Arthur L. Parsons

Introduction

In accordance with instructions received from Mr. T. W. Gibson, Deputy Minister of Mines, the writer left Toronto on May 19th, 1911, to continue the examination of the gold fields in the vicinity of Lake of the Woods, Manitou lake, Eagle lake and Dryden. The work done in the summer of 1910 consisted of a general review of the geological formations in this region, with an examination of such mines as were

Fig. 1.—Granite grading to quartz porphyry, south side Lobstick bay

accessible, and detailed work in small areas near the more important mines. During the past season special attention was paid to a study of the rocks more immediately connected with the gold deposits, to ascertain whether any conclusions could be drawn which would show a definite relation between the ore bodies and some particular rock.

In tracing the formations, the maps published by the Geological Survey of Canada, as the result of the labors of Dr. A. C. Lawson and Mr. Wm. McInnes, proved to be of invaluable assistance, and are used as the basis of the maps published in this report, with the exception of the region near the Manitoba border, in which case the Ontario Surveys Branch map was used. Additional information concerning the geography and geology of the Grande Presquile has been contributed by Dr. A. P. Coleman from unpublished notes, which have in large measure been confirmed independently by the writer.

In discussing the plan of work for the summer it was suggested by Dr. W. G. Miller, Provincial Geologist, that the source of the gold values might lie in the large granite areas, which are presumably of post-Keewatin age. That there might be some connection between the granite and the deposition of gold would at first sight seem to be probable, inasmuch as the more important mines on Lake of the Woods are at or near the contact of the granite and the Keewatin rock. That the granite is not the only rock connected with the deposition of gold in this region is shown by a study of the mines near Gold Rock and Dryden, where the rock adjoining the gold-bearing veins is usually, if not always, a sericite schist, which has probably resulted from the altera-

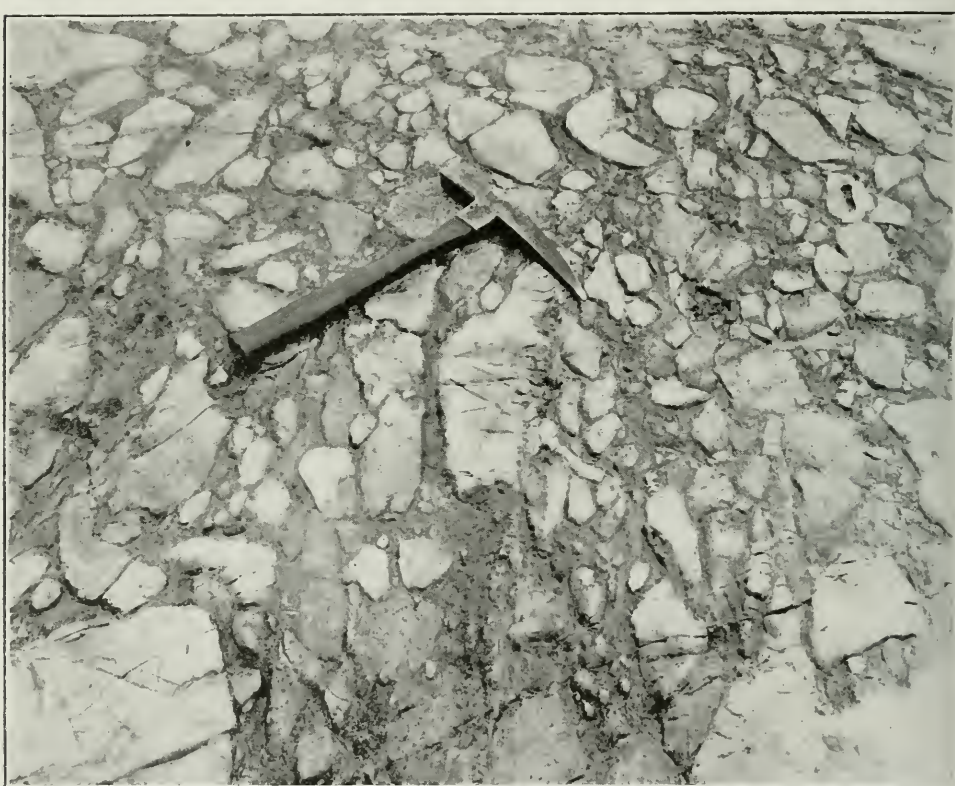


Fig. 3.—Agglomerate near pumping station, Kenora.

tion of a quartz porphyry or an andesite porphyry, and it is almost certain that there is a definite relation between the later granites and these porphyries, as gradations have been found from one rock to the other, so that it may be assumed, although not without question, that these rocks are the gold-bearing rocks of the region. There may be, however, porphyries of two ages.

The gradation from the quartz-porphyries and andesite to the later granites is well shown on the south side of Lobstick bay, where in the area shown in the illustration (see Fig. 1) the two were found to be continuous, though other rock is present as an inclusion. This suggests the probability that the quartz porphyries or andesite porphyries of the region are contemporaneous with the so-called later granites, and are to be grouped with them. In suggesting this correlation, the similarity in mineral composition is a strong factor, as these later granites as well as the quartz porphyries are almost invariably characterized by a predominance of plagioclase feldspar, while the undoubted Laurentian granites of the region show a greater proportion of orthoclase. The description given later of the rocks at the Combined mine and the Bully Boy mine is characteristic of most of the porphyries, though in some cases quartz is also present in the form of phenocrysts.

On account of their highly altered condition, it was found difficult to work out the origin of many of the basic and acidic schistose rocks; but where this could be done the hornblende and chlorite schists appeared to be altered diabase or gabbro, and the hydromica or sericite schists altered quartz-porphyry or andesite.

Fig. 4.—Agglomerate near pumping station, Kenora.

Geology

The region covered by the work of the writer in the past two seasons has attracted the attention of geologists for nearly a century, but the final mapping of the Lake of the Woods and Rainy lake regions was done by Dr. A. C. Lawson about twenty-five years ago, while the Manitou and Dryden areas were mapped by Mr. Wm. McInnes at a later date.

In the Lake of the Woods maps Dr. Lawson recognized the following formations:

LAURENTIAN.

KEEWATIN.

Hydromica schists, etc.

Clay slate, etc.

Agglomerates.

Hornblende schists and altered traps, etc.

LATER GRANITES.

LATER DIABASE.

In the Rainy lake sheet the Keewatin is further subdivided into

- Altered traps, etc.
- Conglomerates.
- Altered quartz porphyries, etc.
- Fragmental rocks, graywackés, volcanic tuffs, agglomerates.
- Soft glossy gray schists and slates.
- Gabbro.
- Serpentine.

Fig. 5.—Trap (?) showing pillow structure, Gold Rock.

The other formations are the same as in the Lake of the Woods sheet, except that a new formation, the Couchiching, has been added.

In the Manitou sheet Mr. McInnes adopts practically the same subdivisions as are given in the Rainy lake sheet, but the conglomerates are omitted, inasmuch as none have been found in this area, and a series of rocks that are similar to the Couchiching are classed as highly altered Keewatin rocks, principally mica schists and fine gneisses.

The Couchiching of Lawson and highly altered Keewatin rocks of McInnes are formations which are the subject of much dispute.

Hornblende Schists and Altered Traps

The series is probably the most abundant of the Keewatin rocks. They are in general dark colored, and frequently have a well defined cleavage, and in composition range from diabase to diorite.

Agglomerates, Quartz-porphyry, Andesite-porphyry, Sericite-Schist

The work of the summer was devoted more particularly to these formations, and the conclusion was reached that they should be grouped together. The derivation of sericite schist from quartz-porphyry has been well shown by Dr. Lawson in his report on the Rainy lake region.[1] This alteration is clearly seen in the rocks on the east side of Oliver island in Lake of the Woods, where a nearly unaltered quartz-porphyry grades into sericite schist, with bands of carbonate, probably dolomite or ankerite.

The agglomerates may be in many cases acidic tuffs and breccias, but, as a matter of fact, it is often difficult to decide whether they are conglomerates or tuffs, or simply crushed rocks commonly called " autoclastic " rocks.

Typical agglomerates occur on the southeast point of Andrew bay. The rock seems to be a volcanic breccia in which volcanic bombs have been imbedded in a molten

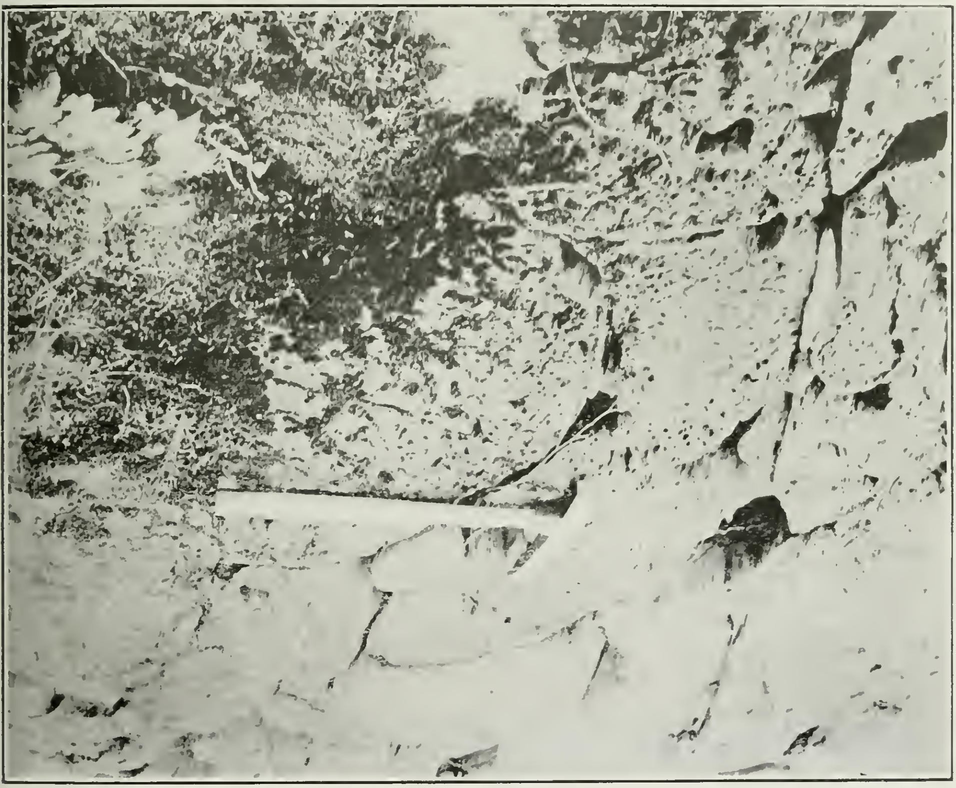


Fig. 6.—Pillow structure, Eagle lake.

magma. It is, however, suggested by Dr. Miller that portions of the original magma may have cooled more rapidly than others and that by movements of the mass they became broken up and were then partially resorbed into the still fluid magma.

This rock was slightly weathered, and when broken it showed very distinctly that it was made up of spherulitic nodules of a stony material in a ground-mass in which crystals exhibiting a conchoidal fracture could be seen. Several nodules of pyrite were also present in the hand specimen.

Under the microscope the section shows fragments of a rock made up of a very fine ground-mass which may be largely quartz, but from its appearance would seem to be

[1] Geo. Sur Can 1887, 85-90F.

more feldspathic; the crystalline particles are, however, too minute to give a satisfactory interference figure, but it would seem as though this material is much the same in composition as the rock in which it is embedded. The enclosing rock is a porphyry in which a schistose structure is imperfectly developed. The phenocrysts are principally plagioclase feldspar showing zonal extinction, though in some individuals the characteristic polysynthetic twinning is apparent. So far as could be seen, no quartz phenocrysts are present. In addition to the feldspar are a few phenocrysts of green hornblende, most of which exhibit twinning parallel to the orthopinacoid and in some cases this twinning is polysynthetic. Much of the feldspar has undergone decomposition, being converted into kaolin or sassurite. Scattered through the matrix are individual crystals of

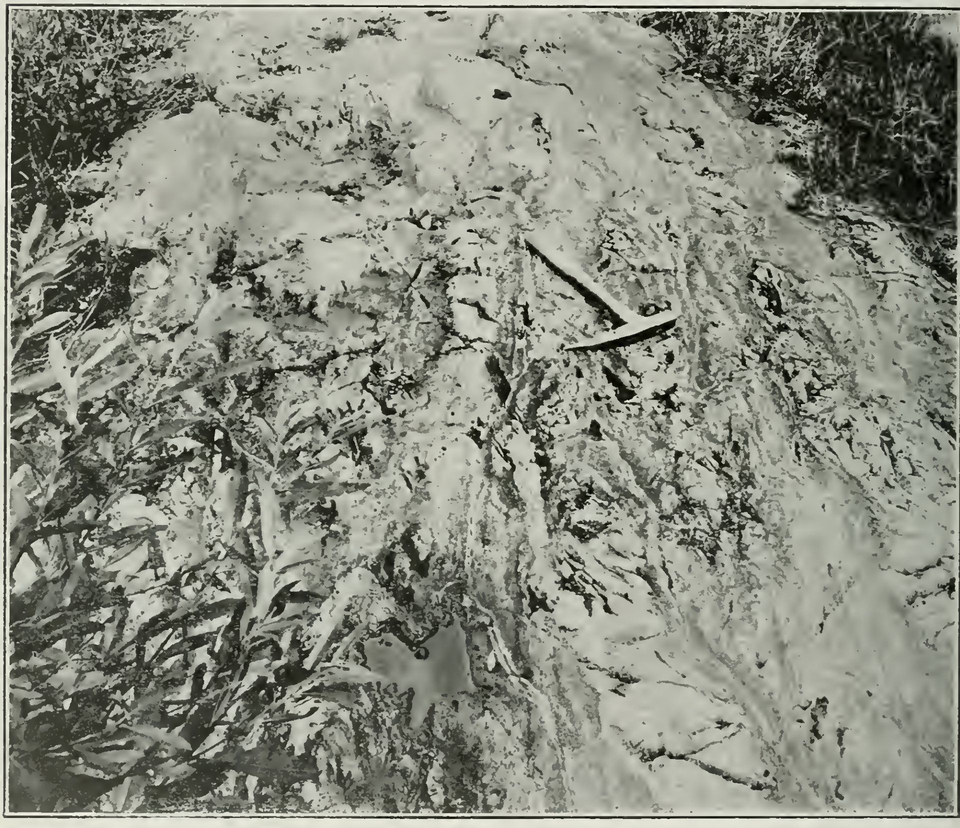


Fig. 7.—Pillow structure, Little Master gold mine, Gold Rock.

pyrite with occasionally large lenticular masses of the same material. No satisfactory evidence of the presence of muscovite is apparent in the section, but along certain planes it is to be seen in the hand specimen.

The phase of the agglomerates exhibiting lenticular masses which are characterized as concretionary traps (often called ellipsoidal or pillow lavas) seems to have been formed by the cooling of volcanic flows in water, but in certain instances the two types are found in direct contact and even intermingled as shown near Gold Rock (see Fig. 5). The pillow structure itself is better shown on the shore of Eagle lake (see Fig. 6), and at this place typical agglomerate is near by, though not shown in the picture. A less altered type of rock showing the pillow structure is to be seen at the office of the Little Master mine near Gold Rock (see Fig. 7).

In general, it may be said that the conglomeratic type is more characteristic of the acid and intermediate volcanics, while the pillow structure is more characteristic of the basic rocks in this region, but this is by no means true in every case.

This series of rocks is of particular interest, as it has been shown that a similar series is intimately associated with several of the gold regions of the United States, notably the Comstock lode in Nevada,[2] and the gold belt of the Southern Appalachian mountains,[3] while a slightly more basic rock (phonalite) is characteristic of the Cripple Creek, Colorado, and Black Hills, South Dakota, regions.

In several places in the Lake of the Woods region and in the Detola mine at Gold Rock, graphitic schist is found intimately associated with the lighter coloured sericitic schists and slightly altered igneous rock. This is ordinarily looked upon as a proof of vegetable or animal life, and probably in most cases graphite must be referred to this origin.

A number of occurrences of graphite are known for which it is difficult to assign an organic origin, and for such cases it has been suggested by A. N. Winchell[4] that the reduction of carbon dioxide and carbon monoxide furnishes a probable explanation of the deposits. Although it is probably safer to assign an organic origin for these graphitic bands until further evidence is found for inorganic origin, it is by no means easy to harmonize the organic origin with the intimate association with igneous rock, as is particularly the case at the Detola mine. Is it not possible that these bands of graphite are associated with the formation of veins of ferruginous carbonate in the igneous rock, which by extreme metamorphism have given rise to some of the iron formation ?

Iron Formation

The iron-bearing rocks near Dryden and the pyrrhotite-bearing rocks near Ingolf may well be considered in connection with the discussions of the andesite-sericite schist series, for although the identity of conditions governing their formation cannot be absolutely shown, there are many points of similarity, and it is difficult to state positively that they do not have the same or similar origin.

As the contact between the highly altered rocks at Dryden and Eagle river and the Keewatin traps and andesites is buried, it was thought that it might be possible to determine the border of the iron formation by means of the dip needle, so that several lines were followed and the dip needle read every twenty-five steps. Except where iron ore was found the readings ranged from 24° to 35° on the highly altered rock as well as on the other Keewatin rock, so that there is ground for supposing that the content of iron does not vary to any marked degree, thus allowing the supposition that the rocks are the same. In the Gold Rock region two places are known where there is marked magnetite disturbance in the Keewatin rocks as mentioned in the last report.

In discussing the Dryden iron range, Dr. Coleman says:—[5]

"While the customary rocks accompanying and underlying the iron range at Michipicoton are quartz-porphyry schists, in the western region they are replaced in may cases by gray mica schist or fine-grained gneiss, Lawson's Couchiching, sometimes enclosing the iron range, sometimes interbedded with it as east of Dryden, but sometimes separated from it by green schists.

"It might be supposed that these Couchiching rocks are the equivalents of the quartz-porphyry schists, and more completely rearranged acid eruptives; but there are reasons for thinking otherwise. Dr. Lawson held them to be metamorphosed clastic sediments, sands and clayey sands, and there is much to be said for this view. His account of these schists places them beneath the Keewatin which he showed to be largely of eruptive origin, as a series of ordinary sediments of great thickness, covering a large area in the Rainy lake region. It is perhaps doubtful whether they are so sharply separated from the Keewatin as he supposed, since there are transitions between them on some of the islands in Rainy lake and elsewhere; and since he distinguished them from the Keewatin, very similar if not identical schists have been found in many other parts of the western Huronian . . . . . Under the microscope the usual minerals

[2] King, Clarence, Geological Exploration of the Fortieth Parallel, III, pp. 13, 25–33.
[3] Becher G. T., U. S. G. S., 16th Ann Rep., Pt. II, pp. 17, 18. Jones, S. P., Geol. Surv. of Ga., Bull. 19, pp. 53–57, 59-64, Nitze and Wilkins, N. C. Geol. Surv., Bull. 10, p. 126.
[4] Econ. Geol. Vol. VI. pp 218–230.
[5] Bur. Min., 11th Rep. (1901), p. 144.

observed are quartz and biotite, neither of which is absent form the 25 thin sections examined, and often feldspars and muscovite, but less often chlorite. Among accessory minerals, in addition to the garnets and staurolites mentioned above, there are tourmaline and sillimanite, though not very frequently.

"The quartz often has dusty margins and sometimes rounded forms as if clastic, and the feldspars occasionally show the same character; but no later growth of the grains by additions from without has been seen, a point of difference from the quartzites and arkoses of the typical Huronian region. The feldspars include both orthoclase and plagioclase, often strikingly fresh, perhaps because of regeneration, but sometimes very turbid. The biotite is usually brown and only seldom green, and a small amount of muscovite is frequently present; hornblende less often. As secondary minerals chlorite and epidote as well as limonite occur."

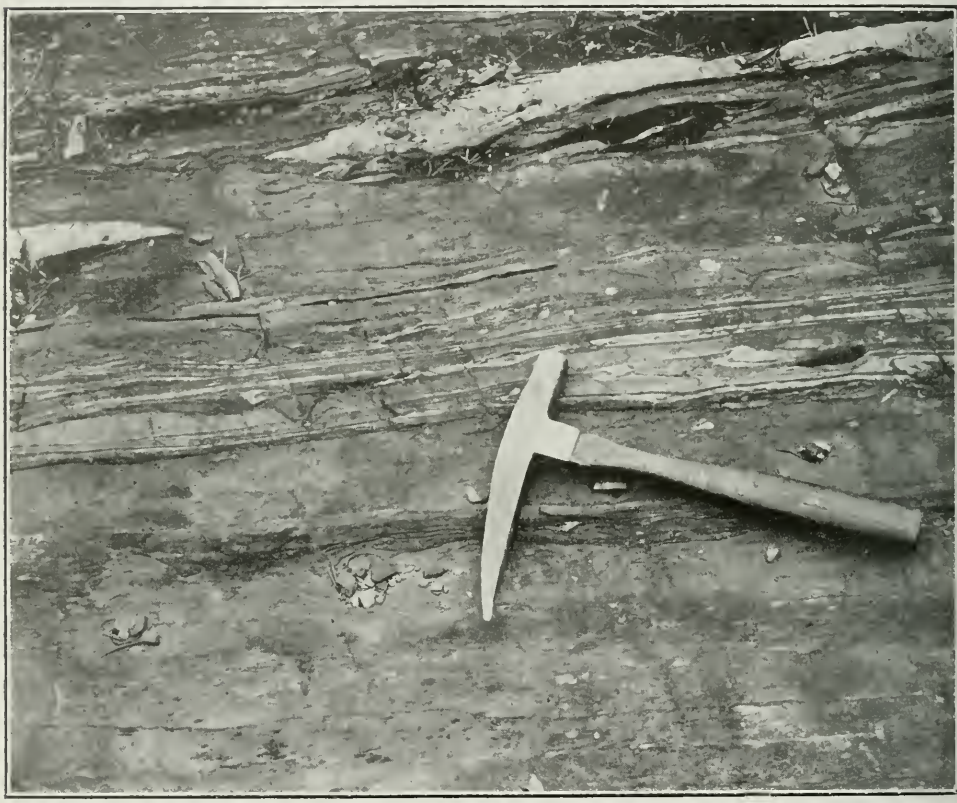


Fig. 8.—Iron formation, Dryden.

Dr. Coleman's conclusion is that the series is a completely recrystallized sediment. The writer's examination of these rocks agrees with Dr. Coleman's description, except that he has not recognized either sillimanite or staurolite in the samples examined.

In the case of the West Hawk lake series, however, there seems to be little doubt that a considerable portion of the rock is of an igneous origin, though there are strong arguments for considering much of the formation to be altered sediments. For field purposes the rocks here were considered as being of two kinds which were roughly classed as altered traps and altered felsites, the altered traps being dark hornblende and biotite schists while the altered felsites are lighter coloured micaceous schists containing both biotite and muscovite. These rocks are interbanded, and it is probable that some of the bands may be sediments, but the separation of the various bands requires detailed work involving more time than could be devoted to it, so that the limits only of the Keewatin area as exposed on the Manitoba boundary have been outlined.

A sample taken from the point on the east side of West Hawk lake, just south of the inlet from the east, is a schistose rock with considerable comparatively fresh plagioclase, muscovite and biotite in somewhat squeezed masses and crushed groundmass, and is aparently an altered igneous rock. Lenticular cavities have been filled with quartz and pyrrhotite, and considerable pyrrhotite is disseminated through the rock.

Another sample of a somewhat more schistose type was taken from the same point which contains more quartz, but also shows a good amount of feldspar, though the latter is more crushed than in the preceding specimen. The biotite in this specimen has been arranged in parallel position, and the rock approaches the Dryden type of rock more closely than the preceding, and is possibly a sediment.

In the opinion of the writer the Dryden iron formation and the Ingolf pyrrhotite formation are highly altered Keewatin rocks, though this has not yet been proven beyond the possibility of doubt, and it will be shown only by finding the gradation from one to the other. It is not necessary to assume in this case that all or even a considerable proportion of the formation is igneous, though there seem to be portions of the rock suggesting such an origin. If, however, these are to be looked upon as altered sediments, it seems necessary to explain why the unaltered or less altered sediments are not found in places at a distance from the great granite masses of the Laurentian and possibly other periods. So far as the investigations show, there is no sediment to which it could be referred, unless the agglomerate beds be looked upon as the source, but these are considered to be closely related to the second great igneous rock of the Keewatin. In many places the writer thought the gradation between the agglomerates and clay slates of Lake of the Woods was shown in the field, but the final proof has not been forthcoming on the study of sections. The results obtained with the dip needle seem to indicate that there is no great change in the percentage of iron in the iron-bearing formation and typical Keewatin rocks near Dryden, but even here the gradation from one type to the other has not been found in the sections. The large amount of quartz, garnet and sillimanite present in many of these rocks of the iron formation has been looked upon as proof that these must be altered sediments, but in the writer's opinion it is an open qquestion whether these are not the products which might be expected from the recrystallization of certain types of igneous rocks under different conditions of temperature and pressure, particularly if a part of the potash or soda in the feldspars had been removed by leaching of any sort between the period when the rock was first formed and the beginning of the metamorphism. In this latter case, however, the rock ceases to retain its true igneous character with the removal of the alkalies, and even though it is not transported it has the chemical character of a sedimentary rock. The field relations are such that no break has been shown between these rocks and the less metamorphosed Keewatin rocks, hence they are shown on the maps as highly altered Keewatin without attempting to correlate them to either of the two main divisions.

A sample of the rock taken a little less than half a mile south from the northern boundary of Zealand township on the line between lots 14 and 15 gave the following analysis:—

SiO_2	61.34
FeO / Fe_2O_3	12.83
Al_2O_3	15.99
CaO	0.79
MgO	1.81
K_2O	2.56
Na_2O	2.03
H_2O	2.25

This rock will need further study before it can be definitely referred to either an igneous or a sedimentary origin, as it lies in the range covered by both.

Another sample taken about three-fourths of a mile south of the northern boundary of Zealand township between lots 8 and 9 shows the composition of an excessively basic diabase.

SiO_2	46.68
FeO / Fe_2O_3	12.72
Al_2O_3	22.88
CaO	10.91
MgO	2.91
Na_2O	2.64
K_2O	0.34
H_2O	1.56

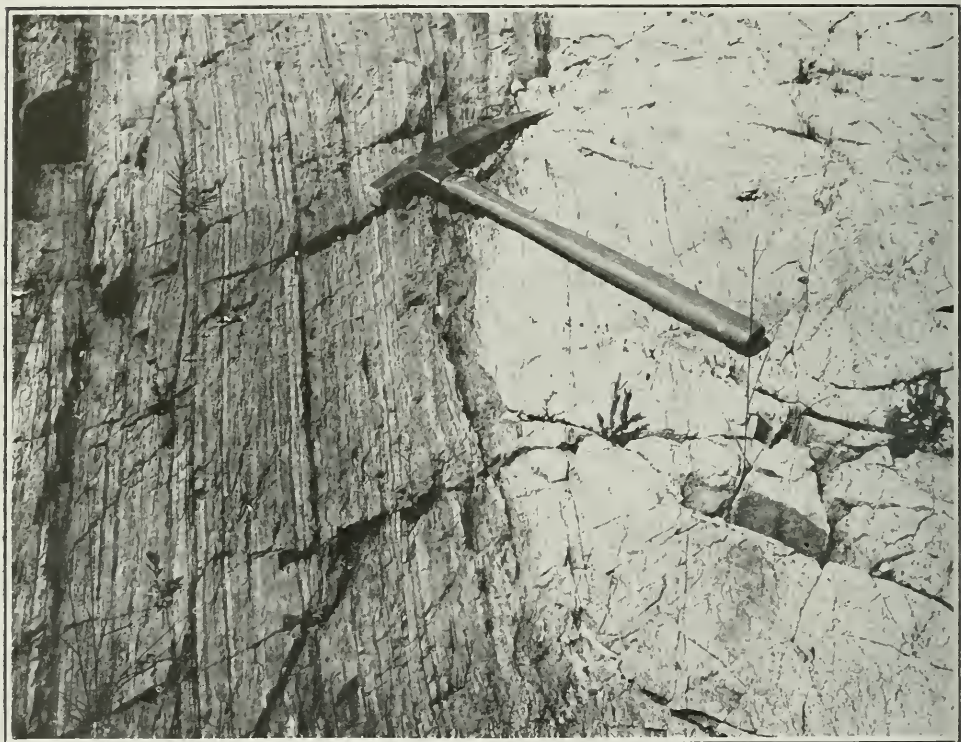


Fig. 9.—Contact, agglomerate (?) and clay slate, Queen island, Lake of the Woods.

Clay Slate

In discussing the clay slates of the Lake-of-the-Woods region, Dr. Lawson groups a series of mica-schists, micaceous slates, clay slates and quartzites together. As to the clay slates proper, it has been the misfortune of the writer that he has not been able to find a distinct slate in the areas which he has visited that are mapped as belonging to this series, but Dr. Lawson states,[6] "The clay-slates vary from hard-compact argillites to the readily cleaving blue black slate of commerce, the one passing into the other and merging into glossy micaceous schists." He also states on the same page that mica schists similar to one described, "merge directly with agglomerate schists in which the inclusions in the schist matrix vary but little from it in composition."

[6] Geo. Sur. Can. 1885, 55 CC.

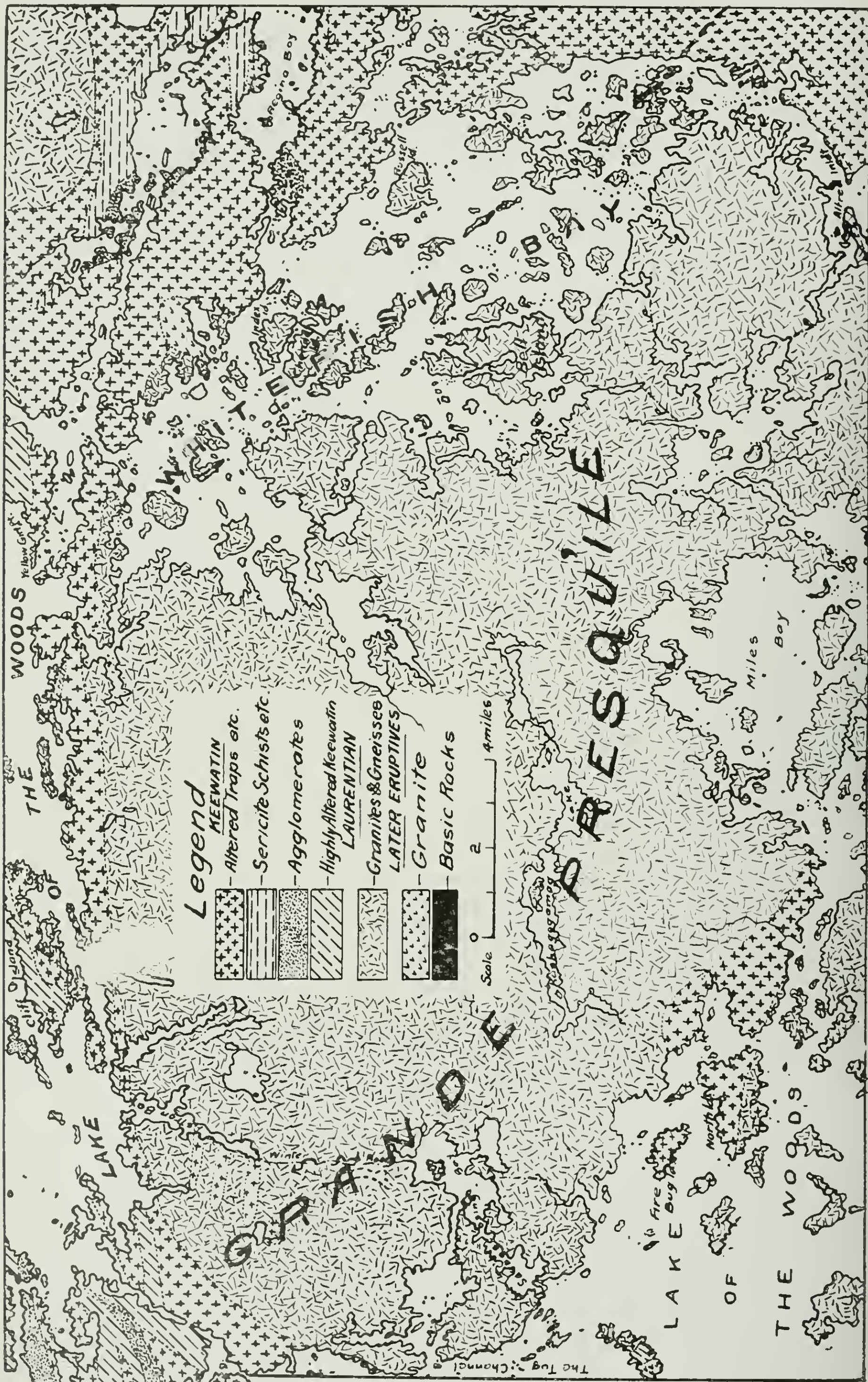
The observation of the writer in the field led him to the conclusion that most if not all of the series mapped as clay slate, etc., is only a highly metamorphosed phase of the agglomerates and sericite schist. As a rule these rocks are mottled and exhibit nodular projections like the agglomerates, though the nodules are usually of no great size. The great percentage of quartz present would suggest a sedimentary origin, but the presence of considerable amounts of fresh plagioclase would seem to indicate a relation to the agglomerates.

In certain cases apparent contacts between the clay slates and agglomerates may be seen (see Fig. 9), but usually there appears to be a merging of the one into the other as is shown at the bottom of the picture which represents the relations on the east end of Queen island in Lake of the Woods.

Fig. 10.—Breccia, Berry lake.

An analysis of the clay slate on Buckette island made by Mr. N. L. Turner, Provincial Assayer, shows conclusively that this rock has the composition of an altered quartz diorite, and thus approaches the so-called later granites of the region which uniformly are to be referred to this class. This analysis shows:—

SiO_2	69.20
FeO } Fe_2O_3 }	3.10
Al_2O_3	17.50
CaO	1.68
MgO	0.12
Na_2O	5.84
K_2O	1.51


Legend
KEEWATIN
Altered Traps etc.
Sericite Schists etc.
Agglomerates
Highly Altered Keewatin
LAURENTIAN
Granites & Gneisses
LATER ERUPTIVES
Granite
Basic Rocks
Scale 0 2 4 miles
LAKE OF THE WOODS
WHITEFISH BAY
GRANDE PRESQU'ILE
Miles Bay
LAKE OF THE WOODS
The Tug Channel

Breccias

Two types of breccias were recognized during the summer, the first being a diabase breccia enclosed in the Laurentian granite on the west side of Berry lake. In this case the diabase has been broken apparently in place by the granite, and has not been moved to any extent, as is evinced by the fragments of the same mass of rock remaining close together, showing even in the photograph (see Fig. 10) above the hammer handle that the fragmental material has suffered only slight displacement. This evidently is an early stage in the development of the lens-like inclusions found on the Grande Presquile. (See Fig. 14.)

The second type of breccia is connected with the movement of rock after solidification and represents brecciation due to vein formation. In this rock an almost agglom-

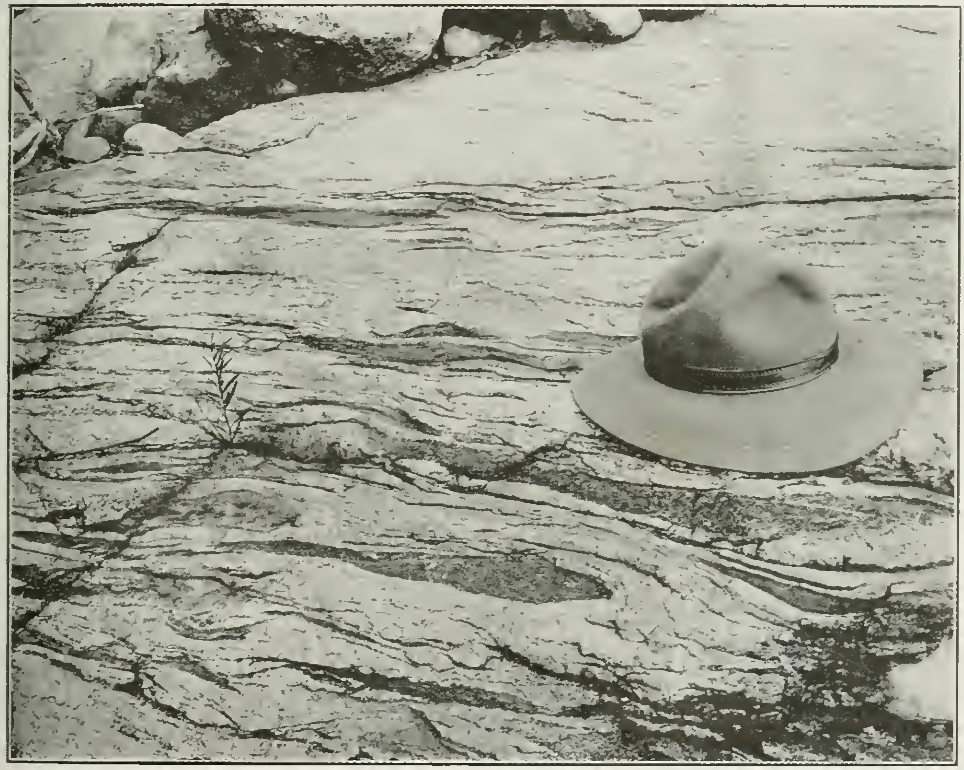


Fig. 14.—Keewatin inclusions in Laurentian, north side Miles bay.

erate structure is developed similar to that at Kenora (see Fig. 2), but the brecciated material is all derived from the adjoining granite (see Fig. 11), which although shown on the map as Laurentian contains such a high percentage of plagioclase that it is possible it should be referred to the eruptive granites. This exposure is to be seen at the Grace mine on Eagle lake and represents some of the capping over the principal vein.

The Grande Presquile

In studying Dr. Lawson's map of the Lake of the Woods region, it seemed that the Grande Presquile might throw considerable light upon the geological problems of this region. As is stated in this map, the interior of this peninsula is practically unexplored, but when we consider the general character of the region it would be natural to expect numerous lakes in an area of this size. At the suggestion of Dr. Coleman a visit was made to Kashagogamog or Arrow lake, a body of water eight or nine miles long. This lake has been visited and mapped by Dr. Coleman, though the map had not been published, and appears in the present report for the first time. The writer's sketch of this lake agrees essentially with Dr. Coleman's, though showing a greater extension to the west. The writer made two sections of the Grande Presquile, one slightly northwest from Sabascosing bay to an unmapped lake about a mile east of the south end of Astron bay. The inlet and outlet were not found, so that it is not known whether it is a tributary of Astron bay or of Maude lake, but the probability is that it is connected with Astron bay. In making the examination of this part practically all the rock was found

Fig. 2.—Agglomerate near pumping station, Kenora.

to be Laurentian gneiss, but near the southwest point of the newly discovered lake, a small intrusion of diabase was found having a strike approximately north of 70 west. At the very south end of Astron bay, a small band of hornblende schist was found, but whether it may be looked upon as an intrusion could not be readily determined, though it had much the appearance of highly altered Keewatin inclusions in other Laurentian regions, though rather more altered than most of the Keewatin rock in this region.

In following along the south shore in the Grande Presquile only minor changes in the mapping have been made, which increase the Keewatin area a little west of Starting point and on the island north of Fire-Bug island. Occasional inclusions of hornblende schists, which evidently are highly altered Keewatin traps, were found along the shore of Miles bay near the north end of which several good examples are to be seen (Figs. 14, 15, 16), showing angular inclusions in one case while in another case lenticular masses, which show the development of the structure by heat and pressure, are well shown.

At the north end of Miles bay is a winding stream which is navigable by a canoe for about four miles. This stream is the outlet of a chain of three lakes of which the most important one is Kashagogamog or Arrow lake. This body of water extends nearly east and west, and from information furnished by Mr. James Margach its western extremity is nearly north of Fish island, and it is about two miles north of the main body of Lake of the Woods at this point. This would place the western end about a mile farther west than the map shows it, but the map gives the essential features. With the exception of a small mass of Keewatin near the outlet of the lower lake of this series, all the rock surrounding these lakes is Laurentian gneiss. In going from Miles bay to Whitefish bay the rōute lies through Obabicon lake, which is only partly shown on former maps. The extension to the northeast in the present case is only approximate,

Fig. 11.—Brecciated granite, Grace mine, Eagle Lake.

but the portage from this lake to Boot bay is only about a mile long, and is probably the best portage aside from Turtle portage in going from Whitefish bay to the lower lake.

The result of the geological examination of these three parts of the Grande Presquile is confirmatory of Dr. Lawson's statement that the rock is almost entirely granitoid gneiss. Several changes in geologic mapping have been made by Dr. Coleman, particularly in the north-western part of the peninsula and on the western shore of Obabicon lake, which in every case give an increased area to the Keewatin. The general conclusions reached by Dr. Lawson, however, have been confirmed, and this area may be looked upon as a huge batholith surrounded by Keewatin rocks. There is still considerable exploratory work possible on this peninsula, but from a mining point of view it would be unprofitable. There is, however, considerable land which might be cultivated with profit, though the first view would incline one to suppose that the country is too rocky for profitable cultivation.

Eagle Lake

The interest in gold mining on Eagle lake is in about the same condition as in the previous summer, except that some work was done on an island near the Grace mine, though the writer received this information after leaving this part of the lake, and consequently did not see the work. The greater part of the interest in mining in this region has been connected with a vein near the northern part of Net island, which has been looked upon as an iron deposit. During the previous winter this vein was tested by diamond drilling, stripping and the sinking of a small shaft. Diamond drilling was also done on North Twin island to intersect this same deposit. The vein as it is exposed on Net island varies from four to twelve feet in width, and on the sur-

Fig. 12.—Winter road, Grande Presquile, Lake of the Woods.

face is oxidized so as to present a mixture of limonite with small amounts of hematite and magnetite. Where excavation has been made the vein material is found to be largely made up of pyrite with small amounts of chalcopyrite. If this vein were better situated with respect to transportation facilities it should prove valuable as a source of pyrite, but as the deposit is of limited extent it would not pay to extend a railroad siding to it, and the only probable value would seem to lie in its possible gold contents.

A number of claims have been staked out for iron in the neighbourhood of Detour Point where the highly altered Keewatin rocks of the Dryden iron belt apparently merge into the altered quartz prophyries and soft glossy gray schists which extend down to Lobstick bay on Lake of the Woods.

Dryden District

Mining conditions in the Dryden district show a slight improvement over 1910. At the League mine an experimental mill has been erected and one Nissen stamp has been installed so as to test the material from the shaft and other workings before erecting a large plant. The shaft has been sunk to a depth of 70 feet and the work is being continued. The secretary and manager expressed themselves as being highly pleased with the results obtained by the test mill.

The Good Luck claim, of which mention was made in the last report, has a shaft 25 feet deep with the vein persisting in about the same width as on the surface and continuing to show free gold.

Fig. 13.—Muskeg, Grand Presquile, Lake of the Woods.

To the west of Good Luck claim is a claim developed by Mr. Geo. Gordon, who during the summer sold it to the Dryden Mining Company of Cleveland, Ohio. The company are continuing the development which in August was represented by a shaft 17 feet in depth, and which in January, 1912, had reached a depth of 70 feet. This latter claim shows free gold and some of the specimens are exceptionally attractive.

In the Contact bay region several transfers have been made, most of the properties having been bought by the Dryden Mining Company. Considerable development has been done on many of the claims near the Good Luck and Gordon properties, and in several cases the indications are very promising, though the development is not so extensive as in the cases mentioned.

During the year the Redeemer mine was partially pumped out for an examination, but nothing further has been done. The writer can give no idea of the promise of this property, but was informed that the second level was not unwatered.

The mine and mill owned by Mr. White of Dryden was idle at the time of the writer's visit, but it was expected that work would soon be resumed.

Mines

In the Lake of the Woods region, work was carried on during the past year at the Mikado and Ophir, both of which present attractive features. It was expected that the Regina, Olympia, Cameron island and Scramble mines would be reopened in the near future, and it was reported that contracts for electric power had been let by the

Fig. 15.—Granite intrusions in trap, north side Miles bay.

Scramble. Since leaving the district the writer has been informed by Capt. H. A. C. Machin, M.P.P., that the Olympia had resumed operations and has been producing gold. The Scramble is also reported to be continuing development work, having installed electrical machinery for hoisting. In most cases the mines visited were in charge of caretakers, which would indicate that the owners have expectations of reopening. In the case of those mines which were described in the last report no new description has been prepared, except as developments have been made in the meantime.

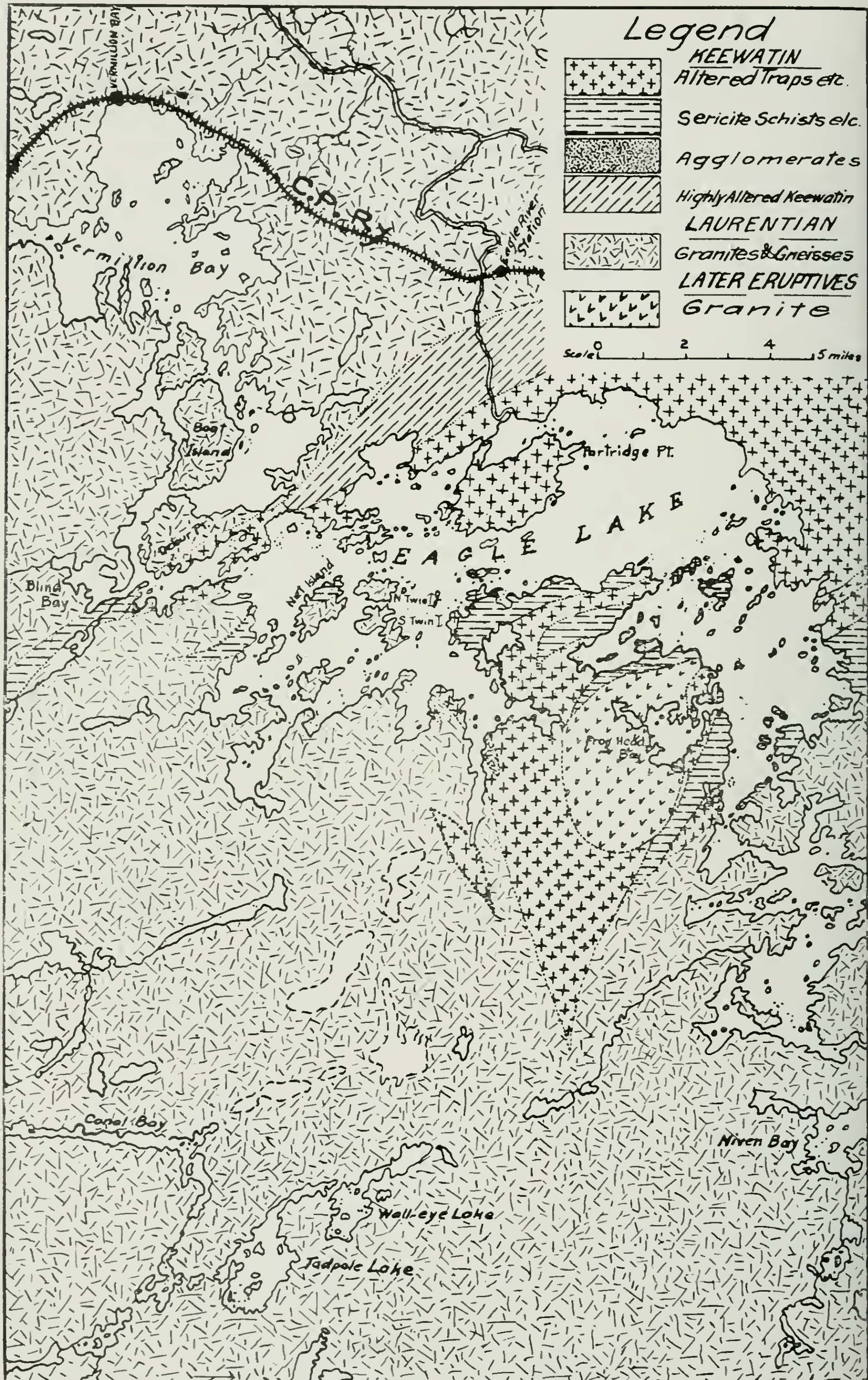
Bully Boy

The Bully Boy mine is situated about half a mile east of Camp bay, and the vein accompanies a porphyrite cutting altered trap. The shaft was filled with water, so that an examination of the underground workings was impossible. The surface equipment consists of a shaft house with two 45-h.p. boilers, one 8-drill compressor and a hoist with a 2½-foot drum. The mill equipment consists of one Blake crusher, four National ore pulverizers, three screens, two Strelow amalgamators, two Johnson vanners, one high pressure Corliss engine, one small hoist for the tramway from the shaft house to the mill.

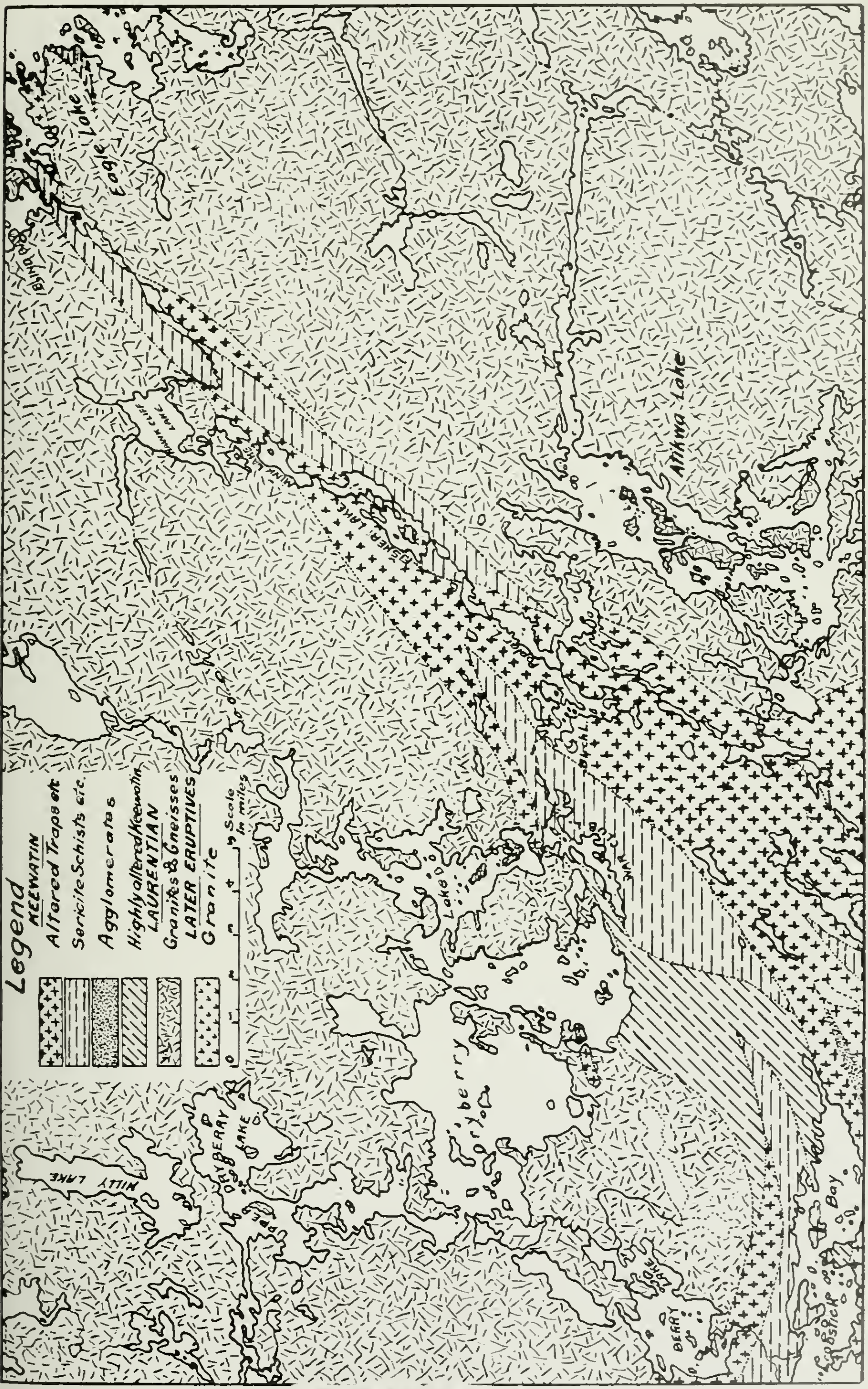
The light coloured rock accompanying the vein shows on the freshly broken surface phenocrysts which have a conchoidal fracture and in the field would be taken for quartz; consequently it was assumed that the rock was quartz porphyry. On examining a thin section of this rock under the microscope, it was found that instead of being a quartz porphyry, the rock is a porphyrite having approximately the composition of andesite. The phenocrysts proved to be plagioclase, very similar in appearance to that found

Fig. 16.—Keewatin rock included in Laurentian, north side Miles bay.

at the Combined mine, except that the zonal extinction was not so marked. Apparently the feldspar is albite or oligoclase. In the fine ground-mass are to be seen minute specks of biotite. The rest of the ground-mass consists of a fine grained aggregate of colourless minerals which are too minute for accurate determination, but are apparently feldspars. The cut (Fig. 20) shows the general characteristic of the rock, and the contact with a quartz vein. The minerals in this rock are unaltered, or if altered, only slightly. The rock is undoubtedly the same as the porphyry found at the Combined mine, and with that may be looked upon as the key to the series which include the quartz porphyries and sericite schists of Lawson and McInnes.



Eagle lake area.



Area southwest of Eagle lake.

Combined Mine

This mine has been described in detail in the thirteenth annual report of the Bureau of Mines, so that it will not be necessary to give the equipment. The vein is nearly horizontal, though its dip varies considerably. By some it has been looked upon as a blanket vein which lies between overlying trap, exhibiting a pillow structure, and a dark underlying felsite or finegrained quartz (?) porphyry. With the quartz, which in the principal vein varies from two to four feet in thickness, is a large body of rusty carbonate rock which seems to be derived from the alteration of a quartz (?) porphyry or felsite and shows considerable sericite. In places this rock becomes a calcareous sericitic schist.

Fig. 19.—Gordon claims, Dryden.

The rock on the surface is all much altered, so that information as to the origin of the rock could not easily be obtained. It was found, however, that exploration had been done with the diamond drill, and an examination of the core which was lying near the shaft house showed the rock to be made up of a dark rock which may be looked upon as more or less altered trap, and a light rock which when broken showed several small crystals exhibiting a conchoidal fracture, and at first supposed to be quartz, hence for field purposes the rock was looked upon as a quartz porphyry. On examining a thin section of this latter rock, it was found to be a porphyry, whose phenocrysts instead of being quartz are plagioclase feldspar in distinct individual crystals and twin crystals which exhibit beautiful zonal extinction. From the extinction angle of this plagioclase, it appears to be from the albite end of the series and probably indicates that the first part to separate out was andesine or oligoclase, while the latter part is albite. The ground-mass is extremely fine grained and is made up principally of feldspar in which are a small number of inclusions of chlorite, and a few larger crystals of hornblende altering to chlorite. The texture of this rock is shown in the accompanying illustration (Fig. 21), and is undoubtedly that of an andesite.

Ophir

During the winter of 1910-11 the shaft of the Ophir was sunk from 80 to 130 feet, and a drift was started at about 40 feet in depth and a second one at 100 feet. As the manager, Mr. Richards, was unwilling to let anyone go down the mine without per-

Fig. 20.—Bully Boy mine, Camp bay, Lake of the Woods.

mission from the owners, and as it seemed that work under such conditions would be unsatisfactory, the underground workings were not examined. Gold was seen in the ore car at the mouth of the shaft which seemed to indicate that the glowing reports of the richness of this prospect by those who have visited the place in the past are not exaggerated. The condition of the surface development is represented by the accompanying illustration (see Fig. 23). During the summer the company owning the Ophir had an examination made by Mr. R. B. Nickerson, M.E., former manager of the Laurentian and Mikado mines, and as a result Mr. Nickerson was employed to push forward the development of the mine.

The Mikado Mine

This mine has been described in greater or less detail in several of the reports of the Bureau of Mines, and was examined in 1910 to determine whether the vein was a fissure vein or not; but as the first four levels only were accessible at that time and during the winter it had been pumped out to the ninth level, it was deemed advisable to make a more detailed examination.

The rocks in the mine are of two general types, felsite and altered traps. In considering altered traps it may be mentioned that there is much variation from the typical dark green to black material, and in all probability some of the lighter portions of the rock should be classed as altered quartz porphyry or andesite, but as the amount of the light coloured rock is not so great and as it is of such a fine character

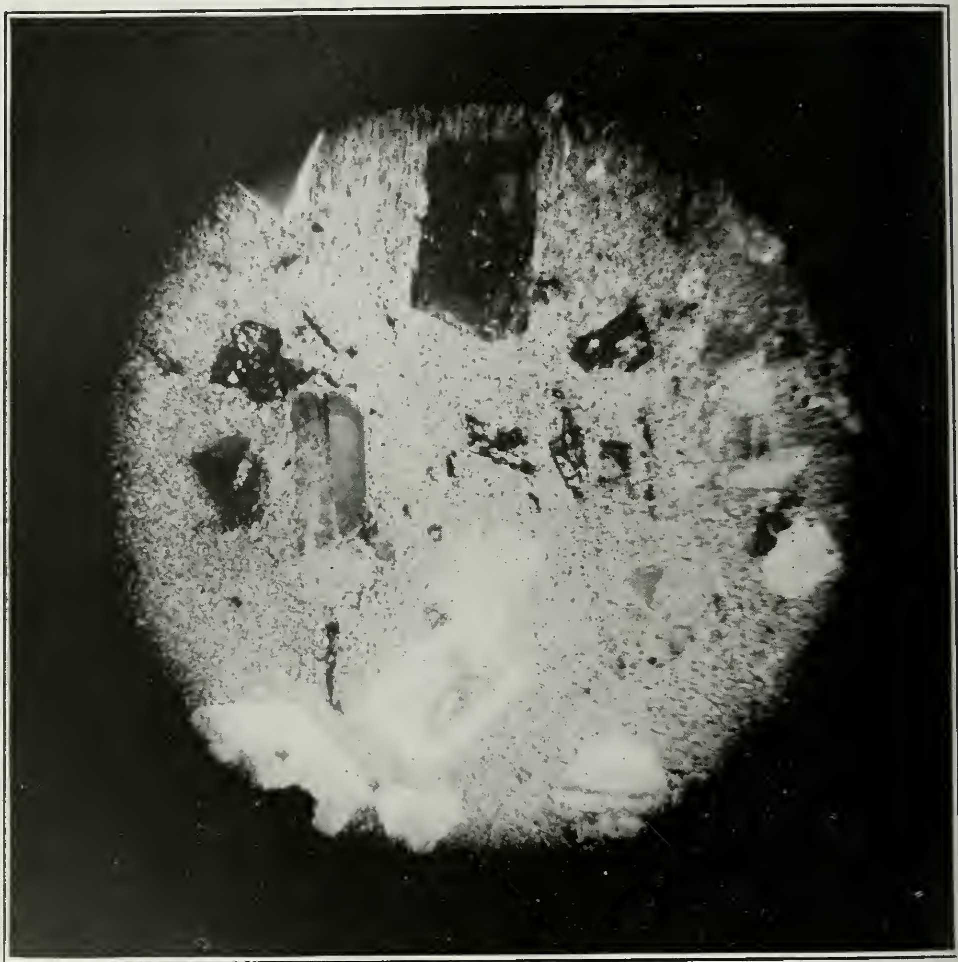


Fig. 21.—Microphotograph of andesite, Combined mine.

that it could only be determined by chemical analysis, no attempt was made to distinguish it from the other Keewatin rocks. It is thought that the distinction between the felsite and the Keewatin rock serves every purpose that can be gained by an examination of this mine, though in other places andesitic rocks play an important role. As will be seen by reference to the accompanying sketches, which represent the foot and hanging walls respectively, the stoping has been done principally in the felsite and for a short distance in the adjoining traps. At the upraise on the seventh level values have been found as reported by the manager, Mr. Nickerson, and engineers who have sampled the mine, varying from twelve dollars to fifty dollars.

The sections shown indicate very clearly that the vein is a fissure vein, and that the rock has not been greatly thrown at this point. With the exception of the first mass of felsite north of the inclined shaft on the fourth level, the indications are that the felsite material is all in the nature of inclined dikes parallel with the granite to the north, and in the area explored it would seem that there are six definite dikes with minor outcrops that may be distinct or may be branches of the larger masses. From a study of the surface conditions, it would appear that there is strong probability of encountering granite within a very short distance of the north end of the fourth level, and when we consider that in the Sultana and Regina mines the values were principally near the contact of the granite and traps, it seems desirable that further explorations should be made at this point to prove the possibilities of the granite contact. So

Fig. 22.—Mill of Combined mine, Camp bay, Lake of the Woods.

far as the development of the mine at present is concerned, the evidence from the geology and the workings indicates that the values have been found only in the vicinity of felsite. All or nearly all of these felsite sills appear on the surface, and if it be true that the felsite is the gold-bearing rock it will probably not pay to explore further toward the south on this vein, as it is thought that the last visible outcrop of this rock on the surface has already been cut in the workings. The rearrangement of the surface plant was described in 1910, and nothing further need be added to that description. The living accommodations have been much improved, and a force of about twenty men were employed up to June 1st, at which time the mine was temporarily shut down.

During the winter of 1910 and 1911 considerable drifting was done on the fourth and seventh levels, and the good values on the seventh level were discovered, which give promise of the profitable development of a second ore body in the mine.

Manitou District

In the Manitou district a moderate degree of activity has been shown in the past year. Development was carried on at the Detola and milling was in progress at the Laurentian, while during the summer the Independence changed hands and it was reported that the Big Master was to be reopened.

In regard to the geology of the Gold Rock region, the essential features were shown in the map prepared last year but it has been found that the altered traps are in many cases quite acidic and grade into diorites and andesites, and considerable masses show a decided agglomerate structure.

As to other parts of Maniatou lake, no attempt has been made by the writer to map the formations, but certain exposures of rock were visited to secure material for comparative purposes.

Fig. 23.—Ophir mine, Lake of the Woods.

The Detola Mine

Since my last visit to Gold Rock work was carried on at the Detola mine until the day preceding my arrival, at which time the mine was closed down temporarily. The principal work consisted in driving a cross-cut on the 235-foot level northwest and southeast. The total length of the cross-cut is 852 feet, of which 509 feet extends northwest from the shaft and the remainder in a southeasterly direction. It was thought that by sampling the walls of this cross-cut specimens might be secured which would show less alteration than the surface rock, and thus serve as a better guide to the geological mapping of the region than the more altered surface materials. Samples were taken every 20 feet. In the northwest cross-cut a vein was found 436 feet from the shaft, which seems to correspond with the vein exposed on the surface known as the

Jack-pine vein. As it is exposed in the drift, this vein is about a foot wide, which is about the same as the width of the surface exposure. The manager, Mr. Dryden Smith, informed me that this vein carries values of about $12 per ton.

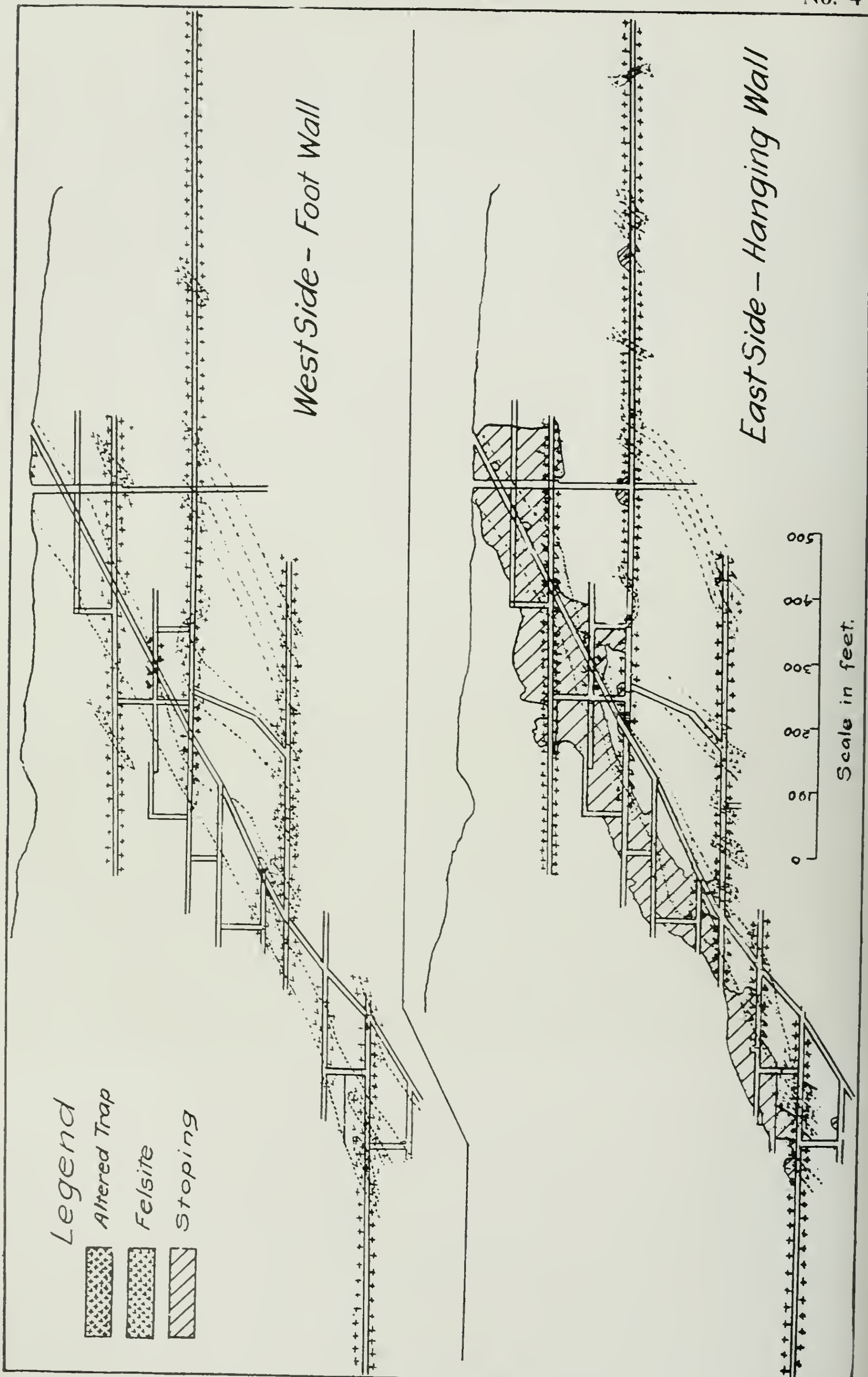
During the year the mill building was completed and the milling machinery installed. A new boiler house and a tank house have been erected on the hill just above the mill. The equipment is in first class condition.

A small band of graphitic schist was found about 120 feet northwest of the shaft in the 235-foot level, which is similar to the graphitic schists in Ptarmigan bay of Lake of the Woods, and apparently the association is the same. The graphitic schists in the Lake of the Woods region are found in hydro-mica schists, while the material in

Fig. 24.—Mikado mine, Shoal lake.

the Detola mine occurs in an altered igneous rock, which was referred by Mr. McInnes to the same formation. From the fact that in certain mining regions the graphitic schist is looked upon as a favorable indication in the search for gold, it was thought that the values at this point might be greater than in the rest of the rock, but so far nothing has been found to indicate that greater values accompany the graphite. From the surface indications the writer was inclined to refer the rock at the Detola to the altered traps in the work of the preceding summer, and the samples taken underground seem to indicate that he was correct in the main, though in places the rock comes very close to the andesite series.

The examination of the material secured on the 235-foot level shows conclusively that the rock here is not a quartz porphyry, though in some cases it is porphyritic. In no case has the writer found original quartz, and the feldspars are always plagio-



Workings of the Mikado mine.

clase. In most cases the plagioclase is labradorite, sometimes with ophitic texture, though occasionally occurring as phenocrysts or nodular aggregates in a fine groundmass. The rock appears to grade from an almost typical diabase to a rock having much the composition of anorthosite. In one instance the rock approaches andesite in composition, though it can hardly be correlated with the rock from the Combined mine on Lake of the Woods as can the rock to the west of Gold Rock, which bears a very close resemblance to the andesite of this mine. It may be noted in this connection that isolated specimens taken near the Big Master and Laurentian mines also approach andesite in composition, though for the most part the rocks are decidedly more basic, except adjoining the vein. It may also be stated that no close line of distinction can be drawn which will separate these rocks in mapping, and in interpreting the map of the Gold Rock region it is only possible to give a broad generalization, for

Fig. 17.—Grace mine, Eagle river.

if an observer comes upon this area, after working in a region of altered traps, the tendency is to group most of these as traps, while when coming from a region of altered andesites nearly all of them would be classed in the field as andesites.

The Laurentian Mine

Through the courtesy of Mr. Bakewell, the manager of the Laurentian mine, the cross-cuts and drifts were examined and samples of the rock taken at frequent intervals. Particular attention was paid to the cross-cuts, as these show the greatest variety in the rock.

In texture and composition the rocks shown in the cross-cut exhibit about the same range as at the Detola, though there is a greater amount of basic rock showing the ferro-magnesian silicates, chlorite and hornblende. The rock is in general quite free from quartz except at the veins.

At the time of the writer's visit work was in progress, and about a dozen men were employed in hoisting material that had been broken down in the stopes and putting it through the mill. The development of the mine is in practically the same condition as it was a year ago, but when the supply of ore in the stopes is exhausted it is expected that further development will be undertaken.

Big Master Mine

Since my visit to Gold Rock it has been reported that the Big Master mine has been pumped out, and that development work is being carried on. Inasmuch as this mine has been looked upon as one of the promising properties in the district, it is to be hoped that the new management may be successful in their venture.

Fig. 25.—Big Master mill, Gold Rock.

Last Chance

During the year work was begun on location S 28 by Messrs. Beck, Kay and Smith, and a promising looking vein of four to eight feet in width has been stripped for a considerable distance and several test pits sunk. Mr. Smith showed some samples of free gold which were said to come from this vein.

Rocks of the Ontario-Manitoba Border

In order to ascertain the point of contact between the Laurentian and Keewatin on the Ontario-Manitoba boundary, a trip was made up the Falcon river to Falcon lake, High lake, West Hawk lake and Ingolf.

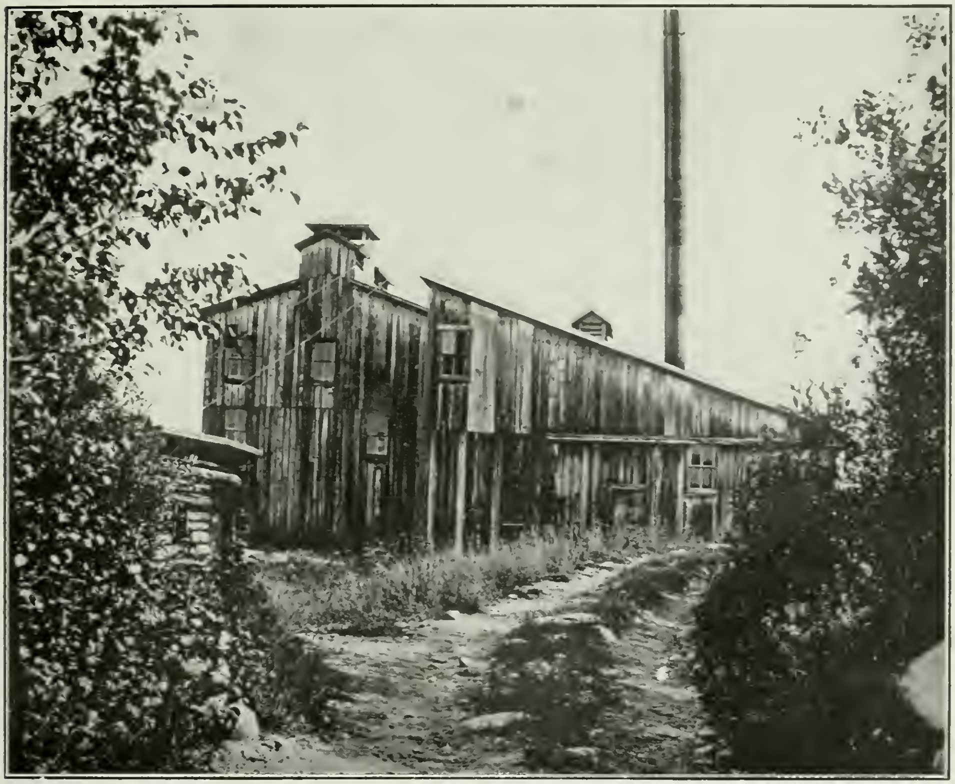


Fig. 26.—Big Master mine, Gold Rock.

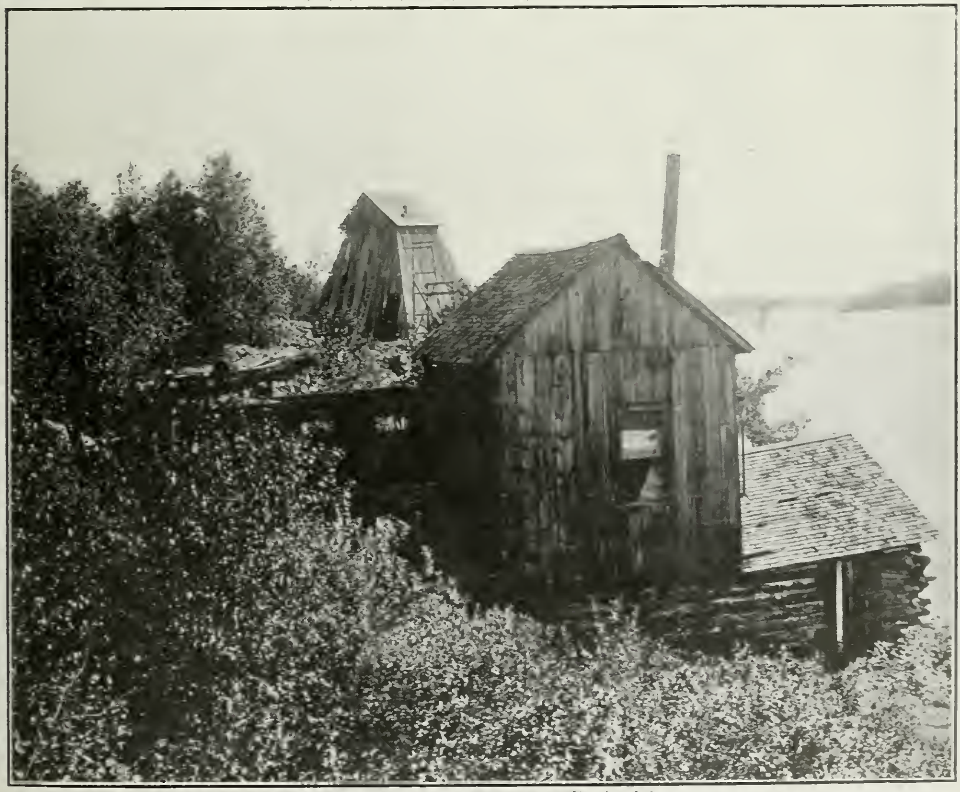
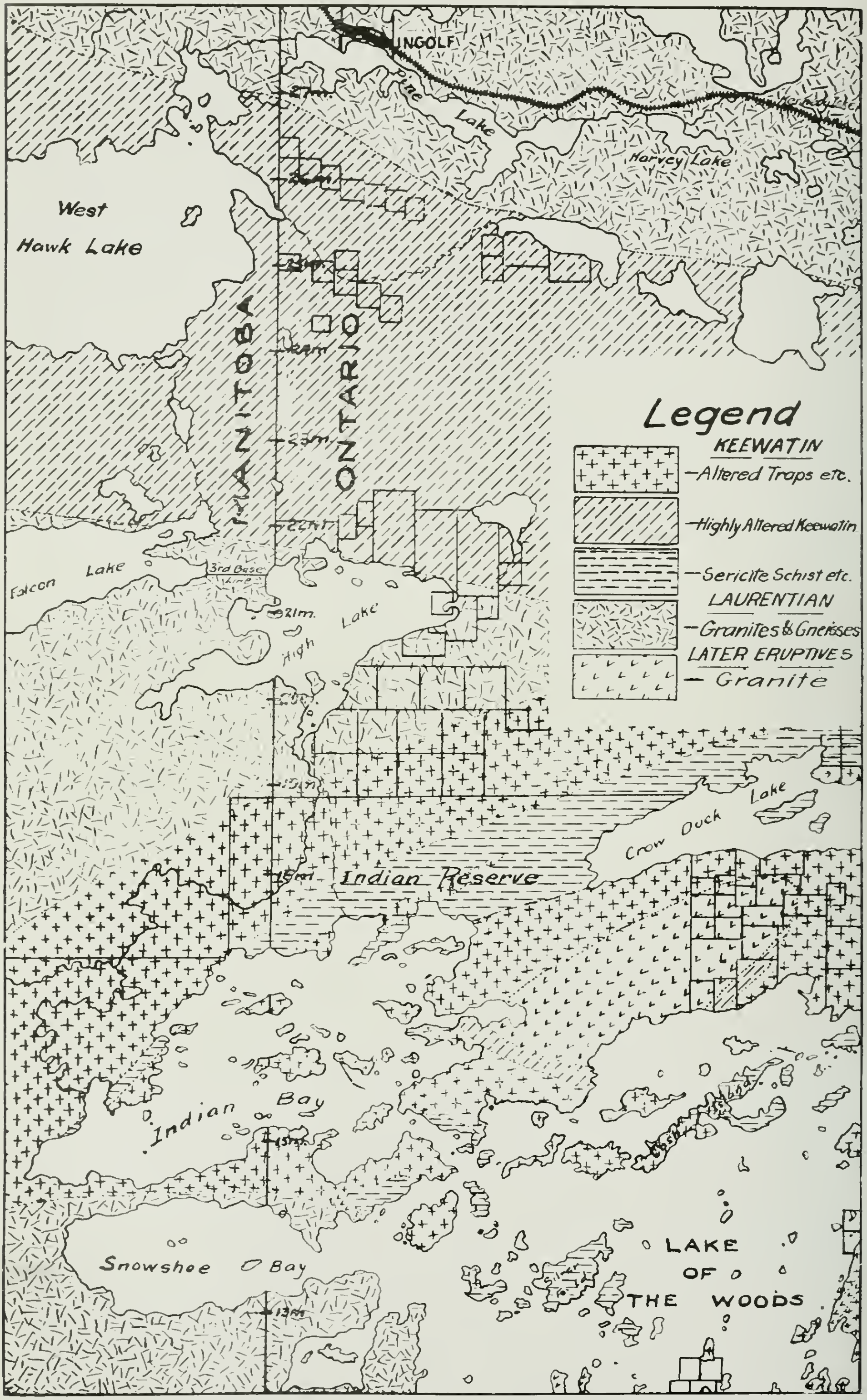


Fig. 18.—Eldorado mine, Eagle lake.



Area Ontario-Manitoba border.

The contact between the altered traps and granite near the south end of High lake was found to be correct, and the rocks surrounding High and Falcon lakes are essentially correct in that they are granites, though the question of the age may still be left open. The north shore of High lake and the extreme northeast end of Falcon lake may be looked upon as a contact zone between the granite and Keewatin. This zone is about a mile in width, as was found by pacing on the boundary line north from High lake, where more than a dozen bands of granite or felsite of varying widths were found in the Keewatin schists.

The Keewatin formation is here about four miles wide, and consists of fine grained highly altered rocks, which show little trace in the field of their origin. The most abundant rock is biotite schist, but hornblende schist is common. Near the contact of this formation with the Laurentian on the north, the rock becomes coarser grained

Fig. 27.—Upper falls, Eagle river.

and is almost granitoid in texture, though much darker than the Laurentian gneiss with which it is in contact. The important feature of this formation is the presence of large quantities of pyrrhotite, which are found in three (or more) distinct bands, extending about N. 70° W. In weathering the pyrrhotite gives a peculiar purplish tinge to the rock, which is an easy means of recognizing the pyrrhotite rock.

This pyrrhotite rock is said to contain considerable gold and several shafts have been sunk on the Ontario side of the boundary, while during the past season development has been carried on a little farther west in Manitoba on the westward extension of one of these ranges. The resemblance of these deposits to the higly altered Keewatin rocks north of Dryden is remarkable and they are in all probability of the same age.

As to the question whether they are altered traps or altered porphyries, the bulk of the evidence would seem to indicate that they are principally altered andesite and agglomerates, but it is certain that there is variation in these rocks, and while the most of them are of a decidedly acidic character and preserve to some extent the plagioclase with zonal structure, at places altered diabase is found where the traces of the ophitic texture are to be seen. In much of the rock a large percentage of granular quartz is present, and there is a strong possibility that these are altered sediments. It is certain, however, that part of the series is of igneous origin, but just what proportion is open to doubt. A comparison of the rocks megascopically and microscopically with those of the Dryden iron formation indicates that for the most part they have the same origin. As certain of the rocks seem to be altered diorites or andesites, they are mapped as Keewatin, and are probably a westward extension of the clay slate and agglomerate areas of Woodchuck bay of Lake of the Woods.

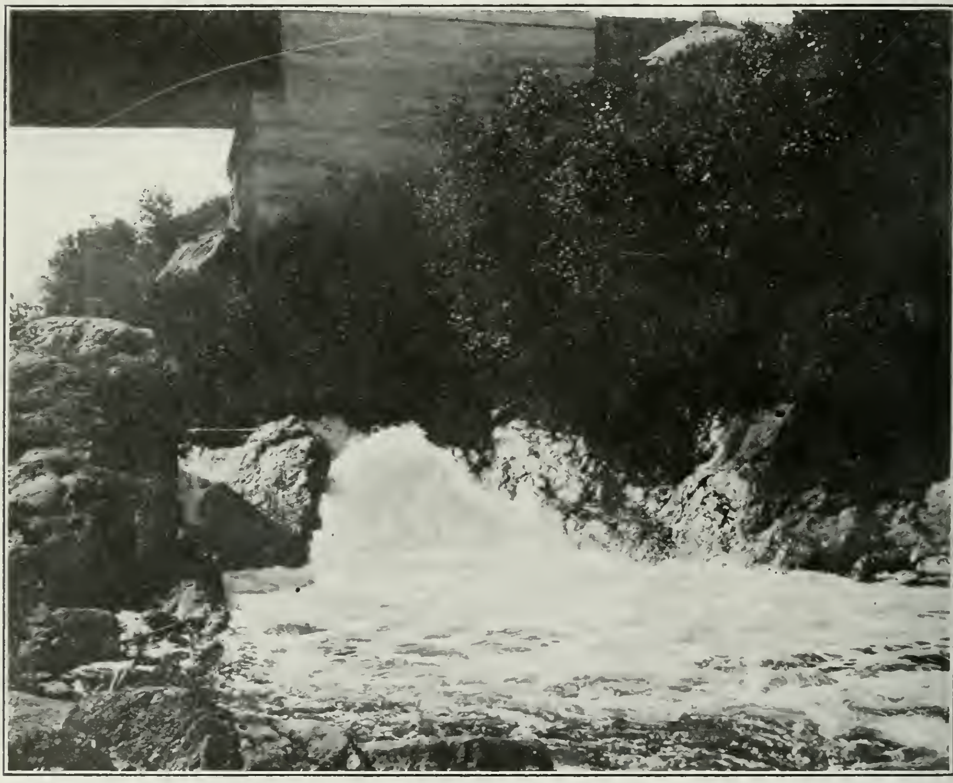


Fig. 28.—Middle falls, Eagle river.

The analysis of these rocks confirms the microscopic examination in assigning an igneous origin for the darker rock, while strengthening the supposition that the lighter coloured rocks are sediments. The first analysis is of a light coloured schist at the pyrrhotite workings east of the lake; the second of a dark rock from the point south of the eastern inlet of the lake.

1.		2.	
SiO_2	81.00	SiO_2	60.50
FeO / Fe_2O_3	2.53	Fe_2O_3 / FeO	3.60
Al_2O_3	10.87	Al_2O_3	22.00

1.—(*Continued.*)		2.—(*Continued.*)	
CaO	0.64	CaO	1.14
MgO	0.14	MgO	0.51
Na_2O	4.46	Na_2O	8.20
K_2O	0.68	K_2O	4.31

It will be seen that the first rock is higher in silica than most igneous rocks, and is probably a sediment, while the second is a diorite or andesite.

Fig. 29.—Lower falls, Eagle river

Water Power

An undeveloped water power of considerable importance is located at Eagle river, where there are three falls within a distance of a little more than a mile, which should furnish the basis of a profitable manufacturing industry. The total fall is about sixty feet, and large storage capacity is afforded by Eagle lake.

The writer wishes to acknowledge the many courtesies which were shown him in his work. In particular would he express his appreciation to Capt. H. A. C. Machin, M.P.P., whose assistance and hospitality were freely given on numerous occasions. The cordial hospitality of Messrs. F. Pfan, of the Cameron Island mine; J. Taylor, of the Regina mine; J. Hubner, of the Olympia mine; Dryden Smith, of the Detola mine, and D. Hutchinson and A. Hutchinson, of Dryden, in addition to that of many others, is most gratefully acknowledged. The kindness of Mr. Rognon, of Dryden, in putting his launch at the service of the party on several occasions was greatly appreciated. In conclusion, it is the desire of the writer to make acknowledgment of the interested collaboration of his assistants, Mr. D. Freeman, of Bowesville, and Mr. J. Margach, of Kenora.

Government Road, near Frederick House lake.

THE PORCUPINE GOLD AREA

Second Report

By A. G. Burrows

Situation

The Porcupine gold area, which for the past three years has held the attention of the mining public, is situated on the Hudson Bay slope of northern Ontario. The latitude of Niven's First Base Line of 1899, which runs through the centre, forming the south boundary of Tisdale and Whitney, is 48° 27′ 54″; consequently the area is somewhat farther south than the Canada-United States boundary in Manitoba and other western provinces. The camp is in the Temiskaming judicial district. Lying along the southern fringe of the great clay belt of northern Ontario, it adjoins a prospective farming country. In this belt many townships have been laid out in six or nine-mile squares and subdivided into concessions and lots; in the gold area itself and in the adjoining country to the north, many half lots containing 160 acres each have been granted to veterans as homesteads.

During 1911 there was little extension of the gold-bearing area beyond what was known in 1910. The discoveries of Hollinger and Wilson of 1909, now the Hollinger and Dome mines respectively, still remain the most important that have been made, while Tisdale is by far the most important township.

The township of Bristol received much attention in 1911 by the discovery of gold on the McAuley-Brydge claims. Here the gold occurs in a sheared zone of altered sedimentary rock, with included quartz stringers. In the townships of Carscallen and Denton to the west were found some gold-bearing quartz veins in a grey biotite granite. Other areas which attracted prospectors were the townships of Turnbull, Thomas and McArthur.

A geologically colored map, scale one mile to one inch, accompanies this report.

Ingress to the Area

A branch line of the Temiskaming and Northern Ontario railway has been constructed from Iroquois Falls (on the main line), in a southwesterly direction to the town of Timmins, a distance of 33½ miles. Timmins by railway is 485 miles distant from Toronto.

A number of townsites have been established in the area. The most important of these are: Porcupine, South Porcupine and Lakeview, situated on Porcupine lake; Schumacher, on Pearl lake; Timmins, west of Miller lake; and Mattagami, on the Mattagami river.

Elevation of the Area

In elevation the area averages about 1,000 feet above mean sea level. In this respect it is similar to Cobalt, which lies 100 miles to the southeast, south of the height of land. The divide between the Hudson Bay and the St. Lawrence waters is not pronounced, being only about 1,300 feet above sea level.

The highest elevation near Porcupine is along the south boundary of Jamieson, where a felsitic ridge has an altitude of 1,350 feet above sea level.

The country from Night Hawk lake to the Mattagami river is one of low relief. Occasional ranges of hills reach an elevation of 150 feet, but generally abrupt changes in elevation are less than 50 feet. Often in a low area rocks outcrop only a few feet above the surrounding drift and are only a fraction of an acre in extent. Northwest, south, southwest and southeast of Porcupine lake the country is somewhat elevated, and rock exposures are more frequent than in most of the area.

Early Examination of Region

Previous to 1909, the area was little known. There were practically no reports upon it except from explorers and geologists who were attached to survey parties sent out by the Ontario Department of Lands, Forests and Mines.

The main part of the camp is situated along an old portage route, from the Mattagami river to Night Hawk lake, which had been used by the Hudson Bay Company officials for a couple of centuries.

In 1896 Mr. E. M. Burwash examined the country along the Algoma-Nipissing boundary line which was run as far as the southeast corner of Whitney township in that year. He noted the occurrence of quartz veins, carrying traces of gold, at various points on the line. One of these veins he found on what is now the east boundary of Shaw, and only a few miles southeast of the main area. He remarked that the country was a promising one for the prospector but for the drift.[1]

Following the classification of the pre-Cambrian in use at that time Mr. Burwash grouped the Keewatin with the Huronian. He says:—

"In the lower part of the series [now considered to be mainly Keewatin] gold appears to be quite widely distributed both in veins which are of tolerably frequent

Street scene in South Porcupine, March, 1912.

occurrence and in mineralized portions of the rock itself. In two cases the veins were situated near the boundary of granite areas."

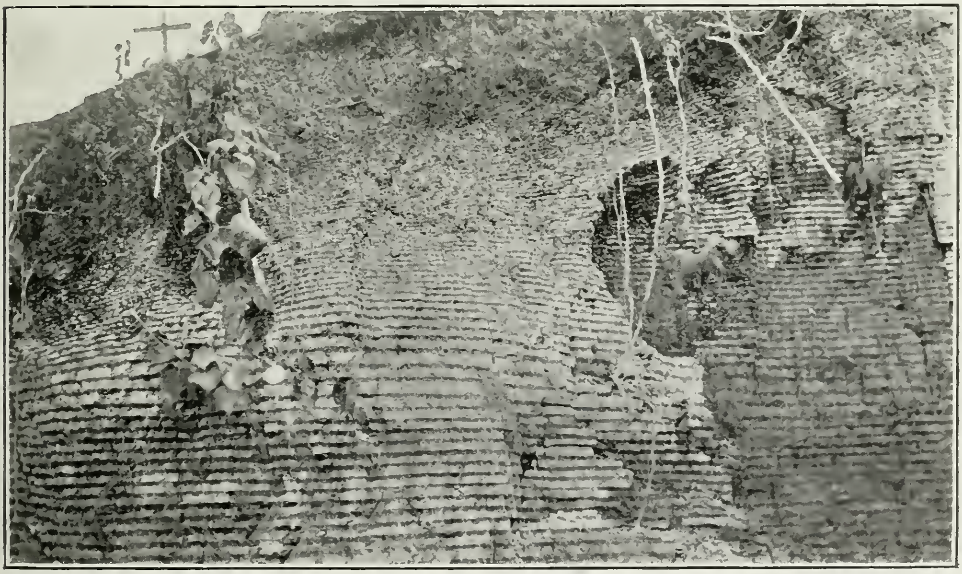
In 1899 Mr. W. A. Parks reported on the geology of the portage route from the Mattagami river to Night Hawk lake by way of Porcupine lake. He, like Burwash, noted the occurrence of gold in some quartz veins, particularly in the southwest portion of Whitney township, obtaining assays from a trace to $1.00 per ton. In his summary Mr. Parks remarked: "I regard the region south of the trail to Porcupine lake as giving promise of reward to the prospector."[2]

Geological descriptions of areas, including and adjacent to the Porcupine area, are to be found in the reports of the Bureau of Mines for 1903, 1904 and 1905 by Messrs. Kay, McMillan and Kerr, respectively.

In October, 1909, Mr. Jas. Bartlett made a brief examination, for the Bureau of Mines, of the early discoveries of the area.[3]

[1] Bur. Min., Vol. VI. (1896). [2] Bur. Min., Vol. IX. (1900), Niven's Base Line. [3] Bur. Min., Vol. XIX. (1910).

Bank 40 feet high of stratified clay overlain by sand. Mattagami river, Ogden township.



Stratified clay at Sandy Falls, Mountjoy township.

The First Prospecting

In 1906 some work was done by prospectors on a vein near Miller lake and a few hundred feet from the present Hollinger vein. Evidently seeing no gold, and having no assays made, they abandoned the property. In the same year claims were staked in Shaw township on what is described in the application as a "vein of sugar quartz and hematite iron." This is of interest since the so-called vein is simply the upturned edges of the Keewatin iron-formation.

In 1908 claims were staked by Mr. H. F. Hunter on the east shore of Porcupine lake in Keewatin formation. Gold was found sprinkled through quartz and schist in a sheared zone.

It was not, however, until the following year that the spectacular discoveries of J. S. Wilson, on what is now the Dome property, caused a rush to the district, and in a few weeks practically all of Tisdale and a great part of the adjoining townships and unsurveyed territory were staked out in mining claims.

Superficial Deposits

The area is for a considerable part drift-covered. These drift deposits consist largely of stratified clays, sands and gravels of post-glacial age; and in addition there are patches of morainic material. Sections of stratified clay, overlain by sand, are well exposed on the Mattagami river, north of Pigeon rapids, and along the shores of Night Hawk lake. Most of the islands in this lake have a rocky shore line, but are capped by stratified material. Where the soil has been removed the rocks are seen to have been intensely glaciated. The fine-grained greenstones have well preserved the scratches and grooves produced by glaciation. On several islands were noted two sets of striations, S. 15° W. mag., and S. mag., the latter of which represents the later ice movement. Owing to the lack of drainage, much of the country, though higher than the rivers and lakes, is very wet, but would be suitable for agricultural purposes if properly drained. For a description of the agricultural possibilities of the country the reader is referred to reports by Mr. A. Henderson.[4]

Forest Fires

During the past two years forest fires have greatly ravaged the area around Porcupine. About the middle of May, 1911, a fire completely destroyed the surface workings and buildings of the Hollinger mine. From that time forest fires were burning in the area until the middle of July. On July 2nd the buildings of the Dome Extension and part of the townsite of Pottsville were destroyed.

The greatest fire of the year occurred on July 11th, when, after a prolonged dry season, a tremendous hurricane from the southwest brought up a fire which did the greatest damage. The surface workings and buildings of the Dome, West Dome, Vipond, Standard, Preston East Dome, North Dome and several other properties were entirely destroyed by fire. The town of South Porcupine was completely wiped out, and almost all the part of Pottsville which escaped the fire of July 2nd. The north part of Porcupine (Golden City) was also destroyed. This fire was attended by a great loss of human life, 71 in all having lost their lives either by being burned, suffocated or drowned.

Timber

In the parts which have escaped the fires there is a dense growth of timber, including white and black spruce, jackpine, birch and poplar. It is interesting to note that a growth of young tamarac is replacing the old tamarac trees, which have all been destroyed in recent years by the larch saw-fly.

[4] Agricultural Resources of Abitibi, Bur. Min., Vol. XIV. (1905); Agricultural Resources of Mattagami, Bur. Min., Vol. XV. (1906).

Geology

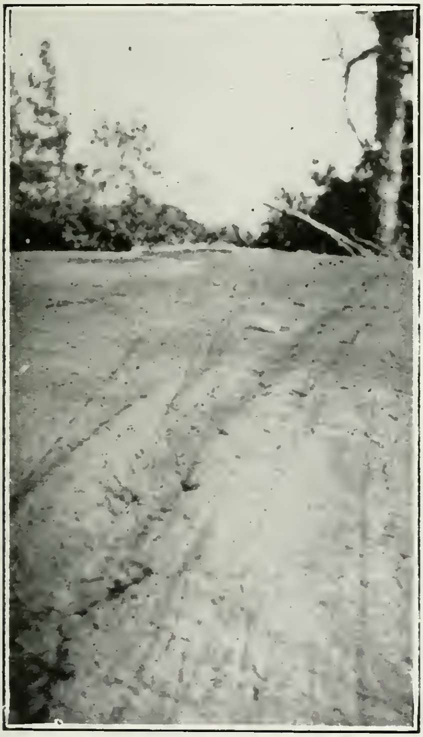
The compact rocks of the area may all be referred to the pre-Cambrian.

Pleistocene

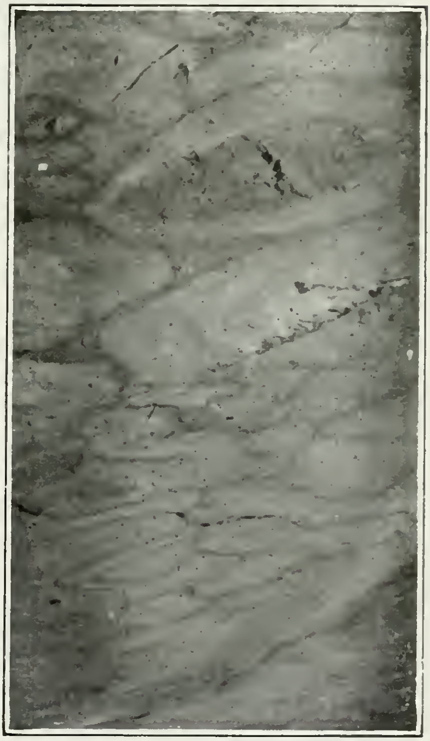
Post Glacial.—Stratified clay, sand, and peat.
Glacial.—Boulder clay.

Pre-Cambrian

Later Intrusives.—Quartz-diabase, olivine-diabase, etc.
Igneous contact.
Cobalt Series.—Conglomerate.
Unconformity.



Glaciated surface, Night Hawk lake.



Ellipsoidal greenstone, Night Hawk lake.

Temiskaming Series.—Conglomerate, quartzite, greywacké, slate or delicately banded greywacké.

Unconformity.

Laurentian.—A complex of granites older than the Cobalt series. It intrudes the Keewatin, but its relationship to the Temiskaming is not definitely known; it may be in part older and in part younger than the Temiskaming series.

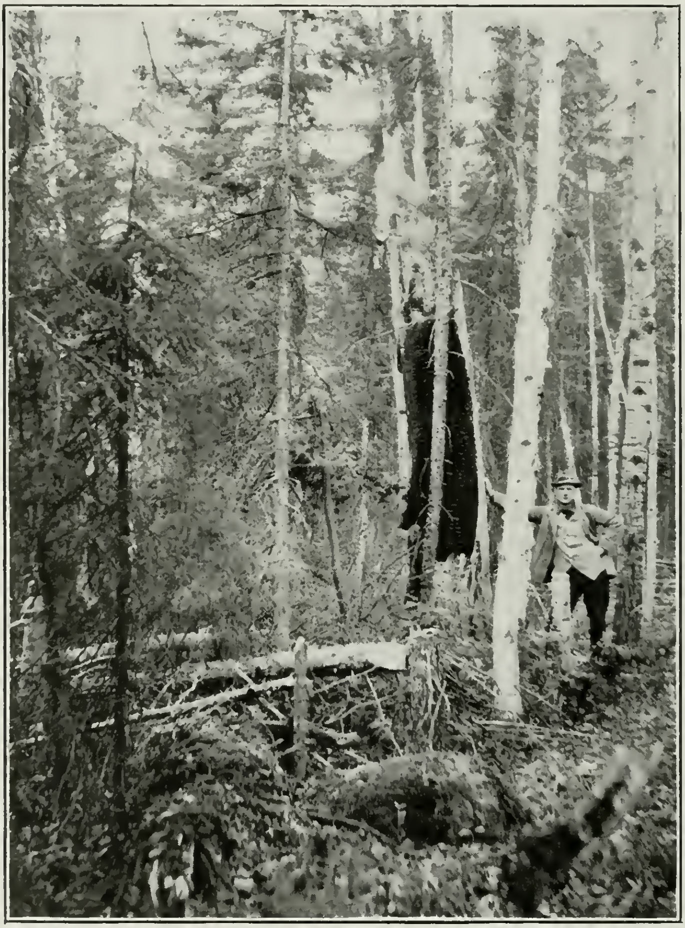
Igneous contact.

Keewatin.—The series consists chiefly of basic to acid volcanics, much decomposed, and generally schistose; amygdaloidal basalts, serpentine, diabase, quartz, or feldspar, porphyry, felsite iron formation and rusty weathering carbonates, and other rocks have been recognized.

Keewatin

The Keewatin has a much greater distribution in the Porcupine area than the other members of the pre-Cambrian, and it is also of more importance economically, since it contains the greater number of the gold-bearing veins which have so far been discovered.

As in other parts of Ontario the series is highly metamorphosed, and many rocks are so much altered as to give little evidence of their original character. However, much of the series can be seen to consist of basic and acid volcanics such as basalts and porphyries, with intermediate types, although these are often altered to schists.



Relics of fire at Porcupine over 50 years ago. Note spruce tree growing through old black stub (red pine), Oct. 1911.

Where schistose, the general strike over a considerable area is found to vary from east and west to northeast and southwest, while the dip is generally steep to the north.

Among the more massive rocks are greenstones (basalts, etc.), which frequently show a striking ellipsoidal or pillow structure. Amygdules often accompany this structure and occur most abundantly along the rims of the ellipses. The centres of the ellipses are often bleached to a light greenish or whitish colour, whereas the margins are considerably darker. This structure is frequently seen in the northwest part of Whitney township. It is very pronounced in the greenstone along the shores of Night

Hawk lake and on the islands in this lake. On the main land, opposite Callinan's island in Night Hawk lake, the ellipsoidal greenstone has been rendered quite schistose, so that the structure appears as alternate light and dark bands. Some of the greenstones have been brecciated and resemble conglomerate.

Serpentine occurs in parts of the area in large volume. The range of hills immediately southeast of Porcupine lake are largely composed of this rock, which is impregnated with much carbonate. Occasional veinlets of fibrous asbestos are seen. A section of a sample of serpentine rock from the southeast shore of Porcupine lake is made up largely of fibrous serpentine, together with residual iron oxides, which in arrangement suggest original crystals like olivine. The remainder of the rock is dolomite. A chemical test showed the absence of chromium oxide in this rock.

Serpentine rock, carrying veinlets of asbestos, occurs in Deloro township on H. R. 968. Some of the serpentine is plentifully seamed with narrow veinlets of asbestos of

Serpentine rock with veinlets of asbestos, south part of Deloro township.

good grade, and if the mineral-carrying serpentine is in quantity, it might be worthy of investigation as a source of asbestos. A similar rock occurs in the southeast part of Eldorado township.

The rock from the boundary between Whitney and Tisdale, about the middle of the fourth concession, is a fine-grained amphibolite, consisting essentially of hornblende, epidote, zoisite and calcite.

The rock from the main shaft of the Davidson is dark green in colour and shows blades of dolomite. In thin section the groundmass appears to be largely composed of chlorite, through which are numerous feldspar rods. In the groundmass are scales of sericite, grains of quartz and numerous large crystals of dolomite. Much of the greenstone along the veins of north Tisdale is greatly altered to impure carbonate rock, but in the sample just mentioned an igneous texture is quite distinctly recognized and the rock is considered to be an altered basalt. A similar rock to this occurs south of the power house at the Crown Chartered, the adjoining property.

A greenstone, north of the quartz-ankerite veins on the Gray claims in Ogden township, which shows a rough ellipsoidal structure, is very similar to the rock from the Davidson.

A spotted rock, from the northeast part of the West Dome in lot 5 in the first concession of Tisdale, is probably an altered amygdaloidal lava. The schistose matrix consists of secondary material, dolomite, sericite, etc., and the amygdules, whose margins are stained with limonite, are filled with calcite, sericite, and quartz. Some of the amygdules are an inch in length.

An amygdaloidal rock from the 100-foot level of the Vipond mine is entirely decomposed. The amygdules are now stained with red iron oxide and show much clear calcite. Rims of chlorite surround the amygdules, along which are scattered grains of magnetite. There are also some minute grains of a secondary mineral, quartz or feldspar.

A sample from the main shaft at the Dome Extension is quite schistose in thin section. Rods of plagioclase can still be recognized, while the ferro-magnesian mineral is entirely altered to chlorite. Quartz is present in small grains, and calcite is abundant in grains. Secondary feldspar is present in the form of clear grains. The rock may have been a diabase or basalt, but is now much altered.

A chemical analysis of this rock gave: Silica, 49.88 per cent.; alumina, 15.29 per cent.; ferric oxide, 0.43 per cent.; ferrous oxide, 11.30 per cent.; lime, 4.54 per cent.; magnesia, 7.83 per cent.; soda, 2.17 per cent.; potash, 0.62 per cent.; carbon dioxide, 3.20 per cent.; water, 5.17 per cent.

The light-coloured more massive rocks are principally quartz-porphyries and felsite, which in places intrude the more basic rocks. When the porphyry occurs in some volume, as around the Hollinger mine, the name rhyolite has been applied to it. Much of the porphyry has been altered to a sericitic schist, and frequently a rather massive rock can be traced into a very schistose one. This change can be well seen in the porphyry to the southwest of the Dome mine workings. A porphyry from the south half of lot 4 in the first concession of Tisdale, examined in thin section, shows the phenocrysts to be largely plagioclase feldspar, while quartz in rounded grains is also present. The groundmass is made up principally of plagioclase feldspar and quartz. Laths of tourmaline are scattered through the rock.

The schist at the surface and at 50 feet in No. 1 shaft of the Hollinger mine, is fine in grain and of a light gray color when fresh. The groundmass consists essentially of sericite (or talc), dolomite, quartz and feldspar. In this occur round and irregular eyes of quartz which may represent phenocrysts in the original rhyolite or quartz-porphyry from which the schist has probably been derived. Cubes of iron pyrites are commonly set in the rock. Other thin sections from the gray schists on the Timmins properties have about the same group of minerals, and most of them effervesce with hydrochloric acid.

The somewhat massive rhyolite exposed just southeast of Miller lake is made up of a fine-grained matrix of quartz, feldspar and sericite in which are set small phenocrysts of quartz and feldspar. The rock is much impregnated with dolomite.

A sample of schistose rock from the 140-foot level of the Bewick-Moreing shaft, east of Pearl lake, shows an abundance of sericite, chlorite and calcite, with numerous quartz grains. The rock is entirely altered, but some of the quartz grains may be remnants of phenocrysts.

A sample of schistose quartz-porphyry from south of the Dome mine workings shows phenocrysts of quartz and feldspar in a fine-grained groundmass of these minerals. The extinction angle of some of the feldspar phenocrysts is near that of oligoclase-albite. Sericite scales are often grouped around the crushed feldspar crystals and have penetrated them. Cubes of iron pyrites are abundant.

In addition to the quartz-porphyry there are numerous dikes of a gray feldspar-porphyry. These are generally less than 100 feet in width, and south of Porcupine lake on the Edwards claim intrude the schistose quartz-porphyry. One such dike of feldspar-porphyry on H. R. 1,043 in Deloro township has been prospected for gold. The dike is intersected with minute stringers of quartz in which most of the gold occurs. A thin section of the rock shows the phenocrysts to be an acid plagioclase which is fairly fresh, but is partly invaded by scales of sericite. Plagioclase is also prominent in the groundmass.

Two analyses of quartz-porphyries gave the following composition:—

—	(1)	(2)
Silica	65.22 per cent.	67.64 per cent.
Alumina	14.62 "	18.68 "
Ferric oxide	3.39 "	1.80 "
Ferrous oxide	1.14 "	1.38 "
Lime	3.01 "	0.39 "
Magnesia	1.09 "	1.04 "
Soda	5.66 "	4.16 "
Potash	1.45 "	1.61 "
Carbon dioxide	2.61 "	trace.
Water	1.07 "	1.92 "
Sulphur	0.79 "	1.71 "

(1) Quartz porphyry from No. 2 shaft, Preston East Dome.
(2) Schistose quartz porphyry, south of Dome mine.

At times the Keewatin has been much crushed and broken, so that the rock has the appearance of a conglomerate; so much so that in the vicinity of the Dome mine, where greywacké and conglomerate occur, it is impossible to draw a close line of distinction between the autoclastic rock and the true conglomerate.

Iron Formation

Banded iron formation, grouped with the Keewatin, has an extensive development in parts of the area. It outcrops frequently in the southwest part of Whitney township in the first and second concessions. The disturbance in the formation here has not been so great as in other parts. Often the bands are lying almost horizontally. In places they have been somewhat brecciated, but otherwise little disturbed. The bands are alternate reddish or grayish sugary quartz and magnetite or hematite. Sometimes the narrow bands of magnetite, one-eighth inch thick, carry a merchantable percentage of iron, but these are relatively subordinate in comparison with the main mass of rock. It is unlikely that merchantable iron ore will be found in quantity. In parts of the formation iron pyrites replaces the magnetite. Almost horizontal, interbanded iron pyrites and silica are seen on the south half of lot 5 in the second concession of Whitney. A sample of banded quartz and iron pyrites gave 40 cents in gold per ton. Iron pyrites occurs in considerable quantity with a sugary quartz on lot 9 in the second concession, and and might be worthy of investigation as a source of sulphur.

In Deloro and Shaw townships the iron formation is more highly tilted—generally from 60° to nearly vertical. Bands can be traced for several miles in a direction somewhat south of west. In this position, and especially where the iron ore is deficient, the formation greatly resembles wide quartz veins, and many prospectors have done considerable stripping and prospecting along it. The formation is frequently cut by quartz veins in which visible gold sometimes occurs. In most cases the prospector has considered the iron formation itself to be a quartz vein or dike, and low gold values have been obtained from some of this material, especially where secondary iron pyrites is present.

Carbonate Rocks

In various parts of the area associated with Keewatin rocks are carbonates to which various terms have been applied, such as: dolomite, ferro-dolomite, ferruginous carbonate and ankerite.[5]

[5] The name "ferro-dolomite" is not recognized by Dana and other authorities.

There is much uncertainty as to the origin of this rusty carbonate rock in different parts of the area. The carbonate may occur in at least four different forms, namely, as original bedded material, as a replacement, as vein filling, and as a decomposition product of basic, igneous or other rocks.

Dr. W. G. Miller, in his notes with the first edition of the Porcupine map, states that certain dolomites of the area may correspond to the crystalline limestone of eastern Ontario. Further he says: " It would appear not unlikely that carbonate in some places is a replacement mineral, and that a considerable volume of rock may at times have been replaced by carbonate."

In the township of Deloro there are bands of carbonate closely associated with bands of iron formation which may be traced for several miles in an east-west direction. The relationship would suggest a similar origin for these rocks, that is, as beds deposited in sea water and now resting in an inclined position dipping to the north. These dolomite bands are frequently intersected with quartz veinlets, carrying some gold values, hence their importance. The bands have recrystallized and carry veinlets of later carbonate, as well as quartz.

In the northeast part of Tisdale and the adjoining part of Whitney, there is considerable rock which carries a high percentage of carbonate. This impure carbonate rock is much fissured by quartz veins, as on the Armstrong-McGibbon, lot 1 in the fifth concession of Tisdale, and other properties in the vicinity.

Several samples of rock which effervesce strongly with acid show an original igneous structure under the microscope. A sample from near one of the Davidson veins on the southwest quarter of the south half of lot 2 in the fifth concession of Tisdale is a medium-grained, greenish, much altered igneous rock. Plagioclase feldspar, showing albite twinning, may still be recognized, and also micrographic intergrowths of quartz and feldspar. The remaining minerals are secondary—chlorite, calcite, etc., and make up a large part of the rock, which is probably a quartz-diorite or grano-diorite. Another rock, taken from a cross-cut at 90 feet depth, on the Scottish Ontario property, is an altered basalt. The plagioclase feldspar is largely altered to saussurite minerals, while the ferro-magnesian mineral has gone to chlorite, and magnetite to leucoxene. Calcite is present in considerable quantity as a secondary mineral. Other examples could be cited showing the replacement of igneous rock by carbonate. It is believed that this process has continued in some cases to such an extent that the rock is now largely carbonate, while the original rock constituents are leached out, or so altered as to show little trace of the igneous origin.

Analyses were made of some impure carbonates which occur with the quartz veins in northeast Tisdale, with the following results:—

	1.	2.	3.
	Per cent.	Per cent.	Per cent.
Insoluble	51.82	58.63	47.35
Calcium carbonate	19.38	19.59	20.98
Magnesium carbonate	6.08	8.06	8.50
Ferrous carbonate	13.49	11.53	12.19

No. 1 is an impure carbonate from near the west end of the main quartz vein on the Davidson claim, N.W. ¼, S. ½, Lot 2, Con. 5, Tisdale.

No. 2 is from the south wall at the east end of this vein and is quite schistose.

No. 3 is from the Crown Chartered property—just northwest of No. 1 shaft.

Similar impure carbonates occur at the Armstrong-McGibbon, Scottish Ontario and other properties near by, and also in other parts of the area—as at the Rea vein, lot 6 in the third concession of Tisdale. Microscopic examination of the above rocks shows them to be entirely secondary. There is an abundance of sericite and a minor quantity of quartz present in the sections.

That there has been considerable migration of carbonate solutions is shown by the manner in which almost all the rocks of this area are more or less impregnated with it. Sections of quartz-porphyry schist show the presence of much calcite as a secondary mineral. Veins and veinlets of ankerite occur frequently, not only in basic rocks, but in the quartz-porphyry.

The origin of some of the ankerite bands, such as are seen in the Curts "vein" on the West Dome properties is difficult to explain. Analyses of samples of this ankerite show it to be almost free from insoluble impurities, in which respect it is quite different from the carbonate occurring in northeast Tisdale. The distinct walls of the band of carbonate suggest a vein or bed origin for it rather than a replacement. Analyses of carbonate from different parts of the Curts vein are given in columns 1 and 2.

Looking west along the ankerite lode on the West Dome property.

—	1.	2.	3.	4.
	Per cent	Per cent.	Per cent.	Per cent.
Insoluble	1.73	....	11.42	....
Calcium carbonate	50.63	51.28	46.63	42.76
Magnesium carbonate	29.57	29.82	28.77	19.86
Ferrous carbonate	14.15	14.70	5.39	12.01

No. 3 is an analysis of ankerite from a narrow vein on the east Foster claim (West Dome).

No. 4 is an analysis of a very dark gray ankerite from a vein on the Gray claim, Ogden township.

The impure carbonates may have resulted in some cases from a direct alteration of basic dikes. What is known as the Powell carbonate band, on M. E. 20 in Deloro township, contains considerable serpentine and a chrome mica which could well come from a chromiferous peridotite. In the south part of the same township, on P. P. 57, there is a carbonate rock which is about 100 feet wide. It consists principally of carbonate and serpentine, through which ramify many veinlets of almost pure magnesite. All these minerals are cut by veinlets of quartz. An analysis of the magnesite gave: $CaCO_3$ 0.48; $MgCO_3$ 80.25; $FeCo_3$ 2.46. Robert Harvie ascribes such an origin for the rusty carbonate bands of the Opasatica lake area in Quebec.[6]

On the other hand it is likely that a great number of the almost pure ankerite veins of the area have been formed from circulating waters as suggested above.

Similar Rocks in Other Areas

Carbonate rocks are characteristic of all the gold-bearing areas of northern Ontario.

Larder lake, which lies about 70 miles east-southeast of Porcupine, is referred to by Mr. R. W. Brock as follows:

"The most interesting rock from an economic standpoint near Larder lake is a rusty weathering dolomite (?). About 60 per cent. of the rock consists of lime-magnesia—iron carbonate, the remainder of quartz and a soft green talcose silicate; probably serpentine. The origin of the rock is as yet a little uncertain. Certain dikes, when squeezed and altered, produce a rock which bears a strong resemblance to it, but its occurrence with slates and phyllites and with the cherts—undoubted sedimentary rocks—as a conformable band . . . render it more probable that it is an altered stratified ferriferous dolomite, probably forming a member of the iron ore formation. This rock, especially where cut by the porphyry or pegmatite . . . . is traversed by innumerable stringers of quartz which in places are gold-bearing.[7]"

Mr. Morley Wilson also refers to Larder lake, and to Opasatika lake to the east, as follows:

"In the neighbourhood of Larder lake and north of lake Opasatika are local outcrops and bands of a rusty-weathering rock consisting of ferruginous dolomite or ankerite, with varying quantities of quartz and feldspar. It is always highly pyritic, and in most localities contains a large amount of chrome mica or fuschite from which the rock derives its color. As a rule the rock is cut in a most complex manner by two or more sets of veinlets of quartz or of quartz and ferruginous dolomite, the dolomite occurring along the margin of the veinlet and the quartz in the centre.[8]"

M. B. Baker describes a similar carbonate rock in his report on the Abitibi lake area,[9] and also A. A. Cole in his report on the gold-bearing deposit at Gold island in Night Hawk lake.[10]

Some of the gold deposits on Temagami lake are associated with the carbonate.

W. G. Miller refers to these in his report on "The Iron Ores of Nipissing District":

"At Ferguson point a pit has been sunk in quartz and dolomite. The appearance of these two minerals in association is interesting as the mixture of the two resembles closely the gangue of some of the auriferous mispickel ore bodies in Hastings county. There are some other masses of more or less silicious dolomite along this (northeast) arm of Temagami, in Emerald lake and elsewhere.[11]"

A. L. Parsons describes a carbonate as occurring at the Regina mine, Lake of the Woods:

"No. 3 vein is principally quartz, though in places a good percentage of a rusty carbonate is found intermingled with the quartz. The west vein, which is about 20 feet wide, consists of two parts, that upon the north being quartz interbanded with rusty carbonate, while the southern portion consists entirely of this rusty carbonate.[12]"

In the same area at West Shoal lake, A. P. Coleman describes the veins at the Oliver Daunais location as quartz mixed with a good deal of dolomite. In some cases the latter mineral contains a few specks of free gold.[13]

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[6] Journal of Canadian Mining Institute, Vol. 14. p. 187. [7] Bur. Min., Vol. XVI. (1907), p. 207. [8] Sum. Rep. Geo. Sur. Can., 1909. [9] Bur. Min., Vol. XVIII. (1909), p 270. [10] Ibid., Vol. XVI. (1907), p. 220. [11] Ibid., Vol. X. (1901). [12] Ibid., Vol. XX. (1911) [13] Ibid., Vol VI. (1896), p. 105.

Carbonate rocks are also associated with iron ore deposits in northern Ontario, as at Helen mine, Michipicoten. In this locality there are masses of siderite impregnated with iron pyrites, from which, according to A. P. Coleman, the hematite ore has been derived.[14]

It will be seen that the carbonate rocks of the pre-Cambrian have a wide distribution in Northern Ontario. They vary considerably in composition, but are represented for the most part by crystalline limestone in which $CaCO_3$ predominates. Other carbonates are ankerite, siderite and dolomite. In one locality the crystalline carbonate has the composition of magnesite.

A strikingly green colour is often seen in the ferruginous carbonate rocks of the area. It is well shown in these rocks on Night Hawk lake. N. L. Turner, Provincial Assayer, obtained decided reactions for chromium in a sample from Night Hawk lake, suggesting the presence of a chromium silicate. Mr. Morley Wilson describes a similar green mineral from Opasatika lake as a chrome mica or "fuschite."

A similar mineral has been reported to occur on lake Abitibi and elsewhere.[15]

A chrome-magnesia mica (biotite) occurs in the township of Hyman, Algoma district.[16]

Fragmental Rocks

At the lower end of the third sandy portage on the Mattagami river below Timmins' landing, the rock is now schistose, but is made up of bands of coarse and fine material which tail out like sedimentary deposits. This rock, however, may be composed of volcanic fragmental material which has been water-sorted.

At the middle and upper sandy portages, the rock has a fragmental appearance in the field, but Mr. C. W. Knight, from an examination of thin sections, suggests that such rocks may have been originally quartz-porphyry, which is now much crushed and impregnated with carbonate. One sample contains somewhat rounded grains of quartz and feldspar in a fine interlocking matrix of quartz and feldspar, with sericite and calcite.

On the south boundary of Jamieson in lot 7, about 4 miles northwest of Sandy Falls, there is a volcanic rock, now somewhat schistose, but the porphyritic character of which is distinct, with phenocrysts of clear quartz in a dense gray felsitic groundmass. The rock described at Sandy Falls may be similar to this, but more highly altered.

Laurentian

A few outcrops of granite occur in the township of Whitney. This granite is a medium-grained biotite variety, and not typical of that occurring in large volume to the north and south of the area. In south Whitney it includes light-coloured porphyry of Keewatin age, but its relation to the Temiskaming is not known.

About 40 miles north of the gold area there are frequent outcrops of granite and gneiss. The known outcrops of rock immediately to the south are mainly of Keewatin age. Granite occurs on the Mattagami river just north of Loon portage, and the contact runs to the eastward, crossing the Frederick House river south of Neeland's rapids, and thence southeasterly to near Iroquois Falls on the Abitibi. To the north of these points for some miles the rock exposures are largely granite or gneiss.

Again, granite occurs on the Mattagami river south of Wawaitin portage, which is southwest of Porcupine. There are also outcrops of this rock along the south boundaries of Price and Adams in association with basic Keewatin rocks, which they intrude partly as narrow dikes. The granites are largely of a flesh-colored hornblende, biotite variety. The only gneissoid structure observed is a paralleling of the constituent minerals. Some of the granite is porphyritic with phenocrysts of pink feldspar up to two inches in length.

A striking hornblende granite with crystals of pink feldspar up to an inch in length occurs along the south boundary of Blackstock. It is similar to granites found in Mc-

[14] Bur. Min., Vol. X. (1901), p. 193. [15] Ibid., Vol. XVI. (1907), p. 219. [16] Rep. Geol. Sur. Can., Vol. VI. (1892-3), p. 27 R.

Arthur and Fripp, and is likely of the same age. In thin section the rock is made up of a flesh-coloured orthoclase as the most prominent constituent, with lesser amounts of microcline and acid plagioclase. The ferro-magnesian constituents have been altered to chlorite. The quartz is in small grains, some of which are enclosed in the porphyritic orthoclase and acid plagioclase.

A reddish variety from the east boundary of Fripp township is a hornblende granite, showing in thin section quartz, albite, hornblende, apatite and titanite. The hornblende is partly altered to chlorite.

In the township of Denton, about 30 miles southwest of Porcupine, a gray biotite-granite intrudes Keewatin greenish and grayish schists. Gold-bearing veins have been found in both the Keewatin and in this gray granite rock, so there may be some relationship between these quartz veins and the gray granite. A reddish hornblende granite occurs in the same township, but its relation to the biotite granite is not apparent.

There are a number of quite fresh reddish acid dikes in the area which may belong to the Laurentian.

One such dike rock is seen on the Thomson claims in Bristol township. It consists essentially of feldspar and quartz. Zonal structure is well shown in the porphyritic feldspar of which the nuclei are often prisms of feldspar. Microcline and quartz are abundant.

A red dike from the Pettipher claim in Thomas township is a granophyre with porphyritic feldspar in a granophyric groundmass.

Another red dike, which is quite fine-grained, occurs on a small island just south of Gold island, in Night Hawk lake. This rock is composed almost wholly of albite. Calcite is scattered through the rock in minute rhombs and there are numerous cubes of pyrite. Occasionally the rock is porphyritic, showing phenocrysts of albite.

These dike rocks are frequently intersected by very small quartz veinlets which sometimes carry gold, while gold values have also been obtained in the dike rock.

A sample of Night Hawk lake dike, not showing any quartz veinlets, gave an assay of $1.80 per ton in gold.

The small veinlets in these rocks are very suggestive of the filling of cooling cracks in the dikes with material which may have been derived from the same magma.

The chemical composition of these acid dikes is given in the following table:—

——	1.	2.	3.
	Per cent.	Per cent.	Per cent.
Silica	65.42	69.28	59.42
Alumina	15.80	15.53	17.86
Ferric oxide	2.75	2.88	3.46
Ferrous oxide	0.91	0.69	1.59
Lime	1.33	2.15	2.61
Magnesia	0.53	0.93	1.15
Potash	6.26	0.25	0.60
Soda	5.18	7.16	9.60
Carbon dioxide			2.01
Water	2.46	1.44	0.43
Sulphur			1.66

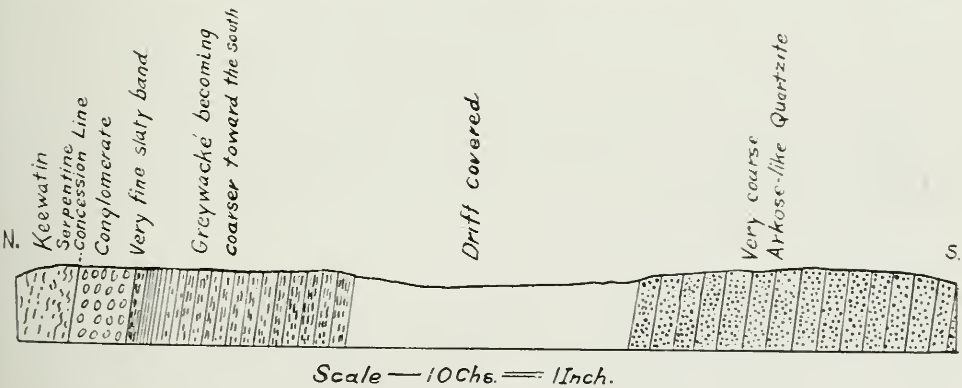
1. Granite-porphyry dike, Thompson claim, Bristol township.
2. Granophyre, Pettipher claim, Thomas township.
3. Felsite, from small island south of Gold island, Night Hawk lake.

While typical granites do not outcrop in the immediate vicinity of Porcupine, they occur in large volume to the north, west and south of the area, and are known to intrude the Keewatin. Where the granites are exposed over large areas they are medium to coarse in grain, and have been exposed at depth by extensive erosion. It is considered that the granophyre, porphyry and felsite rocks are dike representatives of the granites, which very likely underlie the Keewatin and Temiskaming formations at Porcupine. The predominant feldspar of the acid dikes is a plagioclase (near albite), which is also prominent in many of the granites.

Pre-Cambrian Sedimentary Rocks

Geological work in the area during 1911 showed that there are at least two sedimentary series which are later in age than the Keewatin. The older of these has been called the Temiskaming, and the younger Cobalt, corresponding to similar rocks in the

Crumpled rocks at base of sedimentary series on the south part of Dome property, Sept. 1911.



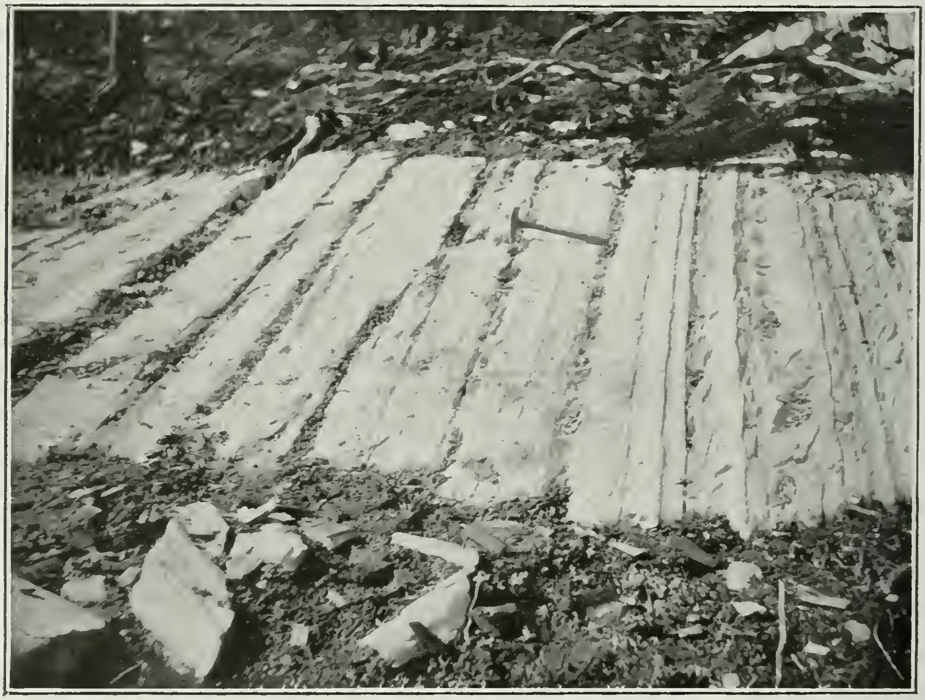
Section of the Temiskaming series in lot 5, con. 5, Whitney township.

Cobalt district. At Porcupine the Temiskaming series is of great economic value, since several important veins have been found in it.

The largest area of fragmental rocks stretches from the Dome mine in a northeast direction for about ten miles. It consists of a series of slate, quartzite and conglomerate which has generally been greatly disturbed. The beds have been highly tilted, dipping at angles from 70° to vertical. A secondary cleavage has been developed in many parts, and the rocks have been rendered quite schistose. The general direction of the strike is from N.E.-S.W. to E.-W. In this respect the series is related to the Keewatin which has a corresponding strike. It is evident that much of the deformation of the Keewatin and Temiskaming was post-Temiskaming.

The sediments at the Dome have been greatly altered to schists. Similar rocks around Three Nations lake have been less altered, and, except for a high dip, greatly resemble the Cobalt series.

The succession of Temiskaming strata is well shown at the property of the Three Nations Mining Company on lot 5 in the fifth concession of Whitney. Along the line between the fifth and sixth concessions very much altered Keewatin rocks, now largely serpentine and rusty carbonate, are exposed. The contact with the Temiskaming conglomerate practically follows this line. At the base of the conglomerate are numerous fragments of rusty weathering Keewatin rocks; while farther to the south there are numerous pebbles of acid rocks, including the quartz-porphyry, felsite, etc. The con-



Interbanded quartzite and slate of the Temiskaming series, showing secondary cleavage. North Dome mine, Oct. 1911.

glomerate is overlain by a narrow band of fine-grained black slate, which splits in very thin layers. Overlying the slate is a greywacké which becomes coarser toward the south. About half a mile south of the concession line the rock is quite coarse-grained, and may be called an arkose-like quartzite. Throughout the Temiskaming series there is considerable carbonate, and many samples effervesce briskly with acid.

It should be noted that no granite pebbles were found in the conglomerate. It is believed that the series was laid down when the surface rocks were largely volcanics, and that the intrusion of at least part of the granite came after the deposition of the Temiskaming, but prior to the Cobalt series.

At the North Dome there is a strikingly banded rock which was originally formed by a succession of fine clay and rather coarse sand layers. A secondary cleavage is developed at a low angle with the upturned edges of the strata.

On the Foley-O'Brian the sediments in addition to being highly tilted show a wavy structure along the strike.

At the Dome property, in contact with large quartz masses, is a conglomerate which is likely basal. On the weathered surface the included fragments of porphyry, greenstone, schist, etc., are conspicuous, but in freshly broken pieces the conglomeratic character is easily overlooked, since the rock breaks in prismatic blocks resembling schist. The included pebbles are frequently drawn out in the direction of the schistosity. A thin section of greywacké from a mile west of the north end of Porcupine lake shows angular fragments of quartz and feldspar, together with sericite and other secondary minerals.

Greywacké, with strike east and west and dip 85° north, occurs on the northeast shore of Night Hawk lake. In the greywacké are thin bands of conglomerate containing pebbles of dark green Keewatin rock, numerous quartz pebbles and some felsite. Some of the pebbles are six inches in diameter. A sample of the greywacké is seen under the microscope to consist of angular fragments of quartz and feldspar, with finer particles of the same material and chlorite, sericite and limonite.

Altered sedimentary rocks outcrop at Wawaitin falls on the Mattagami river. These rocks have been greatly metamorphosed, but conglomerate, slate and quartzite can be recognized. Some rusty bands of carbonate occur with the sediments. Similar rocks occur in Bristol township and at several points along the Mattagami river below Wawaitin falls. These rocks were formerly classed with the Keewatin, but from a similarity to the sedimentary rocks in Tisdale they are now grouped with the Temiskaming.

On Red Sucker creek near Wawaitin falls at the third rock exposure from the Mattagami river there is a fresh looking greywacké which greatly resembles Huronian greywacké at Cobalt. The rock consists largely of quartz and feldspar with some bits of rock like quartz-porphyry in a cement of finer material consisting of quartz, feldspar, sericite, etc.

Mr. J. G. McMillan has recognized a group of altered sediments dipping at high angles in Midlothian township, about 40 miles south of Porcupine, which he has classified as Temiskaming.[17]

Cobalt Series

The younger series of sediments has been observed only in small volume on the south boundary of Langmuir. Here there is a typical undisturbed boulder conglomerate, very similar to the Cobalt conglomerate. It contains numerous pebbles and boulders of red hornblende and biotite granite, and rests unconformably on a Keewatin greenstone. Fragments of Keewatin occur at the base of the conglomerate.

Later Intrusives

In all parts of the area are numerous basic dikes which are generally less than 100 feet in width. Some of these are of olivine diabase. One such dike occurs on the south boundary of Whitney township in lot 12. The rock shows fairly fresh plagioclase set in ophitic fashion in augite. The latter mineral has a decided purplish colour, due to the presence of titanium. Grains of olivine showing high relief, and a few scattered flakes of biotite and magnetite, also occur.

Basic dikes intruding Keewatin greenstone occur on several islands in Night Hawk lake. A thin section of one of these shows a diabasic texture. Rods of labradorite are set in augite, which is beginning to alter to green hornblende. Quartz is present in clear grains and as an intergrowth with albite.

A similar diabose intrudes the Huronian greywacké on the northeast bay of the lake. Many of these narrow basic dikes in thin section greatly resemble the sill diabase of the Cobalt silver area.

A dike of diabase 10 feet wide cuts a ferruginous carbonate rock on the most southerly Dome claim in Tisdale. At this point the carbonate is not intersected by quartz

[17] Report of the Geology of the Area along the T. & N. O. Railway Trial line between Gowganda and Porcupine, 1912.

veinlets, and it was not possible to determine the relationship of the dike to the quartz veins.

A dike of very fresh diabase was encountered in the diamond drilling at the Dome Extension. It is made up of laths of labradorite and augite as the chief constituents. In subordinate amounts are interstitial quartz, magnetite and pyrite.

These basic dikes are considered to be of much later age than the quartz veins of Porcupine. In Bristol township, at the McAuley-Brydge claim, a N. and S. 37-foot dike of later diabase cuts across the gold-bearing quartz-schist band which strikes E. and W.

There is a very prominent hill about 250 feet high to the southwest of Kamiskotia lake which is composed of a basic rock, some of which is very coarse grained, like gabbro. This mass is likely a great dike, with northwest-southeast strike, which crosses Niven's line two miles to the southeast. Thin sections of two samples of the rock have the structure of gabbro, rather than diabase. Quartz, if present at all, is only in minor quantity, and the rock does not closely resemble the Cobalt sill diabase.

Relation of Quartz Veins to Granite

Beck, in his work entitled "The Nature of Ore Deposits," states that "quartz veins more often occur in regions where the older schistose rocks are broken through by granitic, dioritic and diabasic rocks, and are genetically connected with such intrusions." It has been suggested in the notes accompanying the editions of the Porcupine map that the quartz veins of Porcupine are probably the result of a granitic intrusion, the immense quantity of quartz present in the veins having been supplied by the acid magma as a differentiation product. The primary quartz of the veins shows evidence of having been deposited under great pressure, with numerous cavities of gas and liquid inclusions. It has also a marked crystallized structure, with incipient crystal faces showing etched surfaces. The quartz has filled the fissures rapidly, as there is generally an absence of well-defined walls, except where there has been secondary movements. Quartz and rock are often cemented, forming a contact like that of an intrusive.

Mr. C. W. Knight noted the occurrence of feldspar in a quartz vein on the Miller-Middleton, one of the Timmins locations, and suggested the relationship of the deposit to granite or pegmatite dikes. The feldspar which is an acid plagioclase has also been noted in other veins, including the No. 1 vein of the Hollinger, the Rea vein, and in many of the narrow veins in the vicinity of Three Nations lake. The feldspar is most abundant near the margins of the veins. The extinction angle of the feldspar in the veins on the Three Nations Lake Mining Company's claim shows it to be very near albite. A chemical analysis of this feldspar gave: Soda, 10.37 per cent.; potash, 0.90 per cent.

The relationship of quartz veins to pegmatite and aplite has been mentioned by several writers. In the Black Hills of South Dakota, C. R. Van Hise noted the gradual transition from intrusive granites through pegmatite dikes and with decreasing quantity of feldspar to quartz veins remote from the granite.[18]

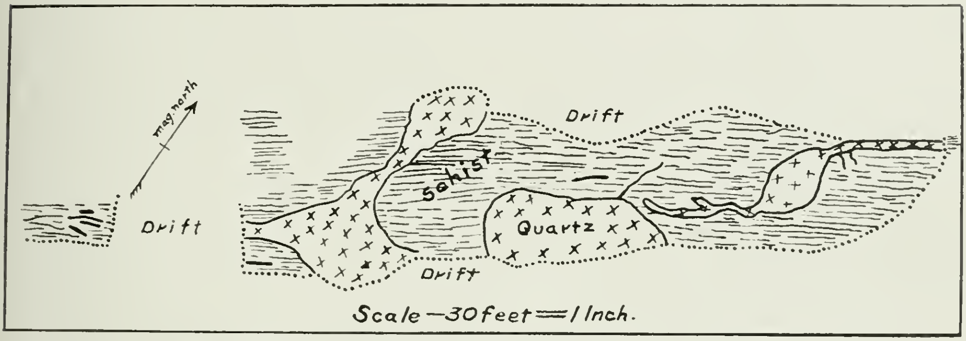
J. E. Spurr, in "The Geology of the Yukon Gold District, Alaska," referring to a set of younger quartz veins on Forty Mile creek, says: "They often contain a little feldspar and sometimes, by increase in amount of this mineral, pass into a variety of fine pegmatite. This in turn seems to be transitional into a coarse aplite which is very abundant."[19]

De Launay in his work, "The World's Gold," refers to the relation of the gold to the granitic rocks. "At Berezovsk in the Urals in certain veins of microgranite, which themselves cut talcose schists, there are numerous very thin veins of auriferous quartz, containing various sulphides of copper, lead and bismuth, with gold, chromium, and tourmaline, and the granitic mass from which the microgranites are derived appears itself to be auriferous."

[18] U. S. Geological Survey. 16th Annual Report. Principles of North American Pre-Cambrian Geology.
[19] U. S. Geological Survey. 1896.

Other Vein Minerals

The mineral scheelite, calcium tungstate, occurs in some of the veins around Pearl lake as one of the earliest constituents. It has been found in the Jupiter, Plenaurum, McIntyre and Hollinger, but only in very minor quantity. It is interesting to note that scheelite generally occurs with minerals like topaz, cassiterite, tourmaline, and arsenopyrite in pegmatitic veins, which are considered to have a genetic relationship with granites. The presence of scheelite in the Porcupine veins may point to the pegmatitic character of the veins in this area.



Sketch showing lenticular character of quartz bodies at Hughes' property, North Whitney.

Quartz masses in contact with schistose conglomerate. Dome mine, Nov. 1910.

Tourmaline occurs quite frequently, not only as a later mineral in the veins but with the original quartz, as at the Dome Extension, West Dome and other properties.

Arsenical pyrites is abundant in the quartz veinlets on the McAuley-Brydges claim in Bristol township.

In support of the theory of the relation of the quartz veins of Porcupine to granite intrusions, may be mentioned the following:

1. The irregular occurrence of the quartz in many of the deposits, in lenticular masses, resembling pegmatite dikes.

2. The occurrence of feldspar, scheelite, and tourmaline in the quartz in several deposits.

3. The great pressure at which the quartz has been deposited, indicated by the presence of liquid inclusions and gas bubbles. These are frequently seen in quartz in granites.

4. The frozen contacts of quartz and enclosing country rock. The free walls seen at some properties indicate a secondary movement in the quartz, since these walls are slickensided. Where free walls exist they may be either the hanging or foot wall, while the other wall is indistinct—grading into the country rock.

5. The occurrence of narrow felsitic dikes, frequently cut by minute veinlets of quartz, which represent the final solidification of the felsitic magma, and which frequently carry gold values as on Night Hawk lake.

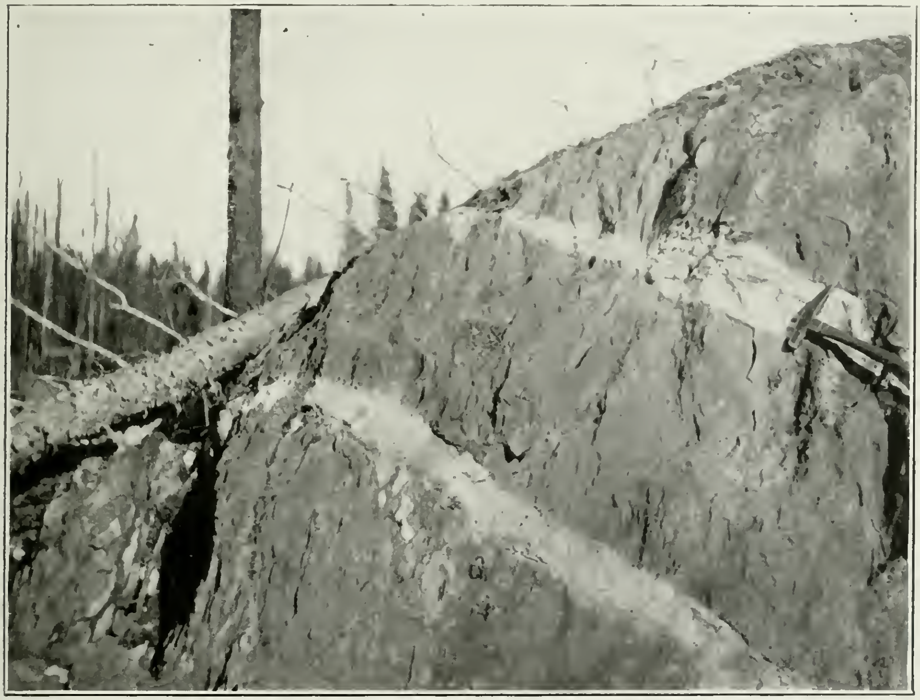
Character of the Gold-Bearing Deposits

The occurrence of gold at Porcupine is associated with the quartz solutions which circulated through the fissures in the Keewatin and Temiskaming series. The irregular fissuring has produced a great variety of quartz structures, varying from the tabular, though often irregular or lenticular, vein which may be traced several hundred feet, to mere veinlets, often only a fraction of an inch in width and a few feet in length, which ramify through a rock that has been subjected to small irregular fissuring. This latter variety is well illustrated in the fissuring of ankerite bands, so characteristic of some of the gold deposits of Porcupine. Irregular and lenticular bodies of quartz often occur which may have a width of ten or twenty feet, but which die away in a distance of fifty feet. Again, there are dome-like mases of quartz which are elliptical or oval in surface outline. In some parts at least these masses can be seen in contact with underlying rocks at a low angle, which would suggest that they are broad lenticular masses which have filled lateral fissures in the country rock. The most conspicuous dome masses are those of the Dome property, where the two largest are about 125 feet by 100 feet. A fissure may be vertical and regular at some points. At others it may incline at a lower angle to the horizontal or take on a more or less lenticular form.

The term "vein" as used in this report is not confined to the filling of a single fissure with well-defined walls, for this type of vein is rather the exception in the Porcupine area. The fissuring has been so irregular that a "vein" in one part may consist largely of quartz, and in another part of numerous veinlets of quartz and intervening schist, greatly resembling a stockwerk; again, the main part of a vein may be almost vertical in attitude, but many veinlets, as branches from the main vein, may extend laterally into the country rock. It is often found that the values are obtained in parts of the vertical vein which have been subjected to a later movement and enrichment, whereas the lateral veins have little or no value. This is illustrated in the No. 1 vein at the Rea mine.

The relationship of the strike of the veins to that of the enclosing rock is often difficult to determine, since generally along the veins there has been shearing of the country rock which may conform to the general direction of the strike of the veins. However, by determining numerous strikes in the schist away from the veins, it is seen that the majority of them are inclined to the strike of the enclosing rocks. In dip the veins vary from vertical to nearly horizontal. In No. 1 shaft of the Hollinger the vein is practically vertical, while a series of narrow quartz veins, 6 to 18 inches wide on the Lindburg claim, have a dip at the surface of only 20°. The prevailing dip of the schist in the Porcupine area is to the north at a high angle, and frequently the veins dip distinctly to the south across the cleavage of the schist. While it is apparent that most of the deformation of the country antedates the vein formation, nevertheless there is a decided tendency in many cases for the fissuring to be influenced by the direction of schistosity, which is also a direction of weakness; hence we find veins having a more or less lenticular structure, the strike of which closely corresponds to that of the country rock.

Lenticular veins occur chiefly where the country rocks have been intensely sheared or rendered schistose, as around Pearl lake. Usually when there has been less disturbance the veins are more likely to have a marked difference in strike from the enclosing rock—as around Three Nations lake and the porphyry area south of Simpson lake. It may be stated that the larger and usually lenticular veins of the area occur where the rocks are extremely schistose, while the narrower, better defined veins occur as stringers from these main lenticular veins, or in less disturbed areas.



Narrow quartz veins (auriferous) cutting conglomerate at Three Nations Mining Co., Sept. 1911.

Distribution of Veins

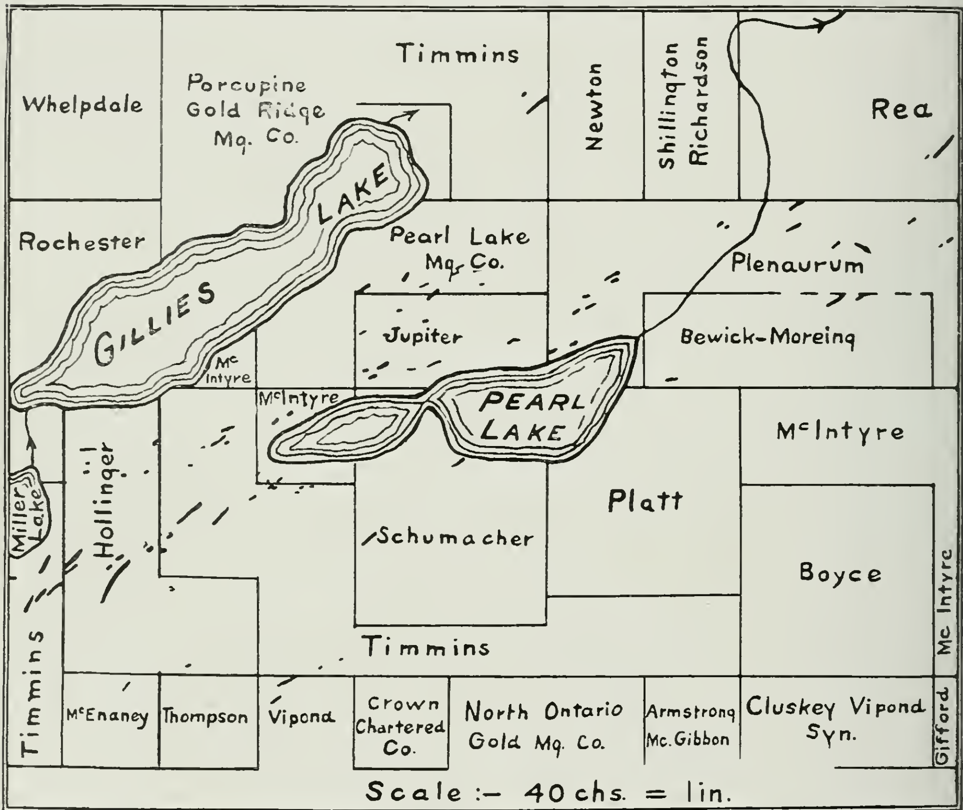
While gold-bearing veins occur over a wide area and are often isolated, it is seen, from a number of those already discovered, that they occur in groups along certain lines. For instance, in Tisdale township there are at least three distinct areas where the fissuring has been most pronounced. One such area extends from the southeast end of Miller lake, on lot 11, in the second concession, in a northeasterly direction for three miles, and includes such veins as the McEnaney, Miller-Middleton, Hollinger, Dixon, McIntyre, Jupiter, Rea, and in addition others with visible gold. The average strike of the veins here is northeast and southwest. An exception is a vein on the McEnaney, which strikes northwest and southeast.

Another series, including the Smith, Davidson, Crown Chartered and Dobie, occurs in the northeast part of the township. To these should be added the Scottish-Ontario, Mullholland, Hughes and Gold Reef, which are in the northwest part of Whitney township. The general direction of these veins is east and west.

Again, in the southeast part of the township is a group including the Dome Lake, West Dome, Dome, and Dome Extension, with a general strike north of east.

Similar groupings could be mentioned in other parts of the area in which gold-bearing veins have been found.

Well defined, disturbed zones occur in the fifth concession of Tisdale. In this locality the main rock is a light greenish, fine-grained, rather massive greenstone. This greenish rock is itself not much fissured, but here and there through it are bands of rusty-weathering carbonate, which is generally schistose, striking east and west. I think that much of the carbonate associated with this greenstone is of secondary origin. It is possible that the shattering and fissuring of the greenstone in an east and west direction may have caused a deposition of migrating carbonate solutions, partly filling fissures and partly replacing the greenstone. These carbonate bands were later fissured, and gold-bearing quartz solutions deposited in them. The fissuring of the carbonate is

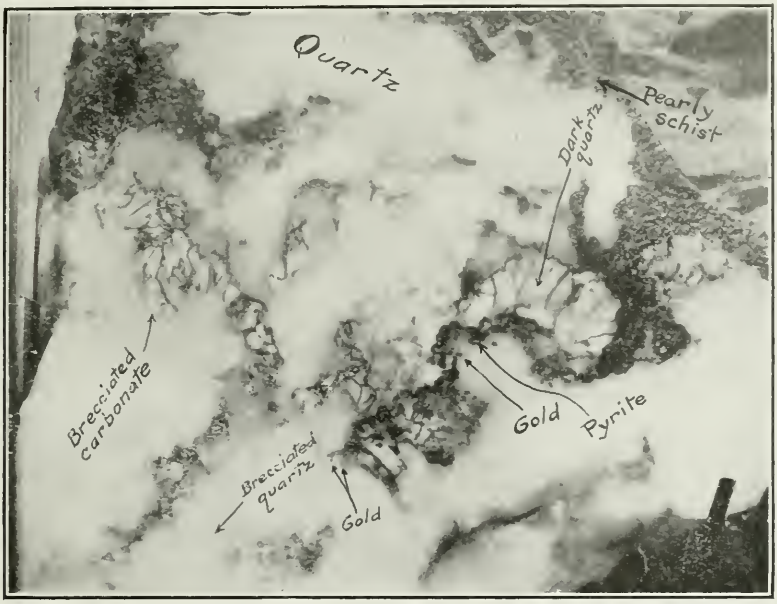


Plan showing the general northeast and southwest distribution of veins in the Pearl lake area.

generally irregular, and hence we find veins with steep or low dip striking with the schist and across it. This irregular series of veins is seen at the Crown Chartered and Dobie properties. Where the veins are small, it becomes necessary to mine both the carbonate and the intersecting quartz veins. Gold often occurs in the carbonate near the contact with the quartz veins, as well as in the quartz.

Occurrence of the Gold

A field examination shows that there is an irregular distribution of the gold in the quartz veins. Very often it occurs along dark streaks in the quartz, along the contacts of quartz and schist, or around patches of dark coloured mineral in the quartz. At the surface, rich portions of veins are often indicated by rusty streaks or patches, while at depth the rusty character gives place to dark gray, black or greenish colours.



Brecciated structure of quartz from McIntyre main vein (natural size).

Streaked ore from the Jupiter mine. The dark lines are tourmaline, while the intervening quartz is greatly crushed and shows visible gold.

Under the microscope the gold is generally found in areas which have been greatly crushed or in the quartz or schist bordering on these areas.

The prominent minerals which occur in the crushed areas are pyrite, calcite, dolomite, sericite, chlorite, tourmaline and quartz. It is thought that most of the gold has been deposited along with pyrite from the impure solutions which circulated in the minute fissures and crushed areas of the primary quartz of the veins. The quartz of No. 1 vein of the Hollinger mine shows numerous dark streaks in parts of it and often across the width of the vein. These are generally short and irregular in distribution. Iron pyrites and often galena occur with the gold. Microscopically, the quartz occurs in fairly large grains, contains liquid and gas inclusions, and has been subjected to secondary pressure and granulation along the margins of the grains. The iron pyrites often occurs in well shaped crystals which have been formed subsequent to the crushing.

These fine dark streaks may have resulted from a solidification and shrinkage of the quartz forming filmy cracks, which may have become slip or crushing planes along which the richer gold-bearing solutions were deposited at a later period.

These minute dark streaks in the quartz are frequently slickensided, and this character may often be seen in hand specimens, as from Rea or Vipond mines.

It should be noted that where cracks or fracture planes have been produced in a quartz vein and subsequently filled by minerals from solution, secondary quartz can be distinguished with difficulty, if at all, from the original quartz. Hence it is not always possible to say whether visible gold in such a vein occurs in the original or in secondary quartz.

Often a vein may show a width of ten feet but the fractured portion may be only a few feet, or even inches, wide along either wall. In this portion there may be many streaks of dark mineral which are often parallel, giving a banded character to the ore, as in many of the veins in the north part of Whitney and Tisdale, namely, at the Mullholland, Scottish Ontario, Davidson and adjoining properties. A similar banded structure is seen at the Rea mine. At these properties tourmaline is the principal mineral of the streaks. The gold may occur along these lines or in the intervening quartz, which is often much crushed and filled with later minerals.

Several sections were examined, which showed grains of gold apparently enclosed in the primary quartz, but the occurrence is much less prominent than where gold occurs in the crushed areas.

It is important to note that practically all the veins which are gold-bearing contain considerable carbonate of varied composition. Wherever the enclosing rocks are schistose they always carry carbonate and frequently effervesce with cold hydrochloric acid. Much of the carbonate of the veins has been absorbed from the wall rock, while portions have been formed from ascending solutions which circulated in the veins. Pyrite and grains of gold frequently occur in the carbonate.

Carbonate in the form of ankerite constitutes the main portion of veins at the West Dome, Apex, and in parts of Deloro township. This carbonate is distinctly earlier than the quartz veinlets which intersect the ankerite veins. Both the ankerite and quartz have been fractured and veinlets of later carbonate deposited in them.

Thin Sections of Vein Quartz

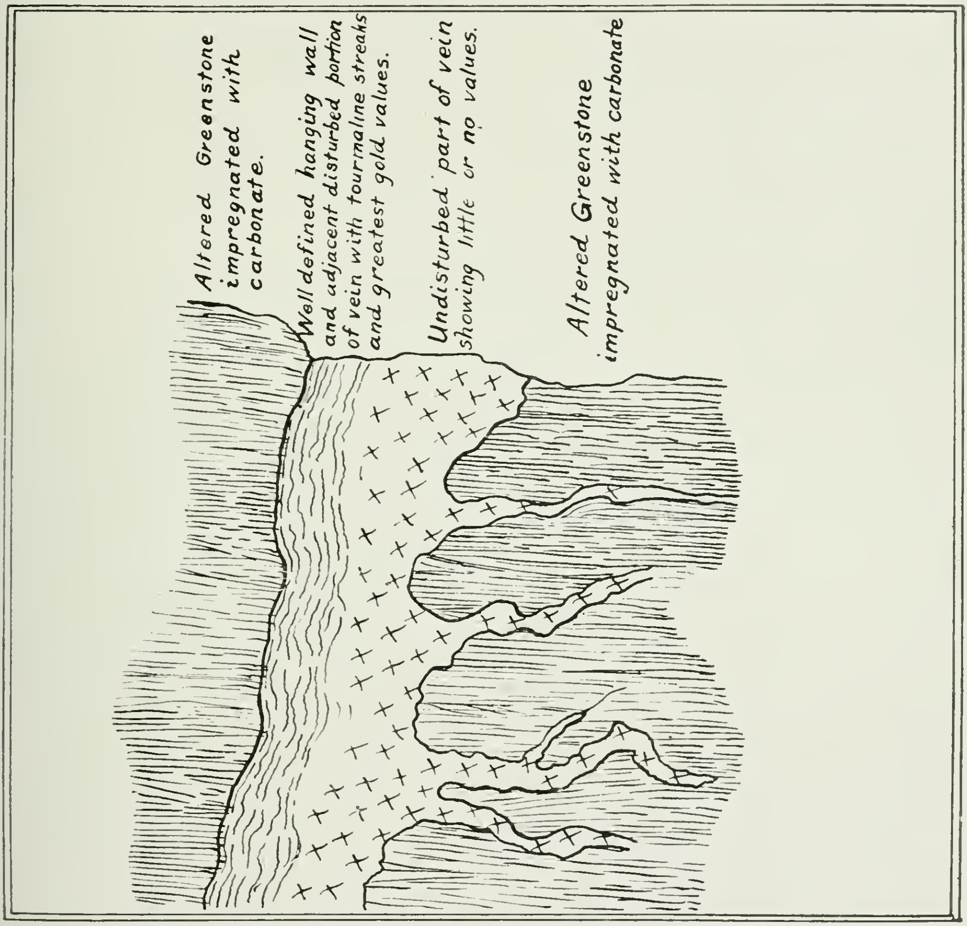
In drawing No. 1 of a section of Hollinger ore the fracturing of the original quartz is evident, while veinlets of calcite penetrate the quartz. Grains of a dark mineral, galena (?), are arranged in a linear manner in the calcite and quartz, and a few grains of gold occur in the calcite or along the contact of quartz grains and calcite.

In drawing No. 2 of a section of Dome ore there is very little dark mineral. The crushed zones are quite clearly shown. Some of the larger grains of quartz have a dusted appearance, while some of the finer grains are quite clear and may be a later quartz. In the crushed areas are grains and strings of gold, and also crystals of iron pyrites, on some of which gold is deposited.

In drawings Nos. 3 and 4 of sections of quartz from the Hunter claim, Porcupine lake, the quartz is almost all very fine-grained, which condition may have been produced by crushing of larger grains. In No. 3 remnants of plagioclase feldspar remain, and a grain of pyrite shows several gold grains deposited on it.

Drawings Nos. 5 and 6 also show crushed areas. In No. 6 a grain of gold occurs in a large grain of quartz as though a constituent of the primary quartz.

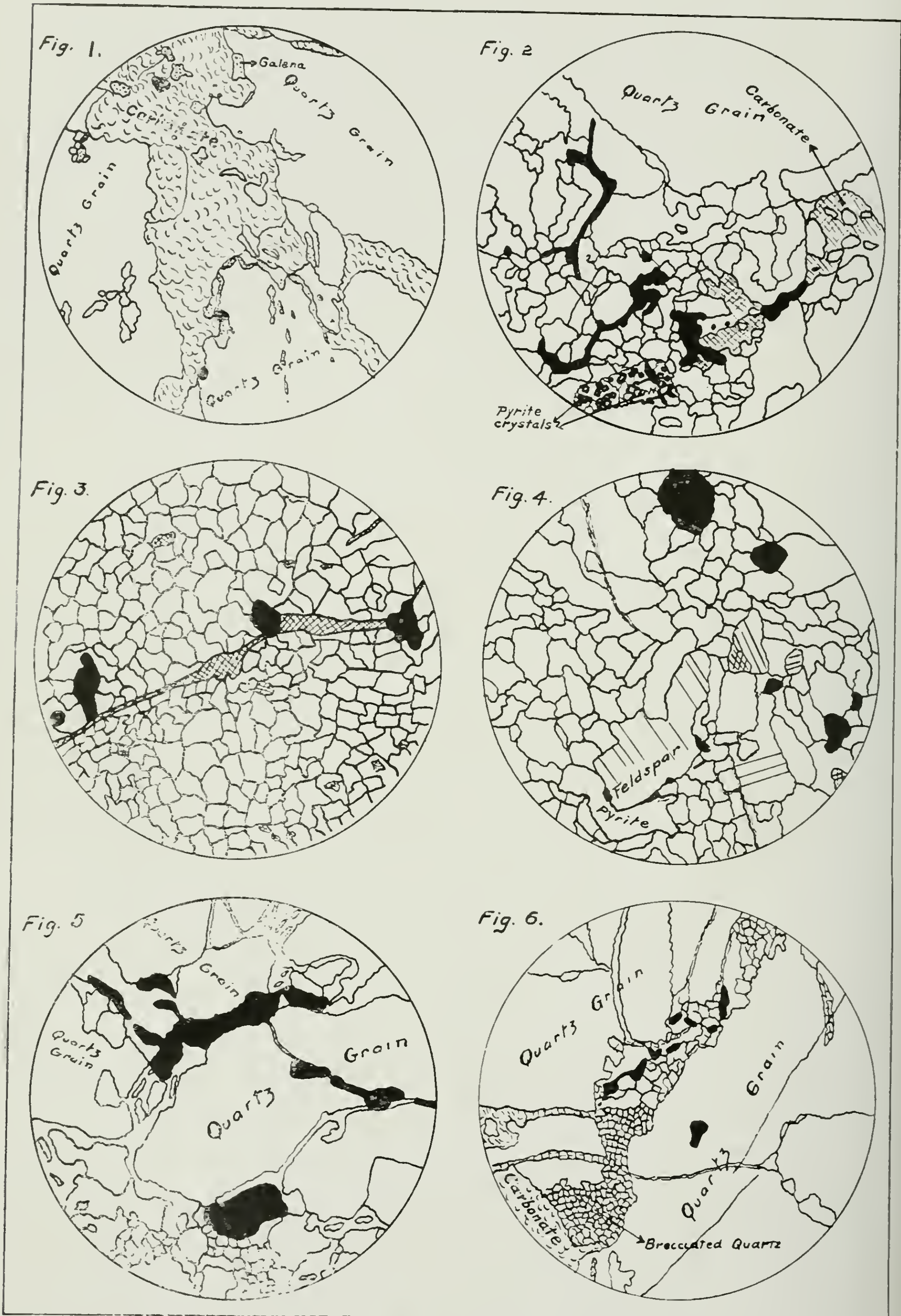
The following sulphides have been recognized in veins at Porcupine: iron pyrites, copper pyrites, pyrrhotite, arsenical pyrites, galena and zincblende. Of these the most abundant is iron pyrites, which occurs in some quantity in all the gold-bearing veins.



Ideal section of vein showing veinlets extending into wall rock. This structure is frequent in the north part of Tisdale. The above sketch somewhat resembles the main vein at the Rea mine as shown near the surface.

Copper pyrites, galena and zincblende, although also widely distributed, occur in minor quantity. Pyrrhotite is the chief sulphide in the veins which are being developed in No. 4 shaft of the Dome Extension. Arsenical pyrite occurs in quantity in the quartz veins at the McAuley-Brydges property in Bristol township.

Only one telluride has been recognized, occurring in the quartz-carbonate deposit at the Powell claim, M.E. 20, in Deloro township. A chemical test of the mineral gave the following percentages: silver, 61.88 per cent.; gold, 0.10 per cent, with strong reactions for tellurium, corresponding to the mineral hessite. Native gold occurs as a later constituent in minute seams in the hessite. Robt. Harvie reported the telluride



Drawings of thin sections of ore, from Porcupine quartz veins. No. 1, Hollinger. No. 2, Dome. Nos. 3 and 4, Porcupine Lake. No. 5, Rea. No. 6, Vipond. Black spots are native gold magnified 30 diameters.

"petzite" in quartz-ankerite deposits at Opazatica lake in the province of Quebec.[20] The presence of telluride in a quartz ore, containing considerable pyrites, from the Mikado mine, Lake-of-the-Woods, has lately been recognized in the laboratory of the Provincial Assay Office.

The rare mineral scheelite has been found in small quantities in several properties around Pearl lake. This is the second noted occurrence of this mineral in Ontario, it having been reported on the dump at the Victoria mines, near Sudbury.[21]

Since the whole surface of the area has been deeply eroded during recent glacial periods, there is now little evidence of secondary enrichment. The enrichment is very superficial, extending only from a few inches to a few feet in depth. The outcrops of the veins and wall rocks are usually discolored or decomposed, due to the oxidation of the iron pyrites and the ferrous carbonate in the ankerite or other iron-bearing carbonates. Cubes of iron pyrites are occasionally obtained at the surface, while copper pyrites and arsenopyrite also occur near the surface. Where the veins have been oxidized to any depth, there are generally some very recent water courses in evidence. Developments so far have shown that, after this very superficial zone has been penetrated, the character of the vein material has remained the same as far as mining operations have continued, namely about 300 feet.

Working Properties

Following is a description of some of the working properties visited in March, 1912.

Hollinger Mine

The main workings of the Hollinger Gold Mines are situated about half a mile southwest of Pearl lake. This property has received the greatest attention of any in the Pearl lake section, having been under development since the winter of 1909-10, following the discovery of gold on the Hollinger claims.

At the end of March last about 5,000 feet of development, consisting of shafts, winzes, raises, cross-cuts and drifts, had been accomplished. Most of this work is on the 100 and 200-foot levels, on veins Nos. 1, 2, 3, 4 and 8. A permanent main shaft, consisting of three hoisting compartments and one ladder compartment and pump-way, has been sunk to the west of No. 1 shaft to a depth of 200 feet. This will be continued to the 400-foot level and connected with the winze which is at present being sunk from the 200-foot to the 400-foot level on No. 1 vein.

An examination of the accompanying plan will show that the principal veins strike almost N.E. and S.W., and are approximately parallel. Development has shown that the ore bodies are nearly vertical, and that they cut the schist at a very low angle to the north. The main Hollinger vein, No. 1, has been traced on the surface for over 900 feet, and on the 100-foot level for 1,000 feet, with an average milling width of 8 feet. This length is the greatest over which a vein has been traced continuously in this section. The vein is not uniform in physical character, varying in width from 20 feet to 2 feet. Parts of the vein are represented by masses of quartz, and other parts by numerous narrow stringers of quartz with interbanded schist. Iron pyrites is the prominent sulphide mineral occurring in the wall contiguous to veins, and also in fracture planes of the quartz. Galena and zincblende occur in minor quantities. Scheelite occurs in small isolated nodular masses in parts of the veins.

The other veins being developed along with the No. 1 vein are not so regular in character or so high in value as the main vein. They occur rather as very lenticular masses of quartz or as highly schistose bands of country rock, very much impregnated with secondary quartz, calcite and iron pyrites.

Where the main cross-cut on the 100-foot level cuts No. 4 vein there is a width of 22 feet, consisting largely of quartz, while in the drift to the southwest the quartz mass

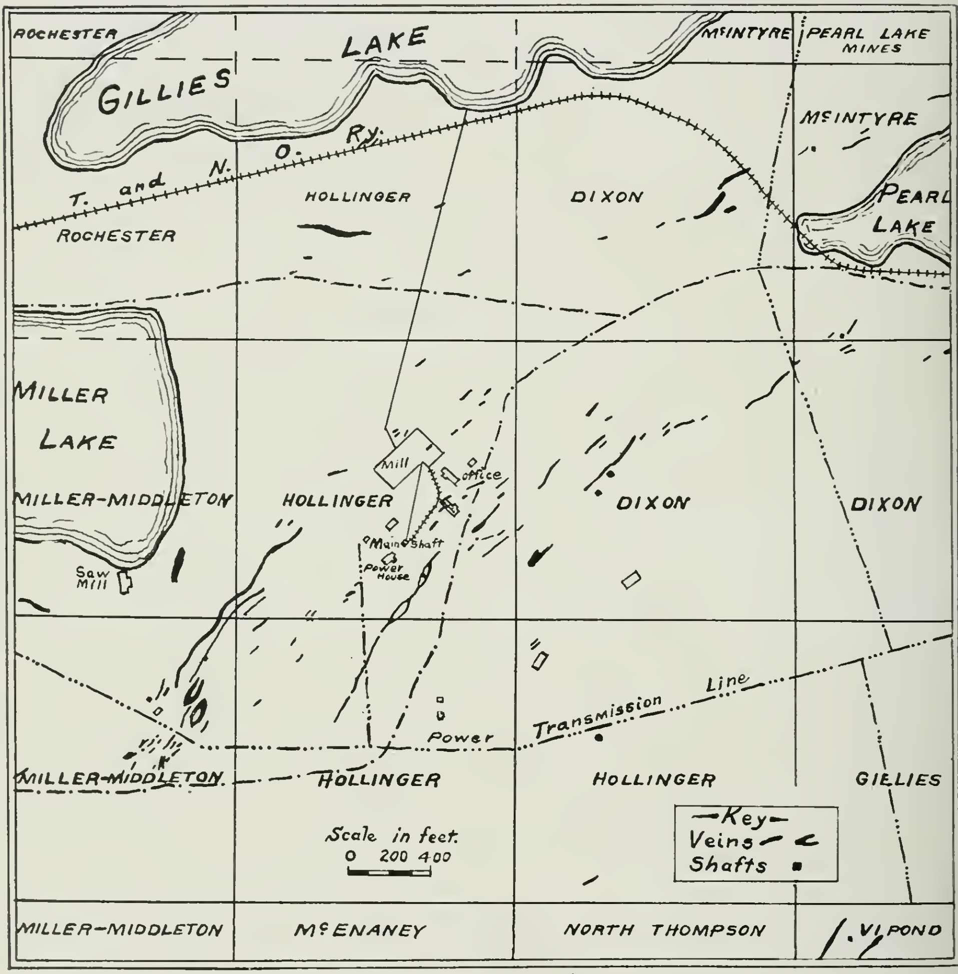
[20] Notes on a Discovery of a Telluride Gold Ore at Opasatica &c., The Journal of the Canadian Mining Institute, Vol. XIV., p. 164.

[21] Report on the Tungsten Ores of Canada. T. L. Walker, Department of Mines, Canada, 1909.

tapers very abruptly. No. 2 vein consists principally of schistose rock mineralized with iron pyrites in cube form, while quartz and calcite occur abundantly in the schist. Drifting on this vein has also shown interfoliated quartz and schist.

The following notes relative to the occurrence of the gold at this property have been taken from Mr. P. A. Robbins' First Annual Report.

So far no heavy faulting has been encountered, but there are many sinuous twists and turns in the veins, the veins being practically vertical, as far as developed, show-



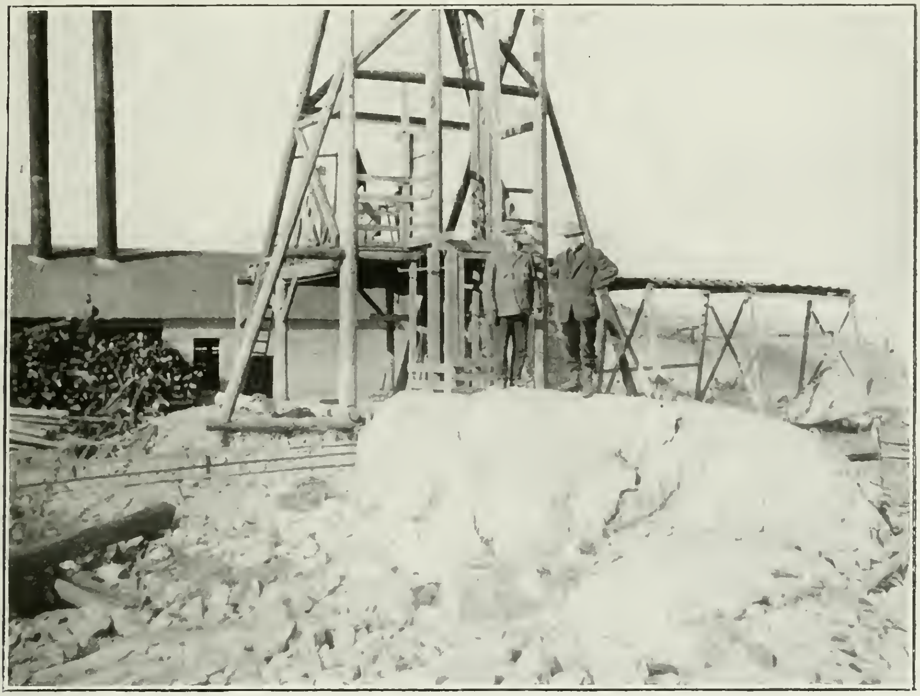
Surface plan of Hollinger and adjacent properties.

ing some tendency to dip to the southeast. The schist is heavily mineralized with iron pyrite and, generally speaking, pyrite is disseminated throughout the quartz masses, being contained in the cleavages, particularly near the walls.

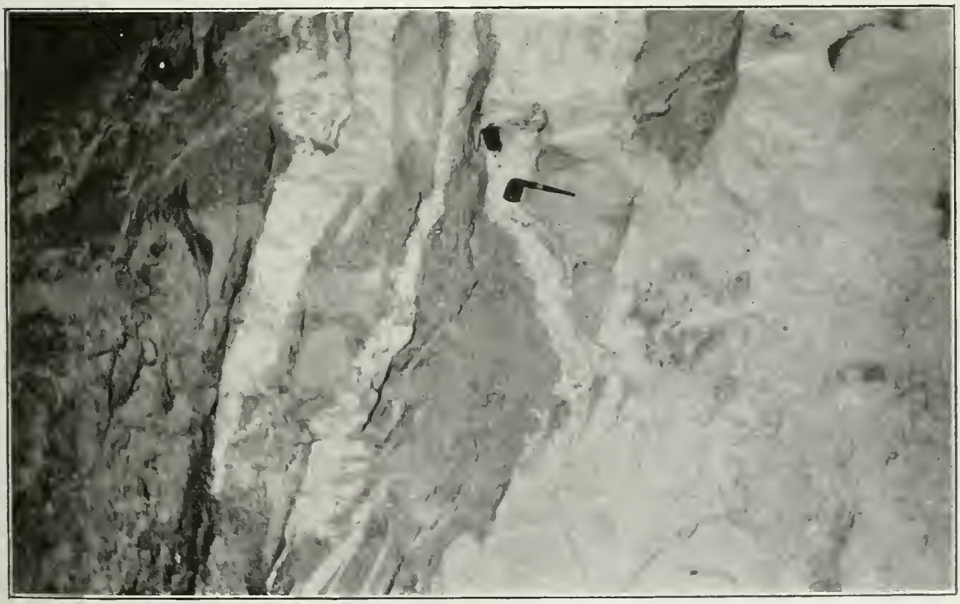
The gold has evidently been deposited contemporaneously with, or a little later than, the pyrite, as occasional instances have been noted where the pyrite is encased in gold.

Generally the occurrence of galena portends rich gold values, and to a lesser degree the occurrence of sphalerite is an indication of gold values.

Large blocky crystals of pyrite are usually attended by low values in gold, while the finely crystalline pyrite occurs with relatively higher gold values.



Mass of quartz at Hollinger mine. S. E. of No. 1 shaft. Oct. 1911.



N. W. wall of No. 1 (Hollinger vein) on 100-foot level, just N. E. of No. 3 shaft.
Width of exposure, 6 feet.

The schist walls of the main vein do not usually carry payable values, except where contiguous to rich sections of the vein, and in such cases the schist seems to be more or less silicified, pointing to the silica-bearing solutions as having also provided the gold. Generally, the southeast wall is the richer.

In other cases, notably vein No. 2, the schist, where it is interfoliated with small quartz stringers, carries relatively high gold values.

There are evidences of the metasomatic replacement of schist by quartz, the replacement in many instances being incomplete.

In the quartz masses the occurrence of gold is extremely spotty, and check samples taken from the same points on the vein will seldom agree within reasonable limits.

Our sampling has shown that the occurrence of visible gold does not necessarily mean payable values, and, to the contrary, payable values are commonly found where no visible gold has been observed. The quartz where streaked by fine lines of pyrite in the cleavages is generally more consistent in the matter of gold values than the clear masses carrying occasional spectacular showings.

Contact of quartz and schist on the N. W. wall of No. 4 vein. Hollinger mine where vein was intersected in the first cross-cut from No. 1 vein on the 100-foot level. Width of exposure, 6 feet.

A mill which will have a crushing capacity of 300 tons per day and a cyanide plant are at present being installed on the property. Experimental tests showed the necessity for fine grinding, and also the advisability of extracting the concentrates for separate treatment.

The process as decided upon is:

- Coarse grinding,
- Stamping in cyanide solution,
- Tube milling,
- Concentration followed by amalgamation of concentrates,
- Cyanide treatment of both gangue and concentrate residues.

The apparatus being installed consists of:

- One gyratory crusher,
- One jaw crusher,

Sampling plant,
Forty 1,500-pound stamps,
Four Dorr classifiers,
Four five-foot diameter by twenty feet long tube mills,
Spitzkasten.
Forty Deister slimes tables,
Four Dorr pulp thickeners,
Four Trent agitators,
Two Moore filters,
Two Merrill clarifying presses,
Two Merrill precipitation presses, and the usual pumps, amalgamating pans, settlers, etc.

The mill will be electrically driven throughout.

Jupiter

This property is situated on the north side of Pearl lake. Very schistose porphyry and other acid rocks occur as a belt about 300 feet in width adjoining the lake. North of this belt is a ridge of less altered greenstone. The veins which are at present being developed are in these schistose acid rocks, which have been greatly impregnated with carbonate. When the property was visited in March, about 2,300 feet of work, consisting of shafts, drifts and cross-cuts, had been done. An inclined shaft (No. 1) was down 100 feet, while two vertical shafts, No. 1B and No. 2, were down 200 and 300 feet respectively. Shafts No. 1 and No. 1B are connected on the 100-foot level, and veins have been drifted on at the 50, 100 and 200-foot levels. No. 2 shaft, which is near the Jupiter-Plenaurum line, has levels at 100, 200 and 300 feet. At the 100-foot level a cross-cut shows 19 feet of interbanded quartz and schist. As in other properties, the veins vary considerably in width and character. Sometimes they may be largely quartz, and again an intimate mixture of schist and quartz. Values do not usually extend into the wall rock to any distance, but where schist and quartz occur interbanded good values are often obtained in the schist. The schists are nearly vertical, while the veins dip to the north at about 75°, but may approximate the strike of the schists.

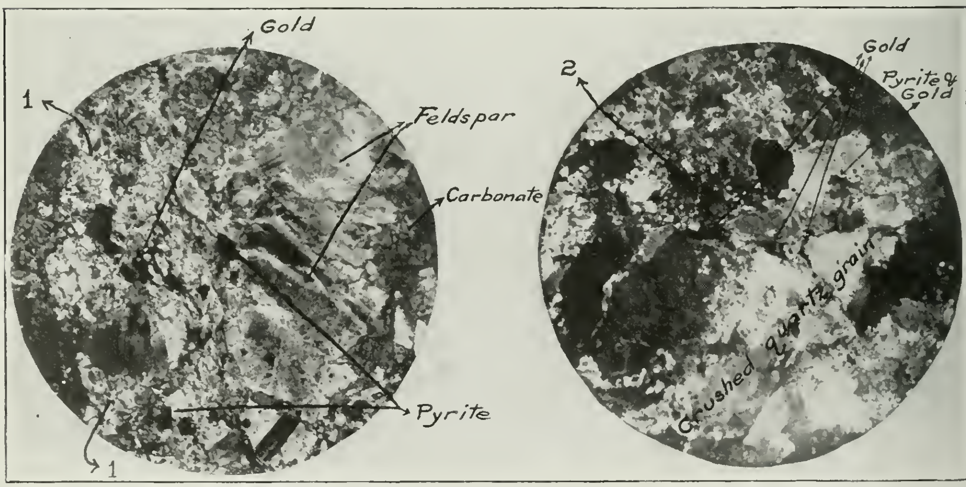
The ore occurs as shoots in the veins, and it has been noted that the values in the veins will varying according to the enclosing rock. When the wall rocks have been greatly altered by carbonate solutions and impregnated with iron pyrites. the veins are likely to be of greater value than when they occur in less altered rocks. The mineral scheelite was first noted in the quartz at this property.

McEnaney

The McEnancy is situated half a mile south of the Hollinger. A shaft was sunk in the quartz-porphyry on a quartz vein striking N.E. and S.W., which at 50 feet dipped from the shaft. Drifting and cross-cutting on the 100-foot level failed to pick up this vein. However, diamond drilling from the 100-foot level indicated a vein to the south of the shaft, having an entirely different strike from that at the surface, namely, N.W. and S.E. Two cross-cuts from the old workings on the 100-foot level intersected this vein and, by drifting, it has been traced 110 feet. The vein increases in width toward the S.E., where a face showed a width of 7 feet. This vein was also encountered on the 200-foot level and had been drifted on for 75 feet. It dips to the N.E., and at the 200-foot level is to the north of the shaft. Sinking was being continued to the 300-foot level. The quartz in the vein has been disturbed, and in parts of it are streaks of iron pyrites along which gold occurs. There is also considerable carbonate of later formation than the quartz. It frequently carries fragments of quartz and also shows visible gold.

The hanging wall of the vein at the 200-foot level is an altered quartz-feldspar-porphyry now much impregnated with carbonate and sericite; calcite has almost wholly replaced the feldspar in some phenocrysts. The foot wall is much more altered and finer grained. It may have been a porphyry, since some remnants of acid plagioclase remain, but the rock now consists largely of fine grains of calcite, sericite, quartz and chlorite. A sample of ore showing much carbonate was examined under the microscope. It contains numerous fragments of plagioclase feldspar, much broken up and invaded

Quartz vein on 100-foot level, McEnaney mine. The dark spots are drill holes.



Microphotograph, McEnaney. Microphotograph, Vipond.
1. Fine grained carbonate, tourmaline, quartz, feldspar, and sericite.
2. Brecciated quartz with later carbonate.

by calcite, tourmaline and sericite; quartz grains also occur through the carbonate. Pyrite is scattered throughout the carbonate, and most of the gold is clustered around the pyrite crystals, while it is also visible in some of the crystals. It is very likely that some of the porphyry wall rock has been taken up by the vein solutions, or that the enrichment has penetrated the porphyry.

Vipond

This property, which is situated about three-quarters of a mile south of Pearl lake, was one of the earliest in the area on which gold was discovered. The rock enclosing the veins is an altered greenstone which often shows amygdules. It is somewhat schistose, but is more massive than the altered porphyries near Pearl lake. Characteristic torsion cracks, so often seen in Keewatin greenstone, occur frequently.

When visited in March, considerable development had been accomplished. Two veins, Nos. 2 and 3, which have a general N.E.-S.W. strike, had been partially developed on the 100 and 200-foot levels. Drifting on the 100-foot level has exposed an ore body of 430 feet on No. 1 vein and on the 200-foot level of 350 feet. Where No. 3 vein was cross-cut on the 100-foot level it showed a width of 30 feet of banded quartz and schist, of which a width of 20 feet gave milling values. About 2,000 feet of drifting had been accomplished. The veins dip at a high angle to the S.E. On the 100-foot level there is an ankerite vein along the foot wall at No. 1 vein.

Vipond mine, March, 1912. Preparing site for mill.

which was formed earlier than the quartz vein. Dark streaks more or less parallel with the vein, were noted in the quartz of No. 2 vein. In the sampling of this vein an arbitrary width of 3½ feet was adopted. The only prominent sulphide occurring in the vein is iron pyrites, while the ore is largely free-milling.

The following description of the treatment of the ore has been given by Mr. C. H. Poirier, superintendent of the property.

The "mine run" passes over a grizzley, spaced to 1½ inches; the oversize goes through a jaw crusher, joins the grizzley product and goes through rolls, set to ¾-inch; this product is elevated to 200-ton bin: from there it passes through James feeders to two 4½-foot Hardinge ball mills, with chrome steel lining and 3-inch chrome steel balls; these mills crush to 20-mesh. The head sample of the mill is taken at the discharge of these mills; the product then passes to a Colbath classifier, the slime (120 mesh and over) passes directly to the plates, the sands are discharged automatically to the feed boxes of two 6½ x 6-foot Hardinge pebble mills, with silex linings and flint pebbles; these mills discharge to another Colbath classifier, the –120 mesh is returned to pebble mills, and the +120 mesh goes over plates. From the plates the product runs to a storage dam, for further treatment, or to waste.

It may be decided to amalgamate between the ball and pebble mills later on if it seems advisable.

McIntyre

The McIntyre property is situated at the west end of Pearl lake and includes the greater portion of the lake. The rocks are largely light-coloured pearly schists, which are altered acid volcanics. Eyes of clear glassy quartz can occasionally be recognized in the rock, suggesting schistose quartz-porphyry.

In March last work was being carried on from three shafts. Of these, Nos. 1 and 4 are on the south side of the lake, 800 feet apart, while No. 5 is on the north side of the lake, 1,000 feet from No. 1. At the time No. 1 was the main hoisting shaft. This shaft is down 200 feet, with drifting at the 100 and 200-foot levels on the vein which is exposed on the surface. On the 200-foot level a cross-cut had been driven toward the ground under the lake, encountering other lenses of ore. Shafts Nos. 4 and 5 were

McIntyre mine, Pearl lake, Oct. 1911.

also down 200 feet, with some development at this depth. In all about 3,600 feet of development had been accomplished. To the southwest of No. 1 shaft, on the 100-foot level and near the raise, quartz fills the width of the drift, is well seamed with secondary minerals, and shows visible gold at several places. In other parts of the vein schist and quartz constitute the ore body. Iron pyrites is abundant in the wall rock, along the contact of quartz and schist, and in crushed areas of the quartz. Most of the visible gold occurs in or along the crushed areas or along contacts of quartz and schist.

A stamp mill has been erected on the property and was in operation in March. The treatment of the ore is simple, involving amalgamation followed by concentration.

The ore is crushed in a 10 x 20-inch Blake crusher and elevated by a bucket conveyor to a 60-ton ore bin. From here it is fed to ten 1,250-lb. Chalmers and Williams stamps and crushed through 20-mesh screens. Amalgamation is done on six 48 x 60 inch plates, arranged in series of three to each battery of 5 stamps. Below the plates are amalgam traps of the Homestake type.

The pulp is then classified on hydraulic classifiers. The sands are concentrated on two Deister sand tables, while the slimes pass through three Callow cones to three Deister slime concentrating tables. The concentrates obtained are clean, consisting principally of iron pyrites with a little galena.

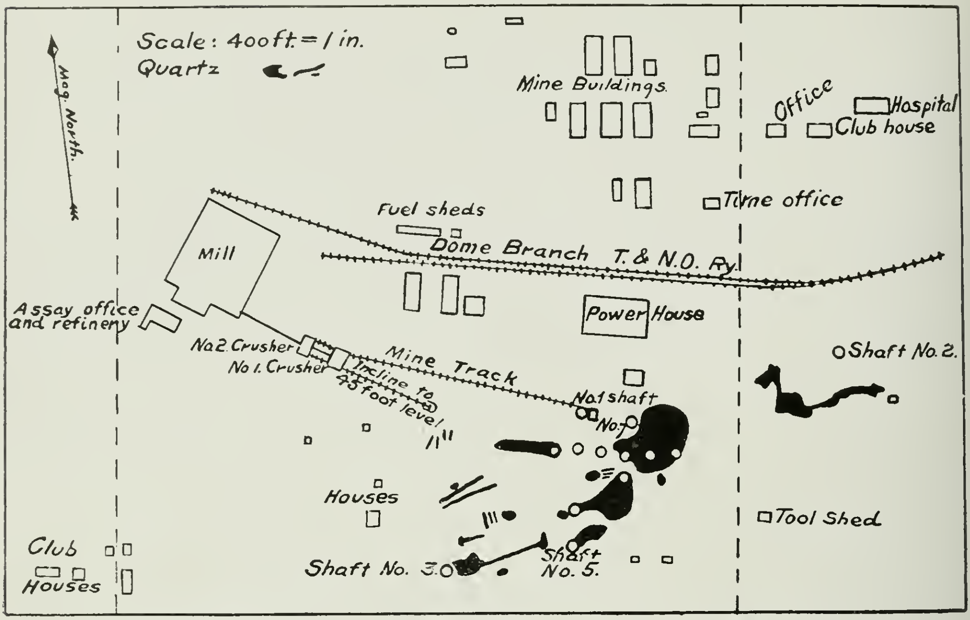
Plenaurum

Two shafts 200 feet in depth have been sunk on the property, which includes part of the east end of Pearl lake. From these shafts, which are on opposite sides of the lake, cross-cuts were being driven under the lake for exploratory purposes. Four quartz veins had been cross-cut at this depth. There are a number of quartz veins exposed on the surface to the northeast of Pearl lake which will be developed at depth from the northwesterly shaft.

Rea mine, looking N. W., Sept. 1911.

The Rea Mine

The Rea mine, which is situated about three-quarters of a mile northeast of Pearl lake, consists of parts of lots 6 and 7 in the second concession of Tisdale, which were originally taken up as veteran locations. A number of quartz veins have been discovered on the property, the most important of which is the No. 1 or Connell vein. This vein strikes N. 47° E. and dips steeply to the N.W. It has been exposed along the surface by trenching for over 200 feet, with considerable variation in width. The average width is given as 6 feet. The hanging wall as exposed near the surface is well defined, showing a movement along the wall with vertical grooves. The quartz along the wall has been greatly fractured, showing numerous slip planes and streaks of dark mineral, which are mostly parallel with the wall. It is in this fractured area that most of the gold occurs, along with iron pyrites and a little copper pyrites, which are the chief



Surface plan of Dome mine. Bodies of quartz are shown in solid black. Shafts and raises are represented by circles.

Members of Canadian Mining Institute excursion party at Dome mine, March 11th, 1912.

sulphides. Under the microscope the mineral of the dark streaks is largely tourmaline, and along these streaks the quartz is very finely granulated and shows a dark bluish colour. An ore shoot, 200 feet in length, has been opened up on the 200-foot level. Here the lines of secondary fracturing are not confined to the hanging wall, but may follow the centre of the vein or the foot wall. Lateral quartz veinlets extend from the main vein into the foot wall. The wall rock is greenstone, impregnated with about 50 per cent. of ferruginous carbonate. Beyond the rusted rock in which the vein occurs, the main country rock is a greenish Keewatin rock, showing an ellipsoidal structure.

The vein has been developed by two shafts 130 feet apart. The Eakins shaft to the southwest has been sunk on the inclination of the vein to the 200-foot level. The main or Kingsmill shaft has been sunk vertically to the 400-foot level.

A minor fault crosses this shaft at about 40 feet in depth, displacing the vein below the fault, to the north of the shaft. Only a short cross-cut was made at the 75-foot

Part of "Golden Stairway" vein containing spectacular gold showings. Big Dome. The lenticular character of the deposit is shown, and rock enclosing quartz is slate. Oct. 1911.

level, as drilling about this time indicated the vein at a vertical depth of 228 feet. The shaft was immediately sunk to the 200-foot level, and a short cross-cut to the north-west intersected the vein. A drift on the vein at this level connects the two shafts. There is also a cross-cut and drift on the vein at the 300-foot level, while at the 400-foot level there is a cross-cut to the northwest. A winze was sunk 16 feet on the vein on the 200-foot level and a raise of 47 feet was made on the 300-foot level. Some diamond drilling was done on the two lower levels.

The Dome Mines

This property consists of a group of six claims in lots 4 and 5 in the first concession, Tisdale. The main workings are on the northeast and northwest quarters of the north half of lot 4. The schistose rocks which enclose the ore bodies are of Temiskaming and Keewatin age. In that part of the ore body in which the large dome-like masses of quartz occur, there is a much altered slate conglomerate, and to the west Keewatin schist, which is much impregnated with carbonate and which also contains considerable sericite. In parts of the Keewatin there are amygdules of quartz and calcite, indicating an old lava. To the northeast of the dome masses the rock is a schistose greywacké, in which is the "Golden Stairway" vein. A band of schistose quartz-porphyry lies to the south of the ore body of the Dome, extending in a northeasterly direction to the Dome Extension.

The best gold values are along the contacts of quartz and schist, where visible gold is frequently seen. It also occurs in brecciated areas in the quartz. Some of the gold is very coarse in character, particularly in the surface showings of the "Golden Stairway" vein, where some streaks of gold have a thickness of about a quarter of an inch. Iron pyrites is abundant along the contacts, occurring in well crystallized forms in the schist contiguous to the veins. A little galena and pyrrhotite also occur in the vein.

Dome mines, Jan. 1912.

Development

During 1910 the development was largely confined to that portion of the property which includes the large dome-like masses of quartz and interfoliated lenses of quartz and schistose rock. The surface of this deposit was carefully sampled and a part of it tested by underground workings, consisting of 5 shafts, a raise, and some drifting and cross-cutting at the 45-foot level. The ground below this level was examined by diamond drilling. During 1911 a great amount of trenching was done to the northeast of the original workings, resulting in the discovery of the lens called the "Golden Stairway" vein; while the low-lying ground extending towards the Dome Extension was examined by diamond drilling.

Mining was also extended to greater depths. Shaft No. 5, located near the south boundary of the ore body, was sunk to the 100-foot level. A 3-compartment shaft, now called No. 1, was sunk at the north boundary of the ore body 110 feet; while shaft No. 7, 80 feet east of No. 1, has been sunk to the 200-foot level. Shafts Nos. 1, 5 and 7 are connected with the workings on the 45-foot level, and Nos. 1 and 7 on the 100-foot level. Some cross-cutting and drifting have also been done on the 200-foot level from shaft No. 7. Shaft No. 2, situated 100 feet north of the "Golden Stairway" vein, has been sunk to the 100-foot level. This shaft will be carried down 400 or 500 feet as soon as possible.

On the 45-foot Level

An incline from the crusher station, situated to the northwest of the ore body, to the 45-foot level is the main mine opening. It is 350 feet long and has a grade of 13.55 per cent. The incline is connected with the workings on the 45-foot level by a drift 240 feet long and 8 feet wide, which is double-tracked. The workings on the 45-foot

Narrow quartz veins in Keewatin carbonate schist at Dome property. Nov. 1910.

level have been laid out in a rectangular arrangement. There are two main drifts, about 300 feet in length and 175 feet apart, which run nearly east and west. These are intersected by 4 parallel cross-cuts 100 feet apart, which have a slight grade toward the north main drift. This drift has a grade toward the incline, and is connected with the No. 1 shaft by a main cross-cut and two by-passes on either side of the cross-cut, making angles of 45° with it. Seven raises have been put up to the surface and with four of the old prospect shafts give eleven working places. Ore chutes have been constructed at the bottoms of the raises and shafts. The ore will be broken into these working places from the surface, and drawn from the chutes into V-shaped cars and trammed to the incline. Trains of 4 cars will be hauled up the incline to the crusher station by a single drum hoist requiring 15-horse power.

An electric driven compressor with a capacity of 1,200 cu. ft. of free air per minute is being installed. This will give sufficient power for the projected development work. In addition there is a convertible type compressor of 1,200 cu. ft. capacity which is at present being run by steam.

The Dome Mill

The following description of the flow sheet of the Dome mill is by Mr. Henry Hanson, mill superintendent:—

The ore from the mine is delivered to a No. 7½ Kennedy gyratory crusher. The product from this crusher is then carried a distance of 70 feet, by a 20-in. Robins troughed conveyor belt (19° incline), and passed over a grizzly to two No. 3 Kennedy gyratory crushers. The product from these crushers, together with the undersize from the grizzly, is conveyed, by a Weller 20-in. troughed belt, up a 20° incline, a distance of 160 feet, and passed to a horizontal conveyor of the same size and make. From this belt the ore is discharged at will to any part of the 16,000-ton steel bin by means of a two-way tripper (2 pulley, style "G").

From this bin the ore is drawn direct to the forty-1,250-lb. gravity stamps. The product from the stamps passes over 8 silver-plated copper plates, 4 ft. 6 in. wide by 12 ft. long, where the gold liberated in the primary grinding is amalgamated. The first plate tailings are then conveyed to four Dorr duplex, drag classifiers, where the coarse sand is raked into the tube mill feed sump. The fines or slime products overflow the lip of the classifier, and pass over 9 by 12 ft. silver-plated copper plates, of which there is one in front of each classifier. The discharge from the tube mills is returned to the classifiers.

The fines after passing over the secondary plates are laundered to three 30 by 10 ft. Dorr thickeners, or dewatering tanks, where the pulp is thickened to a consistency of about one to one. The clear water overflowing these tanks is pumped back to the battery supply, while the thickened slime is discharged into the boot of a 68-foot bucket elevator, where the cyanide is added, and conveyed to the first of four 8- by 40-foot Pachuca agitators. After passing through the series of four agitators, the pulp is drawn from the last into two 25- by 10-foot Dorr thickeners and thence to a mechanical emulsifier or agitator. From this agitator it is drawn to the Merrill slime presses.

The effluent gold solution from these presses goes to four 25- by 10-foot sump tanks, from which it is pumped through two Merrill triangular precipitation presses. The barren solution is stored in two 25- by 10-foot tanks for further use. The residues from the filter presses are flushed out into two 30- by 10-foot Dorr thickeners by means of a 11 by 12-foot Aldrich triplex pump. The clear water overflowing these thickeners is run into the pump storage tank for further use. The thickened slime, or bottom discharge, is run to waste.

Dome Extension

This property is situated a quarter of a mile northeast of the Dome mine. Rocks of the Temiskaming and Keewatin series occur on both properties. Diamond drilling has shown that the band of schistose quartz feldspar-porphyry which is exposed to the south of the Dome workings crosses the low land to the northeast to the Dome Extension. On the Dome the ore body lies to the north of the quartz-porphyry and is mostly in conglomerate and greywacké slate of the Temiskaming series.

At the Dome Extension a disturbed zone occurs to the east of the porphyry in schistose greenstone. No. 4 shaft has been sunk on this shear zone where there are surface outcrops of quartz masses and veins. This shaft has been sunk 100 feet and a cross-cut of 30 feet has exposed a mass of quartz with narrow veins which has been drifted on for 100 feet. In part of the quartz there is pyrrhotite and tourmaline, chiefly along the contact of quartz and schist. Some of the greenstone is impregnated with pyrrhotite. Visible gold occurs with the pyrrhotite and tourmaline and also in the white quartz near the contact. In other parts of this property the sulphide mineral is pyrite.

No. 1 shaft is situated 400 feet west of No. 4 and is also in schistose greenstone. This shaft was down 222 feet and about 400 feet of drifting and cross-cutting accomplished on the 100- and 200-foot levels, exposing some lenses of quartz. The cross-cut on the 200-foot level was to be extended northwest through the 300-foot wide porphyry band into the conglomerate and greywacké in which diamond drilling had indicated a disturbed zone with quartz lenzes. Owing to the depth of the drift to the west of the Dome Extension workings, diamond drilling had to be resorted to in order to show the extent and disturbance of the Temiskaming slate.

Dome Lake

The rocks at the Dome lake property are altered greenstones which are much impregnated with carbonate. Amygdaloidal and ellipsoidal structures are frequently seen on the surface. The schist strikes S. 85° E. mag. and dips N. 80°. Shear zones are very marked in an almost E. and W. direction. One shear zone constitutes vein No. 3, which is traceable over 1,000 feet by trenching and averages 3 feet in width. The country rock has been much altered in this zone by quartz and carbonate solutions. Strips of country rock are included in the secondary minerals, while iron pyrites is disseminated in fine crystalline form through the band. The gold generally occurs in an invisible state in close association with the iron pyrites.

Two shafts have been sunk on No. 3 vein 650 feet apart with some drifting at the 50-foot level. To the west of shaft No. C a lamprophyre dike 18 feet in width, with N. and S. strike cuts the schistose greenstone and veins.

North Dome mine, showing power transmission line: shot drill in operation. Oct. 1911.

Under the microscope a sample of vein consists largely of quartz and calcite in very fine grains, with considerable chlorite, which is evidently an alteration from the enclosing basic rock. Minute crystals of iron pyrites are abundant in the section. There are some small grains of gold in a free state, and in one of the larger grains of pyrite are several minute grains of gold.

North Dome

The workings at this property are on a low conglomerate slate ridge which outcrops from the surrounding drift. The sedimentary rocks strike S. 65° W. and dip steeply to the N. W. The rock has also a less marked dip to the N. E. The direction of the secondary cleavage is about S. 75° W. mag. Short narrow veinlets of quartz cut the schistose conglomerate at a low angle to the strike.

Two shafts were sunk in the conglomerate to depths of 60 and 70 feet with some cross-cutting and drifting at these depths. Narrow quartz veinlets were encountered, some of which dipped with the schist while others cut across it. The conglomerate near the veins is greatly silicified. Visible gold occurs in some of the quartz near the contact with the schist, and has been deposited on some of the crystals of pyrite, which are very abundant along the contact of quartz and schist. Some of the pyrite is of earlier formation than the gold.

Porcupine Lake Mining Company

This property, known as the Hunter claim, is situated on the east shore of Porcupine lake, to the south of Porcupine townsite. Only a very small area of rock was exposed immediately along the shore where visible gold was discovered in quartz and schist. Owing to the drift, surface trenching was resorted to in exploring the property, while several shallow pits were sunk. The ore does not occur in a definite vein, but rather in a disturbed zone which has a well defined foot wall. In this zone there is interbanded schist and quartz, while more defined quartz veins occur near the foot wall. The strike of the zone is N. E. and S. W., while the dip is 60° N. W. The disturbed zone has been recognized at intervals over 750 feet in length and was being tested by diamond drilling from the lake during the past winter.

Vein at Hughes property, Whitney township, showing series of lenses.

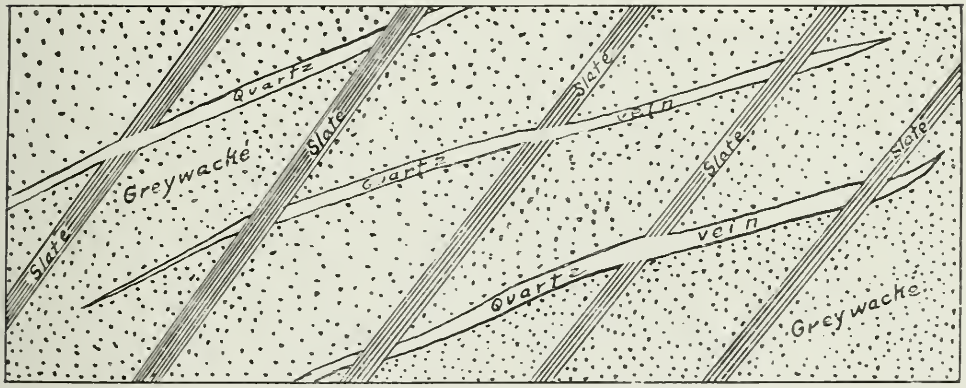
Davidson

This property is situated in the north part of Tisdale township. It was one of the earliest in which gold was discovered. The country rock is altered greenstone through which there are shear zones developed in east and west direction. In these zones the rock has been greatly altered, rendered schistose and impregnated with secondary carbonate, quartz and iron pyrites in cube form. The general dip of these bands is to the north at an angle of about 60°. In parts of these bands numbers of quartz veins or lenses have been formed, from mere veinlets up to several feet in width. For the most part these veins strike approximately with the schist and dip against the schist at low angles to the south. At the Davidson the shear zone is 90 feet wide and on the surface is much rusted by the oxidation of the iron in the carbonate. The ordinary greenstone has a light greenish weathered surface.

A shaft was down 170 feet with a 100-foot cross-cut to the north at the 100-foot level, and some drifting and cross-cutting on the disturbed zone accomplished. The shaft was placed near the south or foot wall of the shear zone, so that at 40 feet the zone dipped to the north of the shaft. One cross-cut over a distance of 27 feet shows many narrow quartz veins. Towards the south wall the veins are broader and have a higher dip. Visible gold occurs along the contacts of the quartz and carbonate rock. Crystallized iron pyrites is abundant in the rock near the veins.

Hughes

On this property situated in Whitney township there are lenses of quartz showing on the surface. These dip to the south across the schistose country rock. At the surface there is an enrichment along the north wall, where the quartz has been fractured and sec ndary solutions have run in. In a cross-cut to the south at the 50-foot level there is a quartz lens 11 feet in width, which shows an enrichment along the south wall of secondary quartz containing some visible gold. At about 70 feet in the shaft there is an impregnation of quartz stringers and iron pyrites in the schist, carrying some gold values.



Sketch showing how narrow quartz veinlets have in some cases not continued through the slaty bands of the Temiskaming series, at LaPalme property.

Three Nations Lake Mining Company

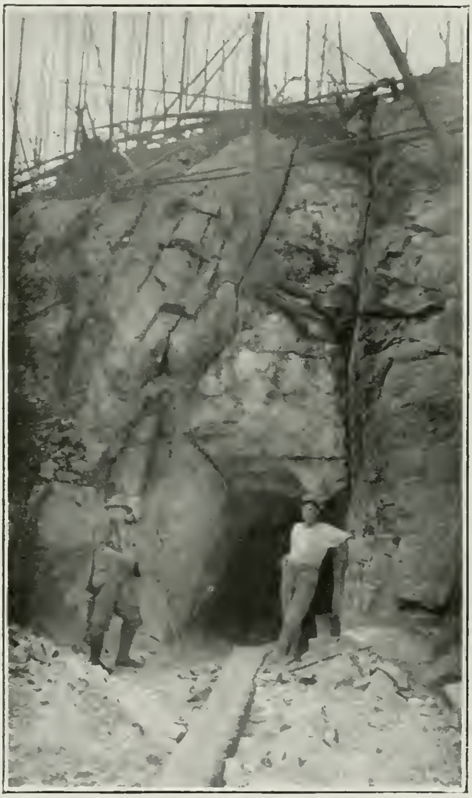
This property is situated in the northeast part of Whitney township, adjoining La Palme. A number of narrow quartz veins which showed visible gold were first found, and some shallow pits and trenches made on them. Later a quartz vein, averaging over 3 feet in width, with a strike N.E. and S.W., was discovered and a shaft sunk on it. This vein, which dips 70° S., left the shaft at 40 feet and, when the property was visited in March a cross-cut was being driven at the 100-foot level to cut the vein. Below 75 feet in the shaft a number of quartz veins, with low dip to the S., came in. Visible gold was noted in the quartz from these veins. On the surface the main vein can be traced for 300 feet. Over part of its length it conforms to the strike of the schist, but towards the southwest cuts across it. Considerable iron pyrites and zinc-blende occur with the quartz in parts of the vein.

A shaft was also sunk on the contact between the serpentine and conglomerate on the north line of the property, where the rock has been greatly silicified and also impregnated with carbonate and iron pyrites. Material from this shaft gave gold values on assay.

La Palme

On the La Palme property there are a number of narrow quartz veinlets, varying from a fraction of an inch up to 7 inches in width. Showings of coarse visible gold occur in a number of the veins. The strike of the veins varies from that of the enclosing conglomerate and greywacké. The rocks dip steeply to the N., whereas the veins dip to the south at about 45°.

The forces which produced these narrow veins must have acted very gently. Veins have been formed which can be traced through quartzitic bands ending abruptly at the slaty band, and continuing beyond in another quartzitic band. The fissures were more readily produced in the brittle quartzite than in the tough slate.



Barite vein on property of Premier Langmuir Mining Co., Langmuir township.

Silver in Langmuir Township

The property of the Premier Langmuir Mining Company is situated in the township of Langmuir, along the south boundary and immediately west of Night Hawk river. On the property is a prominent ridge of Archean rock, which rises about 125 feet from the surrounding drift. The rock enclosing the veins is principally Keewatin greenstone schist. To the south there is intrusive reddish syenite in some volume. Narrow dikes of syenite cut the greenstone, and both rocks are cut by veins of barite. These veins occur along the northeasterly slope of the Archean hill. The main vein has been traced about 1,000 feet in a direction somewhat south of east, while a branch vein has been followed about 350 feet with an E. and W. strike. The main vein would average from two to three feet in width, and at one place has a width of eight feet.

A tunnel has been driven on the main vein at its westerly end a distance of 100 feet. The vein matter shows barite, with sparingly disseminated galena. Much of the barite is very pure in appearance, but portions of it contain calcite. About 500 feet east of the tunnel a shaft has been started on the branch vein, where it shows a width of 50 inches. Towards the south wall of this vein, where a cut had been made for the shaft, there are a few streaks or bunches of dark minerals. These consist principally of black or brown zincblende and galena, and in addition there are scattered flakes of native silver and argentite. Iron and copper pyrites also occur sparingly. It was noted in the pit on the east vein that the barite was cut by some minute veinlets of quartz, along which most of the sulphides occur. This would suggest that the sulphides along with the silver came in with the quartz. Fluorite has been obtained in some narrow cross veinlets from the larger vein. The barite veins have well-defined walls, and the filling breaks freely from the wall rock. A quantity of commercial barite could be obtained from these veins for use in the manufacture of paints, etc.

No smaltite or bloom was seen in the vein matter, but bloom was obtained about one mile to the west. Some small areas of diabase occur in the vicinity, but not immediately near the Keewatin area in which the veins are found.

Assistants and Acknowledgments

Messrs. E. L. Bruce, P. E. Hopkins, A. F. Mahaffy and R. M. Smith acted as assistants during the season of 1911. In addition, Mr. Hopkins assisted in preparing the report and accompanying map.

The topographical part of the survey was in charge of Mr. W. R. Rogers, the topographer of the department.

The assays and analyses mentioned in the report were made by Mr. N. L. Turner, Provincial Assayer.

The writer is indebted to the managers of the various mines and prospects for rendering assistance in the examination of the properties, and to the mining recorders, Mr. A. E. D. Bruce and Mr. J. A. Hough, for maps, plans, etc.

WATER POWERS IN THE PORCUPINE AREA

By W. R. Rogers

For the last report of the Bureau of Mines the writer prepared a few notes[1] on the subject of water powers in the vicinity of Porcupine. This article was incorporated in Mr. Burrows' report on the Porcupine Gold Area.

Since last writing the hydro-electric plant at Sandy Falls has been completed, and electric energy supplied to the mines since June, 1911. Another water power is being harnessed at Wawaitin Falls. Both of these powers, situated on the Mattagami river at distances of 6 and 11½ miles respectively from the Hollinger mine, are shown on the geological map of the Porcupine area.

Other water powers within a radius of 25 miles from Porcupine are: High Falls on the Frederickhouse river in the township of Mann; Grassy Falls on the Price-Fripp township boundary; and Sturgeon Falls on the Mattagami river in the township

General view of dam, spillway, flume and power house of Porcupine Power Co., Oct., 1911.

of Mahaffy. Applications have been made for permission to develop all of these. However, no actual development work has been carried beyond the stage of preliminary surveys.

A copy of the regulations stating the conditions upon which water powers are leased may be had on application to the Department of Lands, Forests and Mines.

Importance of Accurate Data

Hydrographic work in Canada, or rather the branch of it pertaining to stream measurements, was initiated by the Department of the Interior, Ottawa, in 1909. Work, however, has been confined almost exclusively to Dominion lands in the Province of Alberta. A valuable report was issued in 1911 by the Conservation Commission, entitled "Water-Powers of Canada." In this volume emphasis is laid on the necessity of obtain-

[1] Bur. Min., Vol. XX. (1911), Part II, page 32.

ing more accurate data in regard to water powers before proceeding with their development. The only safe basis for estimating the maximum amount of power available is the minimum flow of the stream throughout the year. In some cases storage facilities will help to raise this minimum. In order to secure the necessary data, metering and gauging stations should be established, and to ascertain the maximum, minimum and mean discharges accurate records for a period of years are necessary. The importance of winter observations must not be overlooked, as the minimum flow occurs during that season and should be determined for use in considering power schemes. From the power user's point of view contracts should not be entered into for the supply of more power than is justified by low water records for a period of ten years or more. As such data respecting water powers in northern Ontario is not available, a very conservative estimate should be made the basis of hydraulic and electrical installations.

Transmission line of Porcupine Power Co. through Timmins townsite. Oct. 1911.

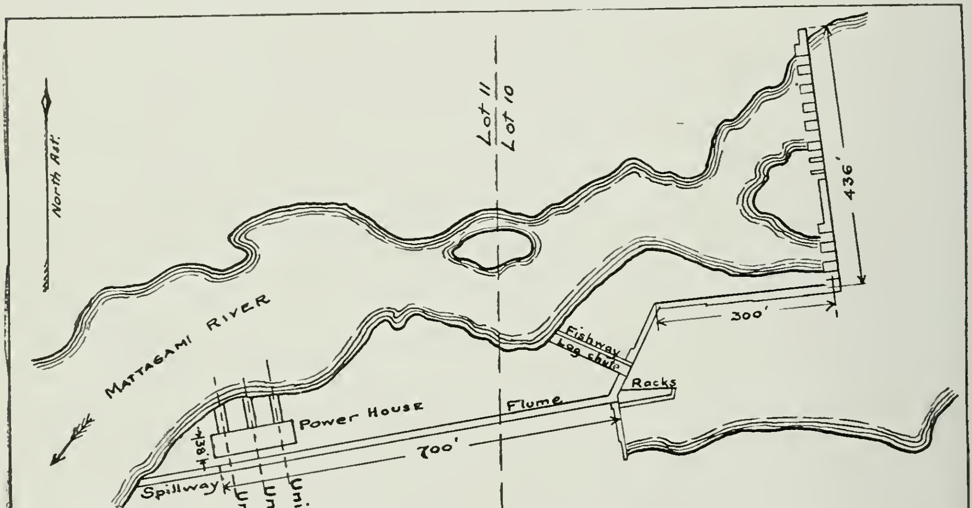
A case in point is that of the Porcupine Power Company. Extreme low water and ice troubles in March, 1912, combined to tie up the Sandy Falls power plant and to greatly inconvenience customers. A year previous, at the Ragged Chutes compressed air plant on the Montreal river, a similar condition developed, which resulted in many of the mines at Cobalt shutting down for lack of air to run the drills. This difficulty has been overcome by the construction of storage dams to retain flood waters, in order to increase the flow at low stage periods.

The drainage area of the Mattagami river at Wawaitin Falls is approximately 1,000 square miles. At Sandy Falls the drainage area has been increased to 2,500 square miles by the additional territory supplying tributary feeders, namely, Mountjoy creek and the Grassy and Lost rivers. Assuming a run-off of 0.4 cubic feet per second per square mile, the discharge at these points would be 400 and 1,000 cubic feet per second, respectively. The effective head at Wawaitin is 118 feet, and at Sandy Falls 34 feet. Figuring on this basis and assuming for turbines 80 per cent. efficiency, under natural flow, the minimum 24-hour horse power is 4,300 and 3,100 respectively. The only definite metering records available give the following:—

Wawaitin Falls.—March, 1910, 366 cubic feet per second.

Sandy Falls.—January 20th, 1910, 1,654 cubic feet per second.

A director of the Porcupine Power Company states that the extreme low water flow per second at Sandy Falls was 1,600, 1,200 and 600 cubic feet, respectively, for the years 1910, 1911 and 1912. It will be seen from the above records that an exceptional year like 1912 emphasizes the necessity of continuous records for a period of years to ascertain the extremes of flow as well as a reliable mean. Extreme cold weather, with no thaws of consequence throughout the winter, produces an acute situation in northern Ontario. Controlled storage is the only remedy for increasing the minimum flow, and it is proposed to dam the headwaters of the Grassy river for this purpose. In this part of the Province of Ontario February and March is the season of extreme low water.



General Layout of Power Plant
Porcupine Power Co. Limited

In the case of the Wawaitin plant, Kenogamissee lake forms a small storage basin. Kenogamissee Falls, 25 miles south, affords facilities for storage and regulation. In addition, it would be possible to divert the Lost or Redsucker river by means of a small dam and a shallow cutting about 1½ miles in length through sandy soil.

Porcupine Power Company

The Porcupine Power Company's plant at Sandy Falls consists of two 25-cycle, 3-phase, 12,000-volt, 214 revolutions per minute, 950-k.w. generators, directly connected to S. Morgan Smith turbines. A third unit of similar capacity is being installed. The electric equipment is of Canadian Westinghouse manufacture. Each unit requires 450 cubic feet of water per second to develop full power under an effective head of 34 feet.

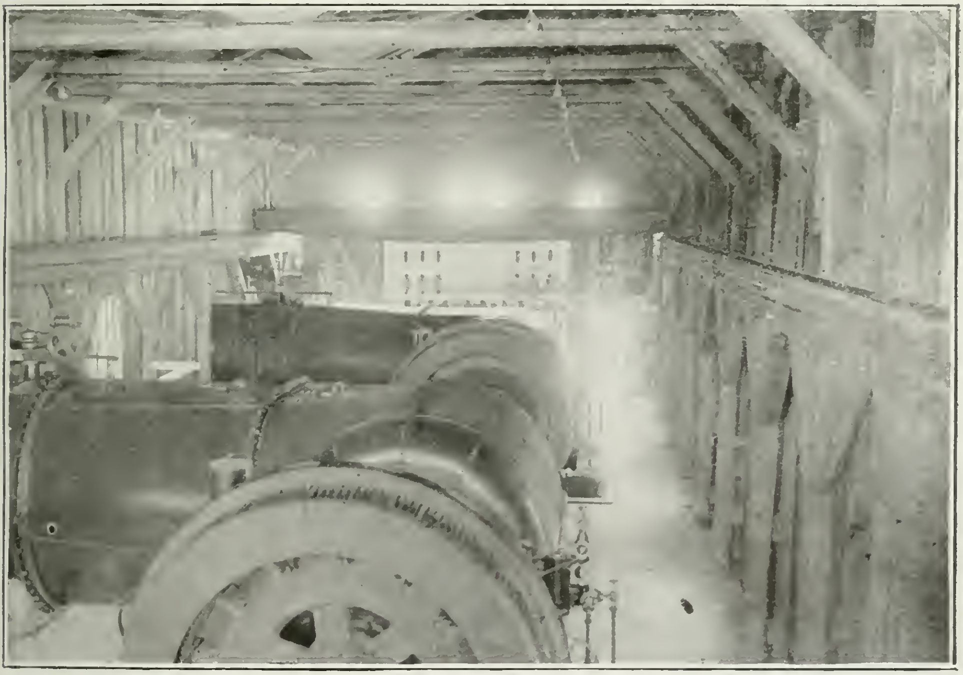
Turbine runners are 54 inches, and intake pipe 10 feet in diameter. The turbines were specially constructed to admit of sections being teamed on sleighs a distance of 45 miles from Kelso before the Porcupine branch of the T. & N. O. railway was built. The power house is a timber structure sheeted with galvanized iron, and is equipped with a 15-ton travelling crane. The timber flume, 13 by 16 feet in section, and 700 feet long, is provided with electric heating wires running through the upright studs in case it should be found necessary to use a heating appliance to prevent ice formation in extreme winter weather.

The dam is of cribwork construction, stone filled, sheet piled, and has 10 sluiceways, varying in width from 12 to 16 feet. Spillway, fishway, and a combination ice run and log chute are also provided.

The plant was designed and constructed by H. D. Symmes, of Niagara Falls, who is a director of the Porcupine Power Company.

Wawaitin Power Company

Construction work at Wawaitin falls started in the summer of 1911. Supplies, machinery, etc., were loaded on scows and pointers and towed up the Mattagami river by gasoline boats from Mattagami Landing. Messrs. Ross and Holgate, of Montreal, are consulting engineers for the company.



Interior view of power house, showing units 1 and 2, Porcupine Power Co.

The Falls are in Thornloe township, their position being shown on the map of the Porcupine Gold Area. It is proposed to use a head of 118 feet, carrying the water from a higher level to a lower by means of an open flume and pipe lines. The open flume or canal is about 1,400 feet long, 40 feet in width, and the greater part is in rock. A 12-foot diameter penstock leads from the flume for a distance of 1,500 feet, where it subdivides into two, each 8 feet in diameter and 1,200 feet long. The surge tank at the junction of the penstock is 40 feet in diameter and 38 feet high. These 8-foot penstocks terminating at the power house supply two units, each Westinghouse generator being 2,500-k.w., 12,000-volts, 3-phase, 25-cycle, running 375 revolutions per minute, with an overload capacity of 3,120 k.w. Provision has been made for a duplication of the pipe lines and power house installations. The power house is of reinforced cement construction, with cement roof.

Part of Wawaitin falls on Mattagami river.

Pipe line excavation, looking north-east towards site of power house, Wawaitin falls, Nov., 1911.

The location of the dam is at the head of a small island, at the point where Kenogamissee lake contracts to river width. This dam, 1,000 feet long, is provided with log chute, 150-foot spillway, and has 16 stop-log sluiceways for the purpose of maintaining a uniform head above the dam.

E. A. Wallberg has leased this water power, and under the conditions must develop electrical energy to the amount of 4,000-h.p. by September, 1912. During the past winter, 1911-1912, progress has been checked for financial reasons. However, at the time of writing, May, 1912, work has been resumed and indications point to completion of the work before the time required by the lease from the Crown. An interest in the power company has been acquired by the Dome Mines, Limited. They will require 3,000 horse power for the first year's work.

The Sandy Falls plant of the Porcupine Power Company is already taxed to the limit of its capacity, and further power must be provided to meet the demands of Porcupine mines as development proceeds.

Thanks are due Mr. Robert Laird, resident engineer of the Wawaitin Power Company, for furnishing construction data. Mr. J. H. Thornley, resident engineer of the Porcupine Power Company, kindly supplied photographs of the power house and general layout, and also explained the main features of construction.

THE SWASTIKA GOLD AREA [1]

By E. L. Bruce

The Swastika gold area centres about the town of Swastika at mileage 164 on the Temiskaming and Northern Ontario railway. The area examined comprises the southern half of the township of Teck and the northern half of the township of Otto. This area was first described by Mr. W. J. Wilson, who made a reconnaissance survey of the Blanche river for the Canadian Geological Survey, and later by Mr. L. L. Bolton, who accompanied Speight's survey party in 1904 and reported on the geology of the country from Round lake to Abitibi for the Ontario Bureau of Mines.

At the time of the gold rush to Larder Lake a number of claims were staked in the Swastika area, and some work was done upon them. The claims now held by the Lucky Cross Mining Company and those of the Swastika Mining Company were located at that time. In the depression which followed operations were continued only on the latter group. The first development was done on the big quartz vein on the west side of Otto lake. A shaft was put down about sixty feet and some drifting done. Surface prospecting on the north side of the lake uncovered No. 1 vein, containing visible gold, and with the discovery of other veins near this one the work on the west side was abandoned. A shaft was sunk and a five-stamp mill was installed on the north side. This mill turned out several small bricks before being dismantled in 1911 to make room for the present plant.

The discovery of gold at Porcupine led to renewed interest being taken in the older area, and the summer of 1911 saw most of the old claims restaked and development work started on many properties.

Topography and Drainage

The area lies just south of the height of land between James Bay and the Ottawa river, and while the difference of elevation is seldom more than two hundred feet the country is rather rugged and broken. Rock outcrops are numerous, and the areas of swamp are neither large nor continuous. The hills are arranged in roughly parallel east and west ridges in conformity with the strike of the formations. East of the Blanche river, however, the regularity is not so pronounced, and the hills are more or less isolated.

The Blanche river, which flows through this area, turns sharply east about a mile below Kenogami station and runs between two of these ridges until it breaks across the southern one in a series of rapids at Swastika. Just south of these rapids it is joined by Amikougami creek, which forms the outlet of Amikougami lake north of Swastika, and which flows in a fairly straight north and south course. Below the junction of the two streams is a broad valley, in which the river meanders considerably before entering Otto lake. Leaving the lake, the river again forms a series of rapids, below which there is a long stretch of quiet water broken only where it crosses the syenite ridge in concession IV. In concession V. the Blanche receives another tributary from the north, known as Murdock creek. This stream, like Amikougami creek, flows south in a fairly straight course. The lower part is shallow and rapid, but the upper reaches are rather sluggish. The Amikougami is broken by a few rapids, but forms a good canoe route to the lakes lying to the north.

Geology

The rocks of the area may be classified as follows:—

RECENT AND GLACIAL:—

Stratified clays, peat, sand and gravel.

PRE-CAMBRIAN:—

[2]Post Huronian.—Diabase, red feldspar-porphyry, augite-lamprophyre.

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[1] This report is accompanied by a geologically colored map of the area described.

[2] The term post Huronian in this report indicates that the intrusive rocks embraced under it are later in age than the sedimentary Huronian rocks of the area described. It is not to be inferred that these intrusives are younger than certain Huronian rocks that occur in other areas. Definite correlation is impossible at present.

Igneous Contact.

Huronian.—Conglomerate and greywacké.

Unconformity.

Laurentian.—Augite syenite.

Igneous Contact.

Keewatin.—Gray feldspar-porphyry, basic intrusives, iron formation and epidotic rocks, greenstones and schist.

Keewatin

Greenstone and greenstone schist.—The greater part of the Keewatin rocks are massive greenstones or their schistose derivatives. Where still massive, the greenstones show an ellipsoidal structure. This characteristic is pronounced in the rocks of the northeast corner of Otto. It is also seen especially well on the hill to the east of mile-post 170, and on the face of the cliff near Kenogami station. Massive greenstones grade into rocks of schistose character. The schistosity becomes more pronounced near the contact with the later acidic intrusives, and the strike of the schists is usually

Photo by C. Spearman.

Otto lake from Swastika mine.

parallel to the strike of the contact. The layers of schist are not at all regular, but often the rock shows a columnar structure, with twisted blocks whose surfaces are serpentinized and highly polished. Rocks of this type outcrop along the railroad east of Amikougami creek. Between this stream and Murdock creek, railroad cuttings show an anticlinal arrangement of these schists. At the western side they have a strike S. 45 W., dip 70° N.W. The dip gradually becomes less steep, until the schists are almost flat. Then the dip increases towards the S.E., and at a point two miles east of Swastika the strike is S. 64° W., dip 80° S.E.

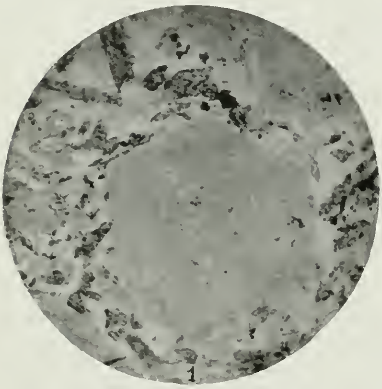
The greenstones and schist extend in a broad belt across concessions IV. and V., Otto, and after crossing the Blanche river at Swastika the northern boundary follows Amikougami creek for some distance, and then swings northeast across the southern part of the township of Teck.

A schistose greenstone east of Swastika consists entirely of actinolite needles, along with sericite and magnetite. A rather more massive rock at the west end of Pike lake has altered to chlorite, with a considerable quantity of carbonates, and has fine particles of sulphides scattered through it. In neither case is any trace of the original structure or minerals left.

At mileage 162 on the Temiskaming and Northern Ontario railway there is a cutting through a very dense black basaltic looking rock that carries many small lenses of sulphides. Under the microscope the rock shows grains of quartz and a dark sooty material. The rock suggests a baked bituminous shale.

Carbonate Rocks.—Carbonates occur at several places in the area. Along the north side of Pike lake a narrow more or less continuous band of a much rusted carbonate rock separates the conglomerate from the gray feldspar-prophyry. This band is so altered and its character so masked by the rusty weathering that it is impossible to determine its original nature. In parts the unweathered portion is light green in colour, probably consisting largely of the chrome-bearing mica, fuchsite. Carbonate rocks also outcrop farther west, in lot 12, concession VI., Otto. They are fractured and the fractures are filled by quartz, producing a network of intersecting veinlets. Other small outcrops of carbonate rocks occur in the eastern part of Teck.

Serpentine.—The greenstones are often much serpentinised along slip planes and on the surfaces of the layers of schist. An outcrop of massive serpentine of small extent was observed on the Crawford claims, about two miles north of Swastika.



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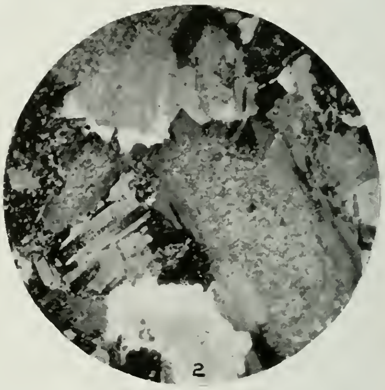

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Iron Formation and Epidotic Rocks.—Banded iron formation, consisting of alternate bands of magnetite and silica, occurs at several points along the southern edge of the Keewatin belt. A rock that seems to be related to it is exposed in the railway cuts in concession V., Otto. This rock consists of interbanded epidote and silica. Iron formation lies a few chains farther south.

Keewatin Intrusives.—A large number of dikes of varying character cut the Keewatin greenstones. Some of these are so much altered that they suggest very early intrusions, and probably belong to the latter part of the Keewatin complex. Others, however, are much fresher, and may be of much later date. These are relatively small in area and have been mapped as Keewatin, since their relationship to later rocks is not known.

Diabase dikes are very numerous in the greenstones. In most cases the rock is very badly altered, and there is little doubt that it belongs to the Keewatin complex. Other dykes are, however, quite fresh in appearance, and some of these may belong to the post-Huronian series, but at no place was any intrusion of diabase into conglomerates or greywackés observed. A considerable area of a massive igneous rock outcrops in concession V., lots 1 and 2, of the township of Eby. It is somewhat altered, but still retains phenocrysts of a bronzy color. Farther north a thin section shows a rock that has evidently resulted from the metamorphism of an igneous rock of a porphyritic type. Some original minerals are still recognizable, and the original structure is not much affected. Feldspar phenocrysts are present and can still be determined as near albite in composition. A few shreds of green hornblende are left, but most of this mineral, which apparently formed the largest number of phenocrysts, has changed over to chlorite. Sericite is also abundant, due to the alteration of the feldspathic constituents.

Feldspar-Porphyry.—Intruding the greenstones near Otto lake and again on the eastern side of Murdock creek is a gray feldspar-prophyry, which has been included in the Keewatin series. The feldspar phenocrysts show distinctly on the surface. Under the microscope the rock is distinctly porphyritic (figs. 1 and 2). The phenocrysts are plagioclase feldspar, near the albite end, set in a groundmass of quartz, feldspar, and hornblende. Considerable alteration has taken place, producing chlorite, sericite, kaolin, carbonates and epidote. Magnetite and chalcopyrite are present. The phenocrysts make up a large part of the rock, the areas of groundmass being narrow.

An analysis of this rock gave:—

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	Na_2O	CO_2	H_2O	Total.
60.71	14.87	3.26	3.60	3.52	3.29	2.52	4.40	1.68	2.35	100.2

This calculates to a norm consisting of:—

Quartz.	Orthoclase.	Albite.	Anorthite.	Magnetite.	Chloride	Kaolin.	Sericite.	Hornblende.	Total.
17.34	11.10	37.16	1.67	1.20	12.93	4.82	3.14	7.70	100.84

This shows the acidic nature of the feldspar. The large quantity of chlorite present explains the rather high percentage of water in the analysis.

Other sections examined exhibit almost complete alteration of hornblende to aggregates of chlorite and epidote. A thin section of the rock in the railway cut near the water tank at Swastika shows a rather abnormal facies of this rock. Here the ferro-magnesian minerals are altogether lacking, the whole rock consisting of albite, quartz and alteration products such as carbonates, sericite, chlorite, epidote and magnetite. The ordinary type is a quartz diorite-porphyry. This abnormal type approaches a quartz keratophyre.

Hornblendite.—Crossing the eastern boundary of Teck is an outcrop of porphyritic hornblendite. It is roughly elliptical in outline and is entirely surrounded by drift, hiding the contact with the Keewatin rocks around it. Near the centre of the exposure, the hornblende crystals are large, often being an inch in diameter, and the whole rock consists of dark minerals. Towards the margin it becomes finer grained, and more light coloured constituents appear. The rock is made up of phenocrysts of green hornblende and brown biotite, with a little magnetite, apatite and titanite. Inclusions of light pyroxene, of the variety diopside, occur in the hornblende crystals. There is very little alteration, and the hornblende is undoubtedly primary. The little secondary material present is epidote, aparently from feldspar. The unaltered character of the rock suggests that it may be much later than the Keewatin series, possibly a basic segregation from one of the acidic intrusives.

Other Intrusives.—Many other smaller dikes cut the Keewatin at different places in the area. Basaltic dikes from an inch up to sixty feet in width are to be seen in the railroad cuts east of Swastika. In one of these cuts a dike of andesite-prophyry six feet in width intrudes the serpentinised greenstones. It has a very striking porphyritic structure. The phenocrysts are feldspar and hornblende. The former are well bounded tabular crystals of albite showing zonal structure. The hornblende is of the ordinary green variety, occurring in prismatic crystals much elongated. Cross sections of these have diamond shaped or hexagonal outlines, and some of the crystals show distinct zonal growth, an uncommon feature in hornblende. Fragments of biotite, now light green in colour from alteration, and, in some places, completely altered to chlorite and magnetite, occur. Apatite is also present.

A dike of similar rock but showing more alteration occurs on the Reeves claims north of Pike lake. This dike is cut by a narrow mica-lamprophyre consisting almost entirely of greenish biotite, with a little magnetite.

Laurentian

All those rather fresh, acidic rocks of the area, whose relationship to the conglomerate is not known, are included in the Laurentian series. In the northwestern part of the district conglomerates were found overlying acidic igneous rocks, although not directly in contact, and containing pebbles very similar to the underlying formation. In other places no relationship was observed. The character of the feldspar, and the presence of augite in the syenite classed as Laurentian, suggests that it may be one member of a series of differentiation products of a parent magma, of which red feldspar-porphyry and augite-lamprophyre, to be described later, are other facies. In the absence of any observed field relationship, however, it has been mapped as Laurentian.

There are three areas of such rocks in the district. The largest of these forms a prominent ridge lying between concessions IV. and V., Otto, and extending east and west. A boss-like mass intrudes Keewatin rocks north of the railway with its centre in H. R. 737. The third is a small exposure south of Perron lake, in the northwestern part of the area.

The contact of the first of these with the Keewatin can be seen in the western part of the township, forming a broad zone. Towards the centre and east, however, the Laurentian ridge is separated from Keewatin rocks by a wide drift-filled valley. The rock consists largely of feldspar, and is often very coarse in grain, the feldspar reaching a diameter of an inch or more. The coarse grained rock is cut by finer grained stringers of the same character, excepting for the size of the constituents. These withstand weathering rather better and stand out from the surface. The cleavage of the feldspars causes the rock to break down rather easily. In thin section the rock exhibits a tendency towards porphyritic structure. It consists of feldspar, augite, biotite, hornblende, magnetite, zircon, apatite and titanite. Quartz is present in the small areas of groundmass that separate the feldspar phenocrysts, but is not very abundant. Chlorite, epidote and secondary hornblende occur as alteration products. The augite is the oldest of the more important constituents, occuring as well formed crystals (Fig. 3), and sometimes as inclusions in the feldspar. The pyroxene is often fringed with uralite. The most striking characteristic of the rock sections is the structure of the feldspar. It has a peculiar ragged, almost brecciated, appearance, which seems to be due to a crude micro-perthitic intergrowth. An analysis of the finer grained part of this rock gave the following composition and norm:—

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	Na_2O	H_2O	Total.
61.65	18.91	2.37	1.48	1.11	2.10	4.20	5.59	0.60	98.01

Quartz.	Orthoclase	Albite.	Anorthite.	Magnetite.	Chlorite.	Biotite.	Hornblende and Pyroxene.	Total.
6.30	18.72	47.20	5.50	1.70	2.50	10.05	6.23	98.20

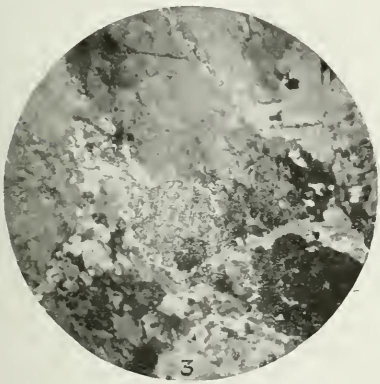
The rock is essentially an augite syenite-porphyry.

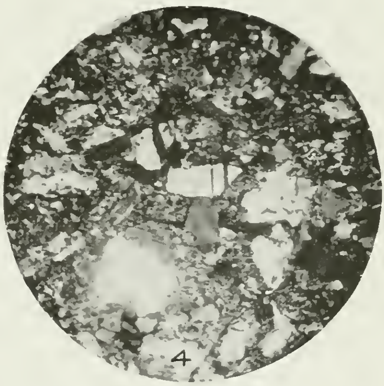
The second Laurentian area consists of syenitic rocks of similar character, but the feldspars do not attain so large a size. The rock of the third area is not so coarse in grain as that of either of the others, and shows a more distinctly porphyritic texture.

Huronian

Huronian rocks occupy the western part of the township of Teck from the boundary line north to the limits of the map sheet and east as far as Swastika. Northeastward from Swastika the contact with the Keewatin is along the course of the Amikougami creek. It then swings eastward again. The Huronian forms a rather high area, rising gently to the north for a mile and a half from the Blanche river, and then breaking into a series of east and west ridges.

For the most part, the series consists of conglomerate and greywacké. These are fresh and unsqueezed away from the contact, but, along the borders of the formation, the rock is a slate standing at a high angle and much rusted and altered. At a short distance from the contact, a conglomerate and greywacké are quite fresh in appearance. It may be possible that the highly tilted slates represent a series older than the fresher conglomerate, or the relation of the Huronian to the Keewatin may be that of a fault contact.





The conglomerate is very massive and shows no bedding. It varies considerably even in short distances, being crowded with pebbles at one place, while a few feet away pebbles are so rare that only careful search will reveal them. Most of the pebbles are well rounded, evidently water worn, fragments of feldspar-porphyry, similar to the gray feldspar-porphyry already described. Reddish, felsitic pebbles also occur and a few pieces of granite were found. Greenstones are common, and fragments of smooth serpentinised rock like that east of Swastika also occur. The most striking constituents of the conglomerate, although less in number than the others, are the pebbles of jasper varying from the size of a pin-head or less up to a diameter of four or five inches.

Where pebbles fail, the rock passes into a typical massive greywacké. Near the western boundary of Teck, the typical greywacké grades into a reddish colored rock of an arkose type. Thin sections of a typical variety show fragments, most of which are porphyry, with feldspar or green hornblende phenocrysts. Along with these are fragments of minerals, consisting of albite, quartz, hornblende and magnetite set in a matrix of finer material of the same kind. Secondary minerals, chlorite, sericite, and kaolin are present. (Fig. 4.)

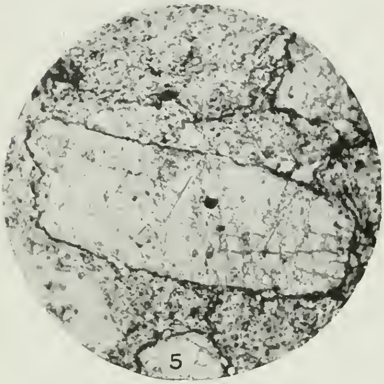
Post-Huronian Intrusives

There are at least two igneous intrusives that are later than the sedimentary rocks. These are of distinct types and their relation to each other is not known. Both occur as dikes cutting greywacké and conglomerate, and sometimes as masses of considerable area.

One of these is a light reddish rock with a tendency to develop feldspar phenocrysts. A small knob of this rock is encountered in the first railway cut west of Swastika. It extends but a short distance south of the railway, and sends off a tongue along the base of the hill of conglomerate that rises south of the right-of-way. The conglomerate along the contact is considerably altered and the pebbles squeezed and drawn out. East of Amikougami creek is another small exposure of similar rock, and on the Costello claim a small exposure of greywackê is cut by at least three different dikes of this rock. Many other small dikes of the rock occur at different places in the conglomerate.

A specimen from the cut west of the station shows under the microscope a rather granitoid texture, and consists almost entirely of an acidic plagioclase feldspar with a considerable quantity of secondary products. Dolomite is the chief of these, occurring in small rhombohedrons massed together, or in veinlets through the feldspar.

Aggregates of epidote and other secondary minerals are present and a little chalcopyrite is scattered through the section.



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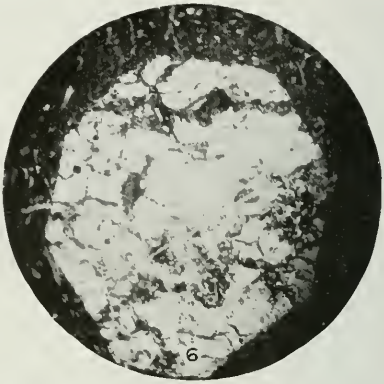

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The analysis of the rock and the norm, are as follows:—

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	Na_2O	CO_2	H_2O	S	Total.
56.25	18.42	1.56	2.41	2.38	6.13	0.32	8.10	4.58	0.22	0.10	100.47

Quartz	Orthoclase.	Albite	Anorthite.	Magnetite.	Chlorite.	Kaolin.	Hornblende.	Pyrite.	Dolomite.	Total.
0.66	1.70	68.20	12.28	1.20	1.70	0.30	4.62	0.30	9.63	100.54

This shows over 80 per cent. feldspar. The small quantity of orthoclase probably unites with some of the soda to form anorthoclase. Hornblende does not occur in the sections examined, and that shown in the norm represents minerals such as epidote, chlorite, and other secondary products.

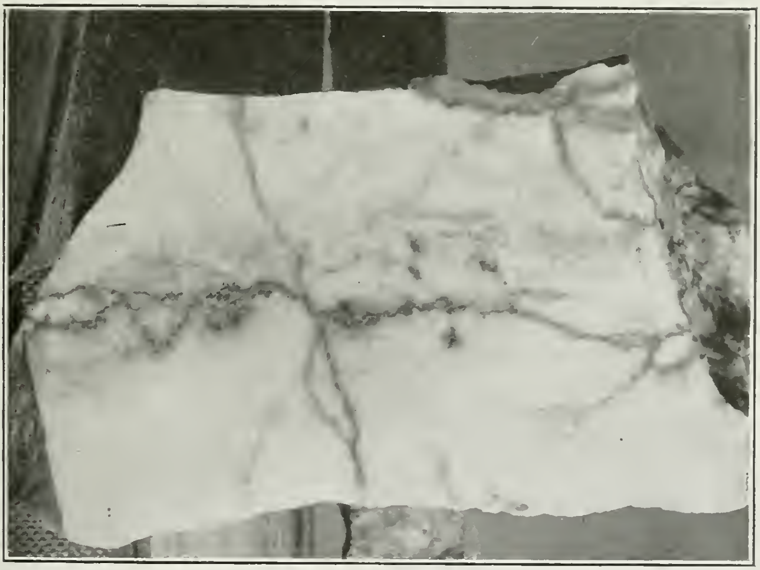
Augite Lamprophyre.—The other post-Huronian intrusive is basic in character. It is black and weathers with a pitted surface. On a fresh fracture it sometimes shows a faint purple shade. Parts of the rock show aggregates of secondary minerals which give it the appearance of having an amygdaloidal structure. This general character suggests rock of the Keewatin complex, but on a small point on the south shore of Elsie lake, near the west end, a narrow dike of this rock striking northeast cuts the greywacké. Other dikes of the same rock occur at points on the trail north to this lake, and some of these include fragments of Huronian in them.

On the north bank of the Blanche river in the township of Eby, augite lamprophyre forms the face of the high bluff for some distance. The contact is on the top of the ridge and near it the lamprophyre is brecciated and recemented by the same kind of rock.

Thin sections show numerous phenocrysts of augite set in a groundmass made up of needle-like feldspars and smaller augite crystals. Magnetite is scattered throughout in considerable quantity, also apatite. both as inclusions in the phenocrysts and the groundmass. Chlorite and epidote occur as alteration products. The augite is green in colour and occurs in well formed blocky crystals (Fig. 5 and 6). The feldspears are too small to be determined optically. The apparently amygdaloidal portions mentioned before are areas of secondary minerals, but they seem to be replacements of certain parts of the rock rather than fillings of vesicular spaces. The analysis of this type, and its composition as recast, are as follows:—

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	Na_2O	H_2O	Total.
52.29	19.38	4.40	6.00	3.54	7.79	4.12	2.12	0.95	100.52

Orthoclase.	Albite.	Anorthite.	Magnetite.	Chlorite.	Kaolin.	Pyroxene.	Total.
24.00	17.86	28.07	2.80	5.05	2.99	19.55	100.32



Photograph of quartz from the Swastika mine. Quartz shows dark streaks in crushed areas. Iron pyrite is abundant along the dark lines, along with visible gold. Length of sample, $3\frac{1}{2}$ inches.

Since the kind of feldspar could not be determined, the relation of augite to anorthite as calculated may not represent the true proportions of the rock.

Pleistocene and Recent

The Pleistocene is represented only by unsorted sands and gravels, and these do not exhibit great development in the area. Since Pleistocene time the streams have formed alluvial plains in favorable places along their valleys. The largest of these is along the Blanche river in concession V, Otto. In the swampy and marshy areas between the rock exposures peat has formed to some depth. South of the area, towards Round lake, the Pleistocene and recent deposits are a much more important formation.

Economic Geology

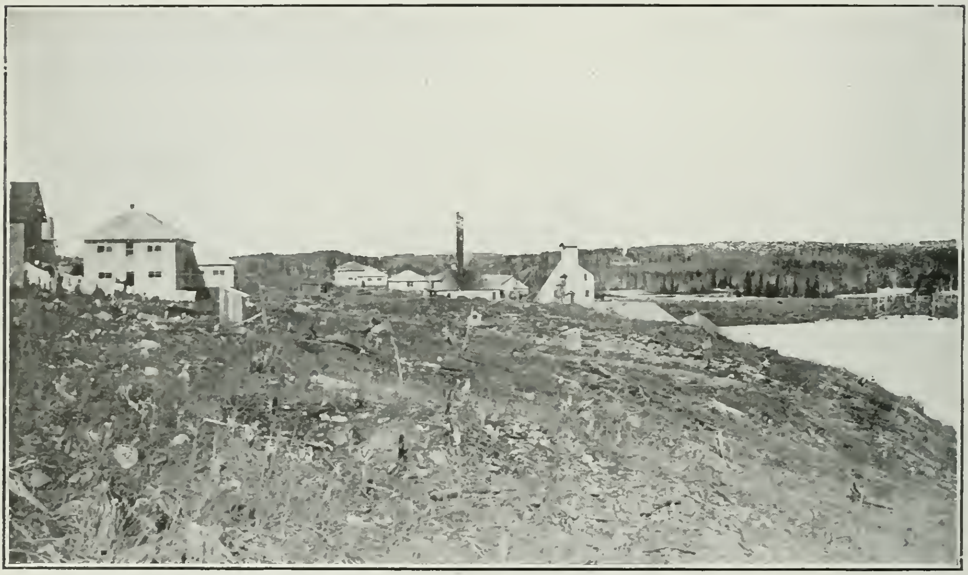
The rocky and broken character of the country makes it quite unsuitable for agriculture, excepting in the limited areas where streams have formed alluvial flats. Farther south, near Round lake, some farms have been taken up.

Fires have destroyed the original forest, but the part north of the Blanche river supports a considerable second growth, mostly of birch and poplar. This is rather light near the river, but becomes denser farther north.

Gold

Visible gold occurs in quartz veins in at least two parts of the district. One lies near Otto lake and includes the Swastika mine and the Reeves claim. The other lies east of Amikougami creek, on the Lucky Cross Mining company's claims.

The veins are of the usual rather lenticular type, as a rule with steep dips. The quartz is of the white crystalline variety, with dark streaks showing in it. A slight fracturing follows the first quartz deposition, and tiny veinlets of a more transparent



Swastika mine with Lucky Cross mine in the distance.

variety cut across the older quartz, like water lines on paper. Sulphides occur in the veins, as chalcopyrite and pyrite. The gold is very often associated with the sulphides or with the dark lines in the quartz, but occasionally is found in the clear quartz. On the Swastika claims the veins cut greenstone and gray feldspar-porphyry. On the Reeves and neighboring claims the wall rock is feldspar-porphyry and the rusty carbonate rock. The relationship on the Lucky Cross veins is similar to that on the Swastika. The porphyry is in small dikes and sometimes forms one wall, occasionally for a short distance both walls, of the vein, which does not seem to vary with change of country rock.

Veins of very similar physical characteristics are found in the conglomerate and greywacké, but, so far as known, no values have been found in them. It may be possible that they are of different age than the veins found in the Keewatin rock, or, if of the same age, the Keewatin rocks have favored precipitation of values where veins cut them. If the latter explanation is correct, it seems likely that the fracturing of the rock and deposition of the vein material and gold values is due to the post-Huronian intrusive rocks, and probably more to the acidic type than to the augite-lamprophyre.

Active Properties

The Swastika Mining Company has done most of its development work on three veins on the north side of Otto lake. The largest of these is eight to nine feet wide, striking north and south. This is intersected by two other veins, the smaller having eight to nine inches of quartz. Most of the ore already stoped has come from the large vein above the thirty-five foot level. The mine now has a three-compartment shaft down two hundred feet, the old shaft being used merely for ventilation. Considerable drifting has been done. A new equipment has been installed, consisting of two 125-horse-power Jenckes boilers, a 10 by 12 double drum hoist and a 12-drill Sullivan compressor.

On the Reeves claims north of Pike lake, two veins, eight and nine feet wide, have been stripped for a hundred feet or more. These veins strike N.E. and S.W., and are about fifty feet apart. In the larger of the two, visible gold occurs at its junction with the small quartz vein.

On the Lucky Cross claims visible gold was found first in a small vein that shows in the railway cut just east of Amikougami creek. North of the right-of-way this vein is about eight inches wide and carries visible gold in a band crossing the vein at an angle from wall to wall. Later prospecting has uncovered other veins north of this, one of which has a width of twelve feet. A plant including a 6-drill compressor has been installed.

The Homestead Mining Company has a vein in the rusty carbonate rock near the Huronian contact, on which they are driving an adit into the hill.

The observations on the area were made under the general supervision of Mr. A. G. Burrows, who spent a few days with the writer in the field. Mr. R. M. Smith acted as assistant during the season. Valuable advice and assistance in the petrographic determinations were received from Prof. C. P. Berkey, while the data were being worked up in the Department of Geology and Mineralogy at Columbia University.

CRIPPLE CREEK GOLD AREA

By W. R. Rogers, Topographer; and E. L. Bruce, Geologist

The Cripple Creek area referred to in the following report, comprising parts of the townships of Whitesides, Carscallen, Keefer and Denton, lies about twenty-five miles to the southwest of Porcupine. Township lines in this section, formerly unsurveyed territory, were run in 1910 by H. J. Beatty, O.L.S. During the same season a hasty geological examination was made by A. G. Burrows, assisted by E. L. Bruce, and a sketch plan showing the mapped area appeared in Mr. Burrows' report on the Porcupine Gold Area.

Renewed interest in the vicinity, coupled with the fact that the information regarding the lakes and canoe routes was very inaccurate, justified further topographical mapping and geological examination. Accordingly, a small party, consisting of A. Mahaffy, R. M. Smith, E. L. Bruce and W. R. Rogers, spent four weeks in the district during the summer of 1911. Reference to the accompanying map will show that some parts of the area were not examined.

Routes

Several routes starting from Porcupine offer means of access to the region. Motor boats run from Mattagami landing to Bristol landing on the Mattagami river. From the latter point a wagon road leads to the McAuley-Bridge claims four miles to the west. Trails are then followed into Carscallen and Denton townships.

The northerly parts of Whitesides and Carscallen may be reached by a trail leaving the Mattagami river at the south boundary of the township of Mountjoy and extending westward, following O. L. S. Niven's base line of 1899.

Prospectors with interests in Whitesides and Keefer, and in the unsurveyed areas to the southwest, canoe to a point 1½ miles above Wawaitin falls on the Mattagami river, from which a portage of 1⅝ miles leads to the Lost or Redsucker river. This river is ascended as far as Cripple creek, which enters about one mile west of the east boundary of Denton. The lower part of Lost river, through Thorneloe and Bristol, is a succession of rapids for 4½ miles, impossible for canoes going upstream, but affording an exciting trip down stream during high water periods. Cripple creek would be a misnomer were it not for the fact that canoes making the trip either up or down stream usually emerge from the ordeal in a crippled condition. Rapids are long and numerous, and in low water the boulder-strewn bed of the stream offers a very shallow and narrow passage.

In the west part of Thorneloe township the Lost river presents some rapids, which inexperienced canoemen avoid on the upstream trip by taking a longer portage route, leading from Joe Moore's cabin on Kenogamissee lake to the head of the swift water on Lost river. Reference to the map of the Porcupine gold area will show these several trails and canoe routes.

Drainage and Topography

The whole area is one of low relief, with few prominent features. The region is so level that excepting along the streams it remains undrained and swampy. The general elevation rarely exceeds fifty feet above the lakes. One notable exception is the conical hill in Denton, three-quarters of a mile east of the centre milepost on the west boundary of the township. Another prominent ridge lies between Turtle and Wallingford lakes, in the township of Whitesides. Both of these are rock exposures of Keewatin age. Lying between the valleys of the Kamiskotia and Lost rivers is a series of lakes. Of these the three largest, Jowsey, Dana, and Star, find their outlet in Cripple creek.

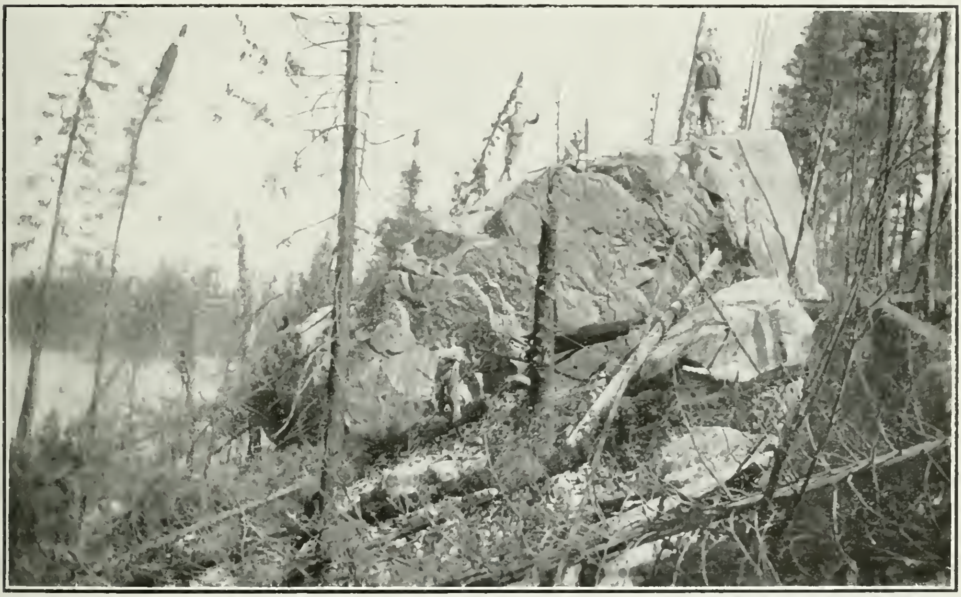
The following elevations are based on T. & N. O. railway surveys:

Kenogamissee lake, 1,008 feet above sea level.

Otter lake, 1,116 feet above sea level.

The elevations of other lakes included in the four townships are aneroid and hand level determinations based on the railway datum:

Redsucker river (at end of portage leading to Kenogamissee lake), 1,015 feet.
Carlton lake, 1,055 feet.
Sedge or Mud lake, 1,060 feet.
Star lake, 1,065 feet.
Dana lake, 1,075 feet.
Jowsey lake, 1,080 feet.
Turtle lake, 1,085 feet.
Levalley lake, 1,065 feet.
Opishingquaqua lake, 1,050 feet.



Large erratic boulder of gray granite, south bay of Star lake.

This particular section is distinctly glacial in character, with a very imperfectly developed system of drainage. Though water is abundant throughout the area, the valleys of the smaller streams are shallow and ill-defined. The lack of systematic relation between ridges and hills on the one hand and stream valleys on the other indicates drift rather than rock formation. In addition, the marshiness of certain tracts at relatively high elevations shows that the physiography was not shaped primarily by the erosion of running water.

Special phases of ground-moraine topography are everywhere in evidence. Numerous examples of *drumlins*, elliptical hills formed from glacial débris, may be seen on the west shore of the southwest arm of Star lake. These are elongated in the direction of the ice movement, a few degrees west of south, and present steep ends at their northern limits.

On the east shore, opposite the drumlins, a ridge of glacial formation paralleling the shore line presents a striking appearance. The hog's back has been burnt over, exposing to view numerous erratic boulders of massive proportions. They are mostly of gray granite formation, and probably have not been moved very far by the glacier

The accompanying illustration shows one of the largest of these, having approximate dimensions of 15 x 20 x 30 feet.

Dana lake owes its irregular outline to long north and south ridges of glacial sands and gravels. A typical esker splits the south part of the lake into two arms. This narrow curving ridge, formed of glacial detritus, is cut transversely by the Whitesides and Keefer boundary. The lake itself, a beautiful sheet of exceptionally clear water, island-studded and forest-bordered, stands out in pleasing contrast to most of the other lakes of the locality, which in general have low-lying and fireswept shore lines, presenting a desolate and uninviting appearance.

In addition to the undeveloped drainage between lakes of this chain, the streams that exist are very small in comparison with the size of the lakes. It is quite probable that a large part of the drainage from lake to lake is accomplished by seepage through the narrow sand and gravel ridges that separate them.

Lost river has a drainage area about equal to the Grassy. Both are tributary to the Mattagami, and join it from opposite directions in the southeast corner of Ogden township. The Kamiskotia is not as large a river as either of the above mentioned, but presents the same general characteristic common to nearly all streams in Archean

Pine grove, east side of Star lake.

areas, that is, the alternation between long lake-like expansions with little current and short contracted portions accompanied by heavy rapids and falls, thus affording good stretches of navigable water, with portages between. Opishingquaqua lake is simply an expansion of the Kamiskotia river.

Through the township of Whitesides the Kamiskotia affords poor canoeing, owing to a series of falls and rapids. The greatest fall is 26 feet at the chutes near the centre of the township. This same low east and west ridge also appears on the Lost river in Thornloe and Bristol, at Wawaitin falls on the Mattagami, and at the falls of the Grassy on the Price and Fripp boundary. As yet none of these rivers have eroded valleys, and only in a few places have they cut through the glacial débris. As a result many of the rapids are difficult to run, owing to boulder-filled stretches of fast water.

Soil

The four townships are not promising from an agricultural standpoint. A great part of the overburden is either sandy, stony or swampy in character. The swamps and low land are generally found a short distance back from the waterways. They are heavily moss-covered and sometimes underlaid by a considerable thickness of peat, but more frequently with a bed of boulders. An occasional knoll of clay or sand projects through these poorly drained swamp areas. As stated elsewhere in the report, rock exposures are neither numerous nor extensive.

Fauna

Owing to fires the region is almost destitute of game. Beaver are numerous, however. Star and Dana lakes afford good fishing. Pike up to 30 inches in length were caught, and trout trolling is good in Dana lake in spring and fall. Pickerel and pike may be caught in pools below rapids on all the rivers.

Forests and Fires

Fires have destroyed the original forest over a large part of the area. The northern parts of Whitesides and Carscallen escaped the fires of 1910 and 1911, although an extensive old brulé exists to the west and north of Kamiskotia chute in the centre of Whitesides. The west part of Denton is almost entirely brulé of several years' standing. Fires were general throughout the region in 1910, but the most disastrous was that of July, 1911, which swept a considerable area in northern Ontario.

Spruce, jack pine, poplar and birch are the most common trees. The township outline surveyor in 1910 reported a fair stand of red and white pine west of Otter lake. This may have been destroyed in whole or in part in 1911, as that part of Keefer was not examined. Another grove of pine that has escaped is situated on the east side of Star lake. The illustration shows that this cut of about one-half million feet of lumber has had its fringes destroyed. Many of the trees in their struggle for life were pouring out pitch to heal the fire wounds. Scattered pine and smaller groves exist in other parts of the township of Whitesides.

Geology

Exposures of rocks are neither frequent nor very large. Hence the following divisions are made entirely on the character of the rock, no contacts having been observed between the more important formations.

GLACIAL AND RECENT:—

Peat, unsorted sands and gravels, and more or less sorted sands and clays.

Unconformity.

POST-LAURENTIAN:—

Diabase dikes.

Igneous contact.

LAURENTIAN:—

Gray granite. Reddish gneissoid granite.

Igneous contact.

KEEWATIN:—

Greenstones, schists, diabase and iron formation.

Keewatin

A few exposures of schist occur on the Redsucker and Cripple creek, but the rock shows only along the banks of the stream. In the western part of Denton, on and near the Godon claims, a considerable area of Keewatin rocks is exposed. They are typical greenstones, in places showing a marked banding, which strikes east and west. Keewatin rocks also outcrop in small areas on the boundary between Carscallen and Whitesides north of the four-mile post. A large hill lies just east of the four-mile post and extends for an undetermined distance eastward. It is composed of altered diabase, Another large exposure of greenstone forms the divide between Turtle and Wallingford lakes, in the township of Whitesides, and other smaller exposures occur near Green lake and Weisman lake. Forming the eastern shore of the latter is a ridge of rather fresh-looking rock. In thin section it is a granophyric intergrowth of quartz and orthoclase, with a little magnetite, sericite, and kaolin. It is not very badly altered and seems to be much later in age than the Keewatin series. No contact between it and other rocks was observed. A small exposure of banded iron formation occurs east of H.S. 1031 in the township of Carscallen. At the chutes of the Kamiskotia a rock that is mostly hornblende occurs. This is probably also Keewatin in age.

Laurentian

Two types of rock are referred to the Laurentian. One of these is a somewhat gneissoid red granite. In thin section it is granitoid in texture, consisting of quartz, orthoclase, microcline albite, and biotite, with secondary magnetite, kaolin and hematite. The biotite occurs as shreds, often bent and sheared. Small outcrops of this rock occur both east and west of Lost river on the south boundary of Denton.

The other type is a massive gray granite. Under the microscope it is very similar in structure to the red granite gneiss. The biotite, however, is in rather larger shreds and is not bent or twisted. These two rocks were not found in contact with each other, and there were no rocks observed that seemed to be a transition of one to the other.

The gray granite outcrops near the centre of the four townships. A considerable exposure of it occurs on the south side of Cripple creek, west of the point where the creek from Carlton lake joins the main stream. Other exposures occur on Carlton lake and on the claims east of the lake. It also outcrops on Jowsey, Sedge, and Dana lakes, and at several places along Cripple creek.

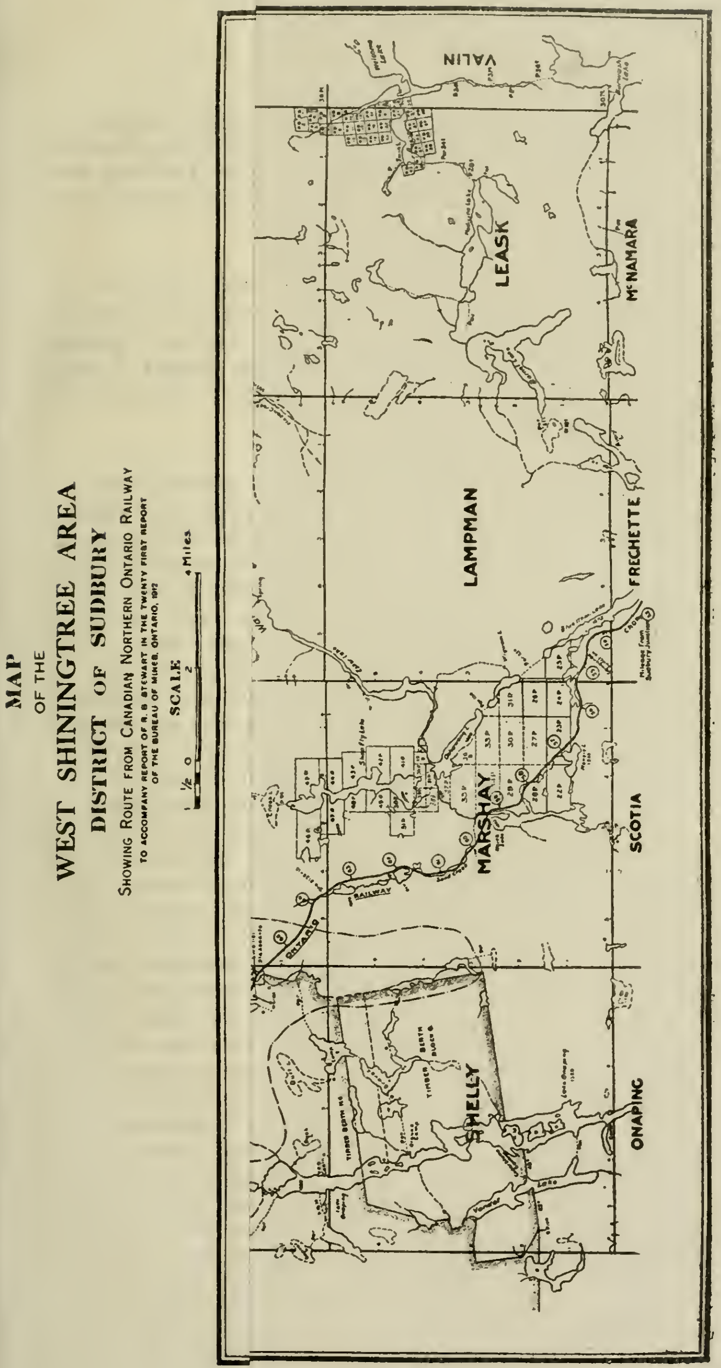
Post-Laurentian

Cutting the Keewatin rocks and the granites are many diabase dikes. These are usually less than a chain in width and almost invariably strike north and south.

On the lower part of Lost lake are several outcrops of a fine-grained, massive rock, which is of sedimentary origin. It has been very much altered, however, and its appearance suggests its correlation with the Temiskaming series.

Economic

Quartz veins occur both in the rocks of the Keewatin age and in the gray granites. So far as could be found, none of any size have yet been discovered in the red gneissoid granite. Roughly, the strike of veins both in the Keewatin and the granite is east and west. The quartz of the veins in the greenstones has a distinctly bluish tinge, while that in the veins in the granite is white. Assay values are obtained from both types, and visible gold is said to occur. Pyrite is found quite plentifully. The veins in the Keewatin are of the usual lenticular type. Those in the granite, while more regular, are usually narrow, seldom exceeding six inches of quartz, with a band of rusty rock three or four inches wide on either side. Often there are three or four narrow stringers parallel to each other. Near the northeast corner of Whitesides a vein was observed one wall of which is a dike of diabase. The vein is apparently later than the dike.


MAP
OF THE
WEST SHININGTREE AREA
DISTRICT OF SUDBURY
SHOWING ROUTE FROM CANADIAN NORTHERN ONTARIO RAILWAY
TO ACCOMPANY REPORT OF R. B. STEWART IN THE TWENTY FIRST REPORT
OF THE BUREAU OF MINES, ONTARIO, 1912
SCALE
4 Miles
VALIN
LEASK
McNAMARA
LAMPMAN
FRECHETTE
MARSHAY
SCOTIA
SHELLY
ONAPING
RAILWAY

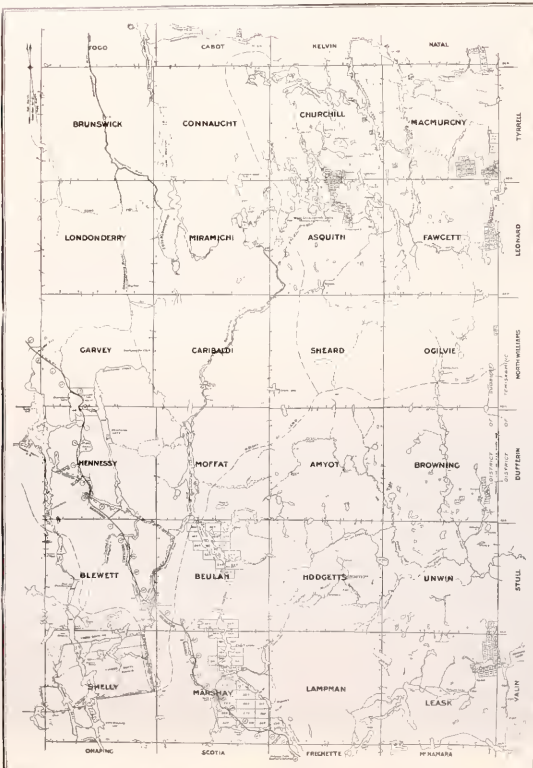
MAP

OF THE

W[illegible] HININGTREE AREA

DISTRIC[illegible] SUDBURY

SCALE



WEST SHINING TREE GOLD DISTRICT

By R. B. Stewart

Late in August of 1911 the writer was instructed by the Provincial Geologist to proceed to the West Shining Tree District, where discoveries of gold had been reoprted from time to time in the daily press, and to make a brief examination of the geology of the district and the character of the deposits.

Location of the District

The area visited is situated in the Sudbury Mining Division, and includes the townships of Asquith, Churchill, MacMurchy and Fawcett. Wasaquagama or West Shining Tree lake, near which discoveries of gold were first made, lies in the townships of Asquith and Churchill. It is about 70 miles north of the town of Sudbury, 60 miles south of Porcupine, and 20 miles southwest of Gowganda.

Route to West Shining Tree Lake

West Shining Tree lake was reached by the Canadian Northern railway from Sudbury to Gowganda junction on Blue lake, and by canoe the rest of the way. From Gowganda junction the railway diverges from the canoe route, but parallels it in a general way, for about twenty miles, being never more than four or five miles distant. At the time the trip was made the railway beyond Gowganda junction was under construction. When a train service is established farther along, ingress to the district will be much easier.

The railway station at Gowganda junction is located about ten chains from Blue lake, which is a narrow body of water with steep banks, and extends in a northwesterly direction for nearly four miles. From its north end a portage of 55 chains, across a sandy plain with a steep ridge of sand running east and west, leads to Wigwam lake, and a portage of 15 chains connects the latter with Oshawong lake. This lake is one and a half miles long, and from the north end a portage of 14 chains joins it with Shoo Fly lake which runs almost north and south, and is about three miles in length. A nine-chain portage leads to Cross lake. From this lake a portage of one mile running north reaches the first of a series of four small lakes or ponds connected by short portages. All these extend in a northerly direction. The last of the small lakes is joined to Meteor lake by a portage of twenty chains. This lake is nearly three miles long and extends northwest. A portage of six chains over a gravel ridge at its north end connects it with Opickinimika lake, which extends north for almost six miles. The Opickinimika river flows from the north end of the lake, and the route follows the river until near the centre of the west boundary of the township of Asquith, a distance of about twelve miles. Leaving the lake, the general direction of the river is northeast for 8 or 9 miles, when it turns almost at right angles to the northwest. About one and a half miles from Opickinimika lake, a lift-over avoids a small rapids, and a short distance farther a portage of thirteen chains passes a falls forty feet in height. Below the falls there is a stretch of three or four miles of good paddling, but in the next two miles frequent rapids occur. The bed of the river at these places is covered for the most part with rounded boulders. At the time the trip was made the water was so low that it was necessary to wade the rapids and in some places to remove the load from the canoe in order to pass in safety. A short distance below the rapids the river turns to the northwest. About three miles below the bend the route leaves the river on the east side by a portage of 30 chains over low marshy ground into Allin lake. A portage of twenty chains connects this lake with a small one to the northeast. From here another portage of 20 chains leads into a small creek flowing north into West Shining Tree lake.

Topography

The route to West Shining Tree lake from Gowganda junction, as far as the north end of Meteor lake, passes through a level country heavily covered with sand and gravel. The only rock exposures that were observed in this distance are on the east shores of Blue and Oshawong lakes. A full description of the district traversed by this portion of the route is to be had in Dr. Coleman's report[1] on the placer claims that were located around Shoo Fly and Meteor lakes several years ago.

The portage betweetn Meteor and Opickinimika lakes crosses the height of land between tne waters flowing towards the Great Lakes and those tributary to the rivers flowing into James bay. The route continues through the territory draining northwards until the portage leading northeast from Allin lake is reached, when it passes into the basin of the Montreal river. The country along this portion of the route is of a level nature, but the rocks are exposed in several places.

The area around West Shining Tree lake is one of low relief. No prominent elevations occur, but the general level of the country is well above the numerous small lakes of the district. The area for the most part is not heavily drift covered, but owing to the level nature of the ground the rocks are not exposed extensively except in parts that have been burnt over.

The forest growth is chiefly spruce, jack-pine, balsam, birch and small cedar.

West Shining Tree Lake, from which the district derives its name, is a very intricate body of water with low shores that are wooded to the water's edge. The lake drains northwards into lake Okawakenda.

Geology

With the exception of the rock exposures on Blue and Oshawong lakes which have been described by Dr. Coleman,[2] no outcrops were observed along the route to West Shining Tree lake until the north end of Meteor lake was reached, where granite was found. Outcrops of granite occur along the route until the small lake south of West Shining Tree lake is reached, where a hornblende schist occurs that appears to form a contact zone between the granite and the Keewatin rocks extending northwards. The granite area extends eastward, as granite was found on the east side of Granite lake, and northward down the Montreal river about a mile from the portage leading from Granite lake. Continuing east from this lake by way of the Montreal river across the township of Fawcett, granite outcrops were found at intervals until near the first small lake on the route to Shining Tree lake, where rock considered to be Keewatin greenstone was observed.

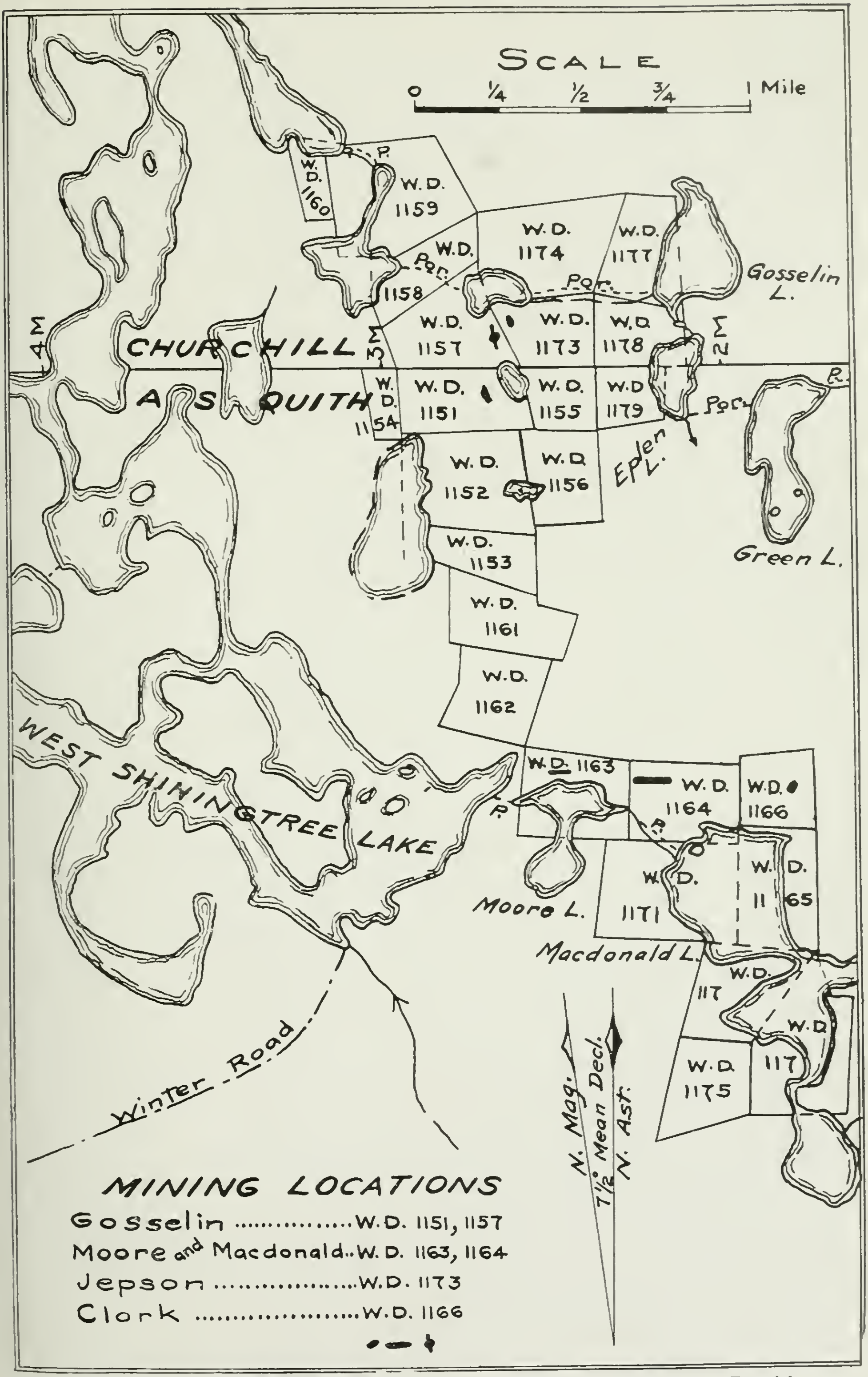
The area around West Shining Tree lake is underlain with rocks of Keewatin age cut in several places by diabase of a later age. The former extend north to Lake Okawakenda and along the north shore of the latter lake to Lake Michikawakenda where they occur along its eastern side to the Montreal river. Outcrops of similar rocks were found across the township of MacMurchy by way of Beaver creek and Shining Tree creek as far as Shining Tree lake.

These rocks may be described in a general way as greenstones and altered diabases, occurring in massive and schistose forms together with relatively small areas of porphyry, felsite and syenite. The felsites may include altered rhyolites and acidic tuffs and the greenstones may include basalts and andesites. It is difficult to give some of these highly altered rocks specific names. The schistosity has been developed locally in zones that have a general east and west direction, probably in the majority of cases running a few degrees north of east. The dip in most cases in nearly vertical. These shear zones are, as a rule, more mineralized than the massive rock, and are often accompanied by numerous quartz stringers.

Carbonate Rocks

In several parts of the district the rocks contain carbonates, which in some places compose the greater part of the rock. Iron carbonate must be present in considerable

[1] Bur. Min. Vol. X. (1901), p. 151. [2] Bur. Min. Vol. X. (1901), p. 151.



Key plan showing surveyed mining locations in the vicinity of West Shining Tree lake.

quantity, as the weathering of the carbonate-bearing rocks forms a great deal of rusty material. These rocks vary in colour from dark to light green and effervesce with acid. Good examples can be found on W.D. 1166, north of MacDonald lake. This association of carbonates with Keewatin rocks occurs in many places in northern Ontario. Mr. Burrows describes similar rocks at Porcupine in his report[3] on that district, and also quotes from various writers who have observed them in other localities.

The greenstones of the region vary greatly in appearance, but it is very difficult to work out definite relations. The rock on the portage between MacDonald and Stewart lakes was taken as typical of the area around West Shining Tree lake and eastward to the Montreal river. It is a rather soft rock of grayish green colour. A section under the microscope shows that it consists largely of fibrous hornblende, chlorite and saussurite, with an indistinct ophitic texture.

The relation of the felsite, porphyry, and syenite, referred to above, with the other rocks was not worked out, but they are probably of a later age. All the outcrops of these rocks that were found occur just east of West Shining Tree lake.

A good example of the felsite can be found on the shore of West Shining Tree lake at the end of the portage to Firth lake. It is very fine grained and light coloured, and weathers white under the moss. It consists of quartz and feldspar, some of the latter shewing albite twinning lamellae. Considerable sericite is present.

A small outcrop of granite porphyry occurs on the west side of W.D. 1163. In consists of quartz, feldspar and sericite. A few micrographic intergrowths of quartz and feldspar surround some of the larger phenocrysts of quartz and feldspar. The rock has been crushed in some parts.

On the north side of the portage from Speed to Gosselin lakes an outcrop of syenite occurs that extends several chains. It consists dominantly of feldspar, part of it showing albite twinning lamellae. The quartz is subordinate. A similar rock can be found on the south side of W.D. 1156, five chains from the No. 3 post.

Quartz porphyry occurs in several places. An outcrop running in a northeasterly direction is to be found crossing the eastern side of W.D. 1159, a few chains north of the southeast corner. Distinct phenocrysts of quartz and feldspar show on the weathered surface. These are contained in a fine grained ground mass.

Diabase

Dikes of fresh looking diabase cut the older rocks in several places in the district. A fresh looking quartz-diabase occurs at the south end of the small lake just east of West Shining Tree lake on the boundary between Asquith and Churchill.

An outcrop of iron formation is to be found at the fire rangers' cabin on the west side of Michikawakenda lake. An impure reddish iron ore is interbanded with a slaty rock. These bands are narrow and appear on the horizontal surface. They have been thrown into angular and rounded folds. Farther to the south greywacké slates are found in a vertical position.

The occurrence of the iron formation in this territory was reported by Mr. Burrows[4] who observed it near the north end of Shining Tree lake in 1896. At a later date Dr. Coleman[5] examined the geological relationship of the iron formation in the same area.

Mining Claims

Many of the claims have been located on the east and west shear zones which often contain numerous stringers and small veins of quartz, some of which carry visible gold. A great deal of rusty decomposed material is found in these zones, due to the weathering of the pyrite and carbonates that occur in the schist. Gold, in a state of fine division, can be panned from this rusty material in some places. This gold has probably been associated with the pyrites, as a quantity of pyrite crystals picked from the rock on one property, showed on assay a small quantity of gold. Several of the larger veins seem to be associated with the more massive rock, but even these are accompanied with considerable rusty schistose material.

[3] Bur. Min. Vol. XX. (1911). [4] Bur. Min. Vol. VI. (1896), p. 167. [5] Bur. Min. Vol. X. (1901), p.181.

The claims in two localities were attracting attention at the time the writer was in the district, namely those situated immediately east of West Shining Tree lake, and those in the southwest of the township of MacMurchy, near where the outlet of Michikawakenda lake enters the expansion of the Montreal river. The general character of the country rock appeared to be similar in the two localities, but the area immediately east of West Shining Tree lake contains felsites and porphyr'es that were not observed in the vicinity of the claims located near the Montreal river. The rocks of the latter locality are probably more massive than those farther to the west.

At the time the writer was in the field very little work had been done on any of the properties, so that it was impossible to get very definite information regarding the extent and nature of the deposits.

Gosselin Claims

This property comprises several claims on either side of the boundary between Asquith and Churchill, just east of the 3-mile post. On the northeast corner of W.D. 1151, stripping revealed several masses of quartz containing visible gold. The quartz showed continuously in places for 30 or 40 feet and was 10 to 18 feet wide. It is associated with a felsitic rock that weathers white on the surface. This rock extends east three or four chains to the shore of a small lake. Here quartz stringers cut the felsite in a very irregular fashion and, in places, constitute about one-half of the rock. In other places near the lake this rock is free from quartz and has a schistose structure.

On W.D. 1157, about three chains north of the township boundary, near the east side of the chain, an extensive outcrop of quartz occurs. Stripping showed the quartz at intervals for six or seven chains running in a northwesterly direction. Where the most stripping had been done the quartz was exposed continuously for 2 chains, running northwest, and about 10 feet wide. From the south end of this showing, a trench running west exposed quartz with some schist for seventy feet. Gold was seen in the quartz about 10 chains from the township boundary and close to the east line of the claim. Just east from here on W.D. 1173 several irregular quartz masses have been stripped. The largest one is about 45 feet in length and averages about 12 feet wide.

The felsite found on W.D. 1151 extends northward into W.D. 1157 for about three chains and contains some quartz, but most of the quartz on the latter claim is contained in a much decomposed greenstone, schistose in places and weathering very rusty.

These claims have the most extensive bodies of quartz so far found in the district and have attracted considerable attention. Gold was first discovered in the district on this property.

The Clark Claims

These claims are situated north of MacDonald lake. On the one examined (W.D. 1166) a mass of quartz and carbonate rock rises about 15 feet above the surrounding level. The outcrop has been stripped along its north and east sides for about four chains. The carbonate rocks occurring here vary in colour from dark to light green and contain a great many crystals of iron pyrites. Judging from the great quantity of rust found here siderite must be the predominating carbonate. The darker coloured rock has a schistose structure. A thin section under the microscope shows it to be composed largely of carbonate with another mineral having the optical properties of sericite. In this section the lighter coloured rock is seen to consist almost wholly of carbonate with a little quartz and sericite. It is said that gold can be panned from the rusty material that occurs abundantly on the property.

A ridge, of a granite-like rock three chains wide, crosses the north boundary of this claim about seven chains from the northeast corner. This rock resembles that found on the portage between Speed and Gosselin lakes, which has proven to be a syenite.

Moore and MacDonald Claims

These claims (W.D. 1163 and 1164) are situated north of Moore lake. On W.D. 1164 a zone of decomposed rusty schist with quartz stringers can be traced for nine chains running east and west. Its width is over 50 feet. The schist contains considerable pyrite and carbonate material. The quartz veins are 10 inches wide in places, but the total quartz would make up only a small part of the sheared zone.

On W.D. 1163 a similar zone with white quartz stringers has been located for several chains. This may be a continuation of the mineralized zone in W.D. 1161 What is apparently the same lead has been located on the claim west of W.D. 1163.

Gold has been reported to occur in the schists on these properties.

The Cryderman Claim

This claim (2331) lies southwest of the Moore and MacDonald claims on the shore of West Shining Tree lake. On the property a zone of very rusty decomposed schist 70 to 80 feet wide has been stripped for 150 feet. Bluish quartz stringers are associated with the schists, which contain a great deal of iron pyrites. The decomposed material gives on panning considerable finely divided gold.

The Jefferson Claim

This claim (2504) is located in the southwest part of MacMurchy where the outlet of Michikawakenda lake enters the expansion of the Montreal river. A quartz vein striking in an easterly and westerly direction and dipping to the north runs up the side of the shore which is 50 or 60 feet high at this place. The vein is three or four feet wide and can be traced for about two chains, but pinches out in two places in this distance. A good deal of rusty schist with small quartz stringers lies alongside the main outcrop. The surrounding rock is more massive than on many of the claims. The quartz is white with a good deal of iron rust formed from the oxidation of the pyrite. Free gold was found about the centre of the outcrop, occurring in fine particles, well distributed throughout the quartz.

Seville Claim

This claim (2536) is west of Jefferson's. The outcrop consists of several irregular masses of quartz associated with a rusty schist containing many quartz stringers. These quartz masses are five feet wide in places, and seem to extend in a westerly direction, but are not exposed for more than forty feet. No free gold was found on this property, although the quartz and surrounding rocks appeared to be almost identical to those found on the Jefferson property. The rocks on this claim are in the main massive, but a pronounced schistose structure is developed in places. A section of the schist from this claim shows it to consist of calcite or dolomite, chlorite, sericite and clear grains of quartz and feldspar. It may be termed a green calcareous schist.

Caswell Claims

These claims (2532 and 2542) are located just above the portage between Michikawakenda lake and the Montreal river. On 2532 there is a zone of rusty schist striking a little north of east. This had been stripped fifteen feet across for a distance of over 30 feet. Many quartz stringers occur which follow the strike of the schist. Free gold was seen in the largest of the quartz stringers.

On the claim 2542 another zone of weathered schist with quartz stringers occurs. Its general direction is a little north of east. This zone is over 20 feet across and the quartz shows in places from one to two feet wide.

McIntyre Claim

This claim is southeast of Jefferson's a short distance. No work had been done on the property. The quartz in one place was apparently about 20 feet wide, but did not maintain this width far. Smaller outcrops can be traced west from the main one for four chains. The surrounding rock is shattered, but not very schistose. A thin section shows it to be a fine grained greenstone of basic composition, consisting of hornblende, plagioclase, leucoxene, chlorite and quartz. A vague ophitic texture would seem to relate it to the diabases.

Conclusion

The geological features of the West Shining Tree district resemble those of the Porcupine gold area. Keewatin rocks, massive and schistose, predominate in both districts, and it is in these rocks that veins and irregular masses of quartz carrying gold are found. The carbonate rocks occurring in the Porcupine area have their equivalents in the West Shining Tree district, and felsites or rhyolites and porphyries are common to the two areas

Gold is widely distributed in the quartz of the district, but in most places the quantity is small. Gold was observed on four properties, and assays of seven samples of quartz taken from as many claims showed no gold in one and values ranging from 40 cents to $6.00 to a ton in others. Two of the samples that came from properties where the quartz was several feet in width assayed $1.60 and $2.80 to the ton. Development work may, of course, bring to light richer ore bodies.

A great many of the quartz veins that have been located are small and irregular, and the large quantity of rock that will necessarily be removed with the quartz in mining operations, will lower the grade of the ore. The occurrence of one apparently extensive body of quartz with visible gold in several places, and the general distribution of gold in the district are encouraging features, and seem to indicate that the small amount of systematic prospecting and development work that has been done so far is not proportionate to the possibilities of the area.

Two maps accompany this report. The large one includes the West Shining Tree district and territory adjacent on the south and west in order to show the canoe route from Gowganda Junction, and also to give the location of the Canadian Northern railway. All the surveyed mining claims of which information is available are shown on the map. The small map shows the location of the surveyed claims east of West Shining Tree lake.

In closing, the writer wishes to express his thanks to Mr. C. W. Knight who made the microscopic examination of the rock sections, and to Mr. W. R. Rogers for the preparation of the maps.

NOTES ON McARTHUR TOWNSHIP

By P. E. Hopkins

McArthur lies three townships south of Tisdale in the Porcupine gold area. It can be reached by trail directly south from South Porcupine following the township boundaries; or by canoe up the Mountjoy river via Mattagami Landing. The latter route was opened in August, 1911, by the prospectors and used for bringing in their supplies. Much cutting of logs and clearing of log jams was required in order to make the river navigable, but it will be necessary to repeat the work another season.

Map of McArthur township, showing geology.

The topography of McArthur is one of low relief, broken by low hills and ridges from 25 to 60 feet high. The most striking feature is the serpentine hill about the centre of the township rising to a height of 230 feet above Mountjoy river, which lies at the foot on the western escarpment. Adams township, immediately to the north, is comparatively level or slightly rolling in character, consisting mostly of sand, with its forest completely destroyed by fire.

Claims were staked for gold in the southeast part of McArthur in the spring of 1911, but little work other than trenching had been done in October, 1911, when the area was examined The classification of the rocks is shown in the legend of the map.

Geology

The oldest series, the Keewatin, outcrops very extensively in the southeast quarter of the township. The rocks consist dominantly of hornblende schists, which in many places are altered to serpentine. In the centre of the township is a high ridge of serpentine with an elevation of 230 feet, which shows glacial striae 40 degrees east of north. Other Keewatin rocks are greenstones, iron formation, porphyries, and carbonate rocks filled with a network of intersecting quartz veinlets. The largest body of iron formation is on the trail about one mile east of Triple Lake, and consists of banded silica and magnetite, some bands of which are an inch in width. The quartz-feldspar-porphyry between the first and second mile post on the south boundary is fine-grained, brownish in colour, greatly altered, and may be called a granophyre. About one-half mile east of Triple lake is an adesite-porphyry. In this section the groundmass shows small phenocrysts of andesine and quartz in a fine groundmass of quartz, chlorite, feldspar, sericite, and calcite. A flow structure is well indicated in the section. It is possible that porphyry and other pebbles were picked up during the flow, giving it a conglomeratic appearance. Some of the diabase may be of Keewatin age.

An expansion of Mountjoy river, showing a hill of serpentine, 230 feet high, in McArthur township.

The Laurentian, which occurs in a series of ridges about 30 feet above the surrounding country in the north half of the township, is a coarse flesh-coloured, hornblende granite. In the southwest there are many exposures of gray biotite granite.

The Temiskaming series, which occurs as a small belt in the centre of the township consists of fine slates and schists with a vertical dip and strike N. 10 degrees to 50 degrees W.

Diabase intrusives, varying from a few feet to 300 feet in width, other basic intrusives, and quartz-feldspar-porphyry dikes cut the Keewatin and Temiskaming series.

Economic

Gold

The gold-bearing rocks of McArthur belong to the Keewatin series. In these rocks occur quartz veins and porphyry dikes, both of which were reported to carry gold.

Gold was observed by the writer only in the quartz veinlets which intersect the seven-foot quartz-feldspar-porphyry dike on the Chouinard property, south side of Clear lake This vertical dike, which strikes 50 degrees east of north, outcrops in a steep face of serpentine on the lake shore; and grab samples taken gave low gold values. Several porphyry dikes, which may be offshoots from a granite mass, occur in this area. On the same property is a dome-like mass of quartz 150 feet long and 60 feet wide, a few samples from which gave only traces of gold. Closely associated with the large mass of quartz are dikes of porphyry which may be of later origin than the quartz, but the relatioship was not clear on account of so much drift.

At the two-mile post on the south line of McArthur in Bartlett township is the Hull claim, on which much visible gold was said to occur in a very narrow quartz vein in a fine grained felsitic rock which is in contact with hornblende schist a few chains to the west.

Agriculture, Forest and Water Resources

There are some level tracts of clay in McArthur and Adams capable of davelopment for agricultural purposes, but for the most part the soil is sandy. The township of Adams has been denuded of practically all forest growth by the fires of 1910 and 1911. However, some banksian and white pine, birch and spruce, still remain in McArthur in areas shown on map. The pine is from 1 to 2 feet in diameter, but the stands are small in area.

In Adams are three falls with drops of 28, 25, and 17 feet respectively, and one in centre McArthur with a fall of 24 feet, all of which are on the Mountjoy river.

Mr. W. R. Rogers made the surveys of lakes and streams shown on the map which forms part of the text of this report.

Mr. J. G. McMillan examined the geology of the country contiguous to the township of McArthur in connection with the T. and N. O. railway trial lines between Porcupine and Gowganda. A map showing the area accompanies his report which has been published by the Temiskaming and Northern Ontario Railway Commission.

GEOLOGY OF THE DETROIT RIVER AREA

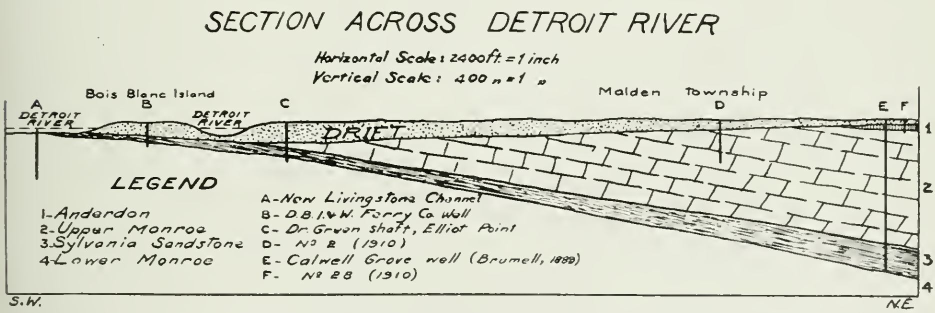
By Rev. Thomas Nattress, Amherstburg

Rev. Mr. Nattress, of Amherstburg, who has given considerable attention to the geology of the Detroit river area, has supplied geological cross-sections which are published with this volume, and the following notes to accompany the same:—

Anderdon Limestone Beds

In both the Amherstburg, Ont., and the Sibley, Mich., quarries, immediately associated with the Corniferous deposits and below them, are beds of limestone high in calcium carbonate, named in 1907 by Amadeus W. Grabau, who examined the rock at the instance of the State Geologist of Michigan, the Anderdon limestone beds. Up to that time the formation had not been recognized.

Forty drill cores, taken out to determine the extent of the deposit of Anderdon limestone in Anderdon and Malden townships, have disclosed a basin and a trough leading to it from the south, together containing the Anderdon beds. I have named this trough the Malden valley of Anderdon limestone, and have followed it up some 6,500 feet from a point in Malden township to where it expands into a basin, the central area of which is the Amherstburg quarry property.[1] The basin approximates 4,000 feet in diameter.



NOTE.—The section is a general one through Malden township, Essex county; Bois Blanc Island; and Detroit river. It is compiled from information derived from wells approximately in the line of section.

At the immediate base of the Anderdon is a rock of transitional character with a percentage of calcium carbonate from 60.56 to 69.04. The average percentage over a distance of two miles is 63.49. This transitional rock therefore contains a higher percentage of calcium carbonate than does the heavy-bedded dolomitic limestone which lies second above it and forms the base of the Corniferous.[2] This dolomitic rock contains about sixty per cent. of $CaCo_3$. Like it, the transitional rock appears to be almost fossil free.

Age of the Beds

Prof. Grabau has emphasized the Devonian affinities of these beds, while classifying them as Silurian. I have shown that these beds do not lie between two dolomites; that they rest upon a transitional dolomitic limestone which is Devonian in its chief characteristics; and that they are Devonian in chemical properties, containing as high as 99.55 per cent. of calcium carbonate; and whereas Grabau describes "the Monroe beds and underlying formation (as) all involved in slight folding which took place in post-Monroe and pre-Dundee times," I have shown the Anderdon limestone beds

[1] 13th Report Mich. Ac. Science, 1911.
[2] Corniferous—Dundee (Michigan)—Jeffersonville (Indiana)—Columbus (Ohio)—Onondaga (New York.)

occupying the synclinal space between two of these lateral folds. It would appear that the Anderdon limestone beds have been wrongly classified as Silurian, and that they are really of Devonian age.

Trenton-Sibley Area

Twenty-five drill holes were put down in the Trenton-Sibley area in the season of 1911, 20 of which penetrated the Anderdon beds; the other five were outside the limestone deposits and south of them.

In this area Anderdon material occurs in the same form as at the Amherstburg quarry, in basin formation. Its relation to strata above and below is the same as on the Canadian side of the river. Immediately below the Anderdon is a dolomitic limestone resting upon dolomite and outcropping beyond the outer edge of the Anderdon. Immediately overlying the Anderdon is the Corniferous (Dundee) with dolomitic limestone base, the Anderdon outcropping beyond the outer edge of this deposit.

Other Occurrences of Anderdon Limestone

Other occurrences of Anderdon limestone rock of the same quality and varied appearance as that of Essex and Wayne counties, are found along the Maitland river at Goderich; along Lake Huron north of Goderich, in the neighborhood of Kincardine and Southampton; at Cargill and at St. Marys, following along the north side of an arm of the old Devonian sea; and in the Thames valley between Ingersoll and Woodstock. It has also been identified immediately to the westward of the Columbus (Corniferous) outcrop on Marble Head, Ohio.

The small Canadian islands in the western end of Lake Erie show only dolomites and no trace of the Anderdon. If the Anderdon beds outcrop in Lake Erie, it will be along a line west of Pelee and Kelly's island, and east of Put-in-Bay island, Bass islands

Cross-Sections of the Detroit River

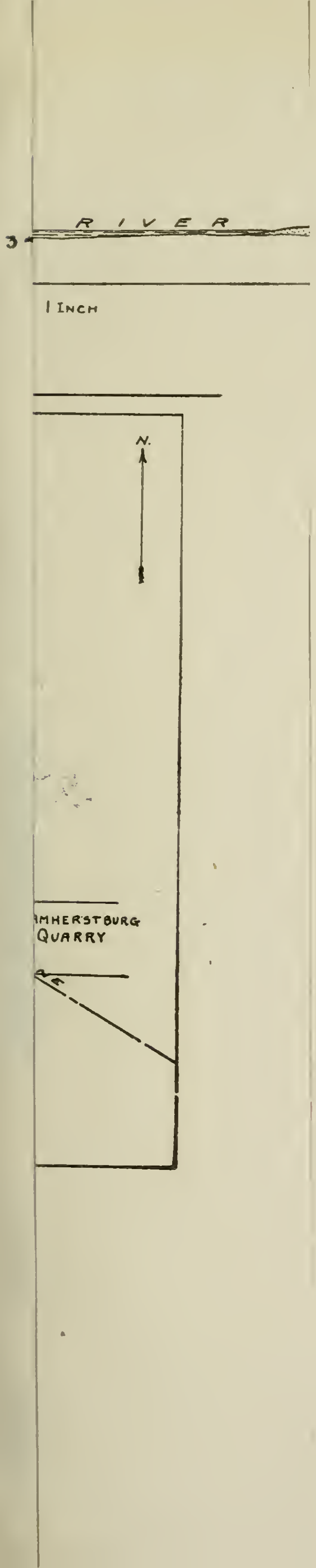
Amherstburg to Sibley

A cross-section of this area, from Amherstburg quarry on the Ontario side to the Sibley quarry on the Michigan side and including both of these, shows Anderdon and overlying Corniferous at each end of the section, with only the underlying domolites over the intervening distance. The depth of the boulder clay and other features are also shown. The direction of the cross-section is N. 57° W.; the distance 35,700 feet; the eastern end of the section 10,200 feet east of the east channel bank of the Detroit river, and the western end 6,000 feet west of the west channel bank.

The section shows that the beds occur in the form of gentle synclines at the Sibley and Amherstburg areas. But the vertical scale is six times the horizontal, so that these synclines are greatly exaggerated on the cross-section. As a matter of fact, if the section were drawn with the vertical and horizontal scales equal, the undulations or folds of the strata would be hardly noticeable.

Malden to Bois Blanc Island

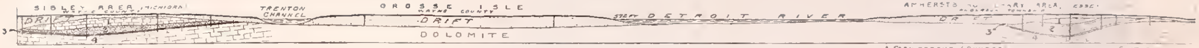
At a point west of the south quarter of Bois Blanc island and in the new Livingstone channel there was found to be a light deposit of Sylvania sand resting upon bedrock. This sand was scraped off by the dredges in clearing the bottom preparatory to drilling. There was no sand rock penetrated by the drills, only dolomite being found here. The Detroit, Belle Isle and Windsor Ferry Company's wells show a surface extension of Sylvania over the south quarter of Bois Blanc. Dredging in the river channel east of the island showed a Sylvania surface extending over the immediately adjacent river bottom. Two farms lie adjacent eastward. On one of these, the Patton, under forty feet of drift and one foot of shale, there is a 20-foot depth of Sylvania, described as consisting of 10 feet of loose white sand and 10 feet of sand rock. Below this 20-foot deposit the drill penetrated dolomite. South of this on the next farm in the Dr.



RIVER
3
1 INCH
N.
MHERSTBURG
QUARRY

SECTION ACROSS THE DETROIT RIVER

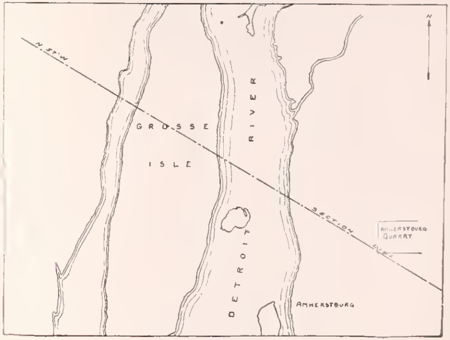
To accompany Report by Thomas Nattress in Part I of
The twenty first Report of The Bureau of Mines
—ONTARIO—
Hon W H Hearst, Minister of Lands, Forests and Mines
Willet G Miller, Provincial Geologist
1912



HORIZONTAL SCALE—2400 FEET = 1 INCH VERTICAL SCALE—400 FEET = 1 INCH

Note The vertical scale is six times the horizontal, thus greatly exaggerating the gentle synclines at both ends of the section

1 CORNIFEROUS (DUNDEE)
2 ANDERDON BEDS
3 DOLOMITIC LIMESTONE
4 DOLOMITE



MAP SHOWING POSITION OF SECTION

SCALE
0 1 2 MILES

Green shaft, at Elliott's Point, the drill was put down into the Sylvania some distance, under 44 feet of drift, blue clay and a gravel bed next the rock, and 25 feet of dolomite. Some 7,500 feet northeasterly from this is the Colwell Grove well,[3] the record of which shows 252 feet of limestone next above 60 feet of sandstone. The well was drilled in 1889, up to which time no distinction had been made in the records between limestone and domolite. In the immediate neighborhood of the Colwell Grove well is the number 28 well of my survey of 1910. This shows about four feet of Anderdon limestone under 12 feet of drift. Below the Anderdon 9 feet of transitional limestone rests upon dolomite. Neighbouring tests, wells Nos. 29, 27, 30, and 1 of the 1910 survey show similar deposits of Anderdon.

The Dry Cut Channel

Mr. Nattress also contributes the following notes on the geology of the "Dry Cut" part of new Livingstone channel now under construction by the U.S. Government in the Detroit river:—

Steam shovel in rockwork, also fast working drill invented for this contract.

Situation of the Cut.

The new Livingstone channel under construction by the United States Government, in Detroit river, reaches from Ballard's reef, north of the Lime Kiln crossing, out into Lake Erie about two miles beyond the Detroit river light house. From end to end it is thirteen miles in length. The purpose of it is to relieve the congestion of lake traffic by providing a channel for down-bound boats (the new one) and one for up-bound traffic. The work of construction has been contracted for in sections, of which the Stoney Island "Dry Cut" is one.

It has been called the "Dry Cut" for the reason that an area 5,750 feet in length has been enclosed within an earthen dam, unwatered, and the channel excavated in the dry. This was the method employed by the same contractors, Grant Smith and Company and Locher, in the construction of the new West Neebish channel of the Sault river.

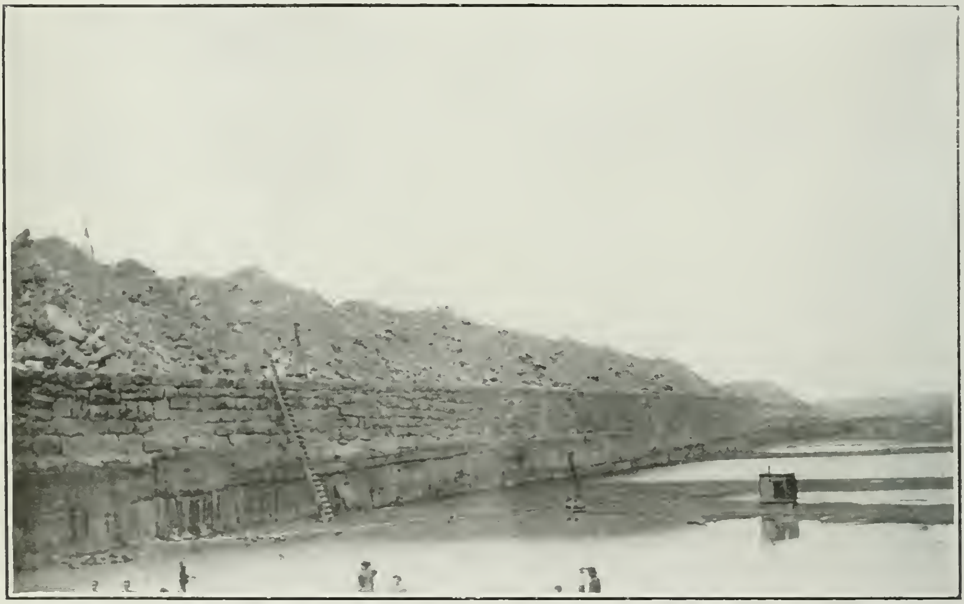
[3] Geo. Sur. Canada, Vol. V., 1889, part Q.

The rock cut constituting the new channel in this distance is 450 feet wide; the amount of rock removed 1,400,000 cubic yards, or over 3,000,000 tons; and the earth removed, over the south quarter of the distance, 160,000 cubic yards.

The Rock Formations Exposed.

It has been claimed by some of the American geologists that the rock over this area is Upper Monroe, or the uppermost Silurian—as hitherto recognized in southern Michigan and western Ohio. This is, however, questioned by such authorities as Professor Charles Schuchert, of Yale and Dr. Stauffer, of the Western Reserve University at Cleveland. The writer has also presented evidence, as published in the Michigan Academy of Science report of 1911, that it cannot be of later age than the Lower Monroe; and that the anticlinal formation is, along with Grosse Isle, the northern extension of the great Cincinnati anticline

The strata penetrated within the cut have been measured by Professor W. H. Sherzer, of the State Normal College, at Ypsilanti, for the Government of Michigan, along with myself, and found to total 102 feet in the distance of 5,750 feet The



Retaining wall at top of channel cut and in front of west dump, showing cap stratum of Stony Island anticline.

fossil-bearing strata are but few in proportion to the entire depth and number of strata cut through. The forms contained are, with the exception of *stromatopora*, but moulds and casts.

The division of the strata into faunal zones suggested by one student of the deposit is too general in character and not sufficiently exclusive; (1) the Coral Zone—the lower strata at the north end; (2) the Zone of *Cladopora bifurcata*—the middle beds; and (3) the Zone of Smaller Gasteropods.

The lower strata, (including the cap-stratum of the Stoney Island anticline, the first stratum below this, which is the lowest penetrated in the Cut; the bed above the cap-stratum, carrying but few forms; and the next above that, making four strata altogether;) are characterized by branching corals, spreading corals, and cup-corals, and may very properly be characterized as The Coral Zone. These beds carry also in abundance *Conocardium* and *Schuchertella;* also *Cyrtoceras*, *Dawsonoceras*, and *Loxonema* (the larger forms) coming in.

Cladopora bifurcata will be found too general in its distribution throughout the series to be impartially considered as marking a faunal zone.

The second zone (or middle zone of three) is characterized by *Panenka Canadenis;* a certain smooth surfaced, rare-occurring *Orthoceras;* the larger gasteropods, and the *Prosserellas*— which latter continue on up through the strata. The smaller gasteropods are also coming in.

The third faunal zone is very well described as the zone of smaller gasteropods. There are, however, three several horizons of smaller gasteropods; the lowest associated with the larger gasteropods; the second (or middle,) 8 to 14 inches in thickness of deposit, is crowded with these forms; and the third, or upper, 4 to 5 inches in thickness. The *Prosserella* continues. So also does *Cladopora bifurcata,* in ill-preserved condition toward the south end of the cut. *Clathrodictyon ostiolatum* is an outstanding feature of this zone. There also occurs the flattened imprint of something that suggests *Cyrtoceras.*

Stony island "Dry Cut"—a general view taken from the north showing one of the three steam shovels at work with dump skip lowered alongside

Physical Features of the Deposits

The deposits that have been thought to be sand are impregnated with strontianite in minute crystals that have, for the most part, dissolved out. I do not suspect silica. There does not seem to have been either an in-shore or an immediately off-shore influence at work in the depositing of rock material hereabout. A probable explanation of the heavy-bedded and largely non-fossiliferous strata in the Silurian rock penetrated in the cut is rapid deposit of rock material in deeper water whereas the fossil-crowded interbedded strata mark periods of comparative uplift and shoal water, and of slow deposit of rock material.

The crystals that characterize the strata penetrated within the "Dry Cut" are sulphate and carbonate of strontia, scalenohedra of calcite, calcite seams of minute dog-tooth crystals, and—in cavities within nodules and in hollowed cores of *Clathrodictyon ostiolatum*—minute quartz crystals.

There are shales, thin, and usually—though not always—more or less bituminous, at some half dozen horizons; and considerable thin-lined, apparently open sea, and very shallow sea deposits.

Ripple marks, varying in characteristics, were noted at several horizons, and at two in particular which suggest the varying influence of the lapping sea. It is just possible that the apparently—though only apparently—concretionary deposits at two horizons are explainable by reference to wave action, very gentle, uniform, and of long continuance without appreciable variation.

Toward the south end of the "Dry Cut" the anticlinal formation falls away to the synclinal, which, of shallow depth, extends along the west side of Bois Blanc island almost to its foot where another anticlinal south-to-north billow is developed.

Very heavy erosion has taken place along the east side of the cut toward the south end, and a correspondingly deep deposit of boulder till left. This is now thought to be Illinoisan till. On the opposite side of the cut the glacial striæ are well defined and do suggest, in direction, the Illinoisan movement.

All of the original contract width of cut, 300 feet, is, at the north end, in Canadian water. So also is nearly, if not quite, the entire length of the dry cut on its east side. The west side of the completed 450-foot cut is probably altogether in United States water. The new channel will be lighted by pairs of permanent light-houses throughout the whole length of deep rock cuts, and most of these lights on the east side of the channel will be in our waters.

Cross section of earthen dam between upper and central parts of unwatered area, showing the main conduit conveying air from compressor plant.

Islands in West End of Lake Erie

The following notes on the geology of the smaller Canadian inlands in the west end of Lake Erie are likewise by Mr. Nattress:—The smaller Canadian islands in the west end of Lake Erie have not hitherto been reported upon geologically and though charted, are scarcely recognized as Canadian territory. The geological map of Ontario suggests by proximity that they may be Devonian and Corniferous. The geological map of Michigan suggests that they might be of the age of the uppermost Silurian dolomites. The Ohio map suggests with almost a certainty that they must be Lower Monroe, and that they may be Clinton or Niagaran.

Amid this uncertainty, and on the lookout for the high-grade limestone beds to which Professor Grabau has given the name of the Anderdon Beds, I chartered a tug on 31st July and made the tour of these islands.

North Harbor and East Sister Islands

On North Harbor island, some twelve miles off shore from the mainland of Essex county, there is a heavily glaciated surface of about an acre in extent of very compact dolomite. A preglacial uplift had left the island—as is true of all the islands in the west end of Lake Erie—exposed to the onset of the ice sheet, which, in passing off the bluff west side, caused the rock to break and fall off to westward.

East Sister island lies less than a mile south of North Harbor and is fifty to seventy-five acres in extent. The rock is the same here as on North Harbor. Ripple marks were observed.

Old Hen and Chickens

Old Hen island with its associated reef, the higher points of which are called "The Chickens," lies some four miles to the southeast of East Sister. The same strata are exposed here, and beds below these. The uplift at this point has been greater than in the case of North Harbor and East Sister, and seems to have been of the nature of a thrust since every side is bluff, except where the southeast side has been cut down by glaciation. Wave action has done considerable undermining of the heavy upper beds on the more exposed sides of this island. Some thirty feet in depth of rock is exposed. A Cleveland fishing club has a club house and cottages on this small piece of land. Samples of rock were taken which, on analysis, show $CaCo_3$ 55.60, 56.10, 55.90, 55.10, 55.70, 55.60, and 54.90.

Middle Sister

Middle Sister island is the most westerly of the Canadian islands in Lake Erie. It is about eight miles in a northwesterly direction from East Sister island. The rock elevation here is about the same as on Old Hen island, perhaps slightly greater. The same wave erosion was observed here as on the latter island.

The rock on all four of these islands resembles closely the Monroe of the Bass islands and Put-in-Bay island to the south, in Ohio waters. It is probably the Lower Monroe formation.

Banks of water-worn pebbles, free of sand, are piled up on the exposed beaches of these islands, sometimes bank on bank. The rock itself, being a dolomite, would make a good road metal, and would be readily accessible for break-water purposes or filling for crib-work.

As for the Anderdon Beds, if these outcrop at all in Lake Erie it will be between Pelee Island and Old Hen island. The distance across is about six miles, giving ample room for these beds where, in the order of nature, they belong—between the base of the Corniferous and the top of the Monroe.

The outer end of Marble Head, and Kelly's island, Ohio; Middle or Lighthouse island (the most southerly point in Canada) Pelee island, and a point on the mainshore of Essex county just outside the mouth of Detroit river and below Bar Point,—these are all Devonian and Corniferous, (the Columbus of Ohio geological reports, the Dundee of Michigan,: or the Onondaga of New York). All west of that quarter circle, and in Lake Erie, including West Sister island is Silurian.

End of Part I.

INDEX VOL. XXI., PART I.

REPORT

OF THE

BUREAU OF MINES, 1912

VOL. XXI., PART II.

REPORTS ON THE

DISTRICT OF PATRICIA

RECENTLY ADDED TO THE PROVINCE OF ONTARIO

COMPILED AND EDITED WITH AN INTRODUCTION

By WILLET G. MILLER, Provincial Geologist

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CONTENTS

ILLUSTRATIONS

MAPS

Gap in Trap Hills at Narrows, Sutton Mill Lakes

Shore of James Bay near Mourning Point

Photos by Mr. D. B. Dowling, G.S.C., 1901

THE DISTRICT OF PATRICIA

Introduction and Summary of Contents

By WILLET G. MILLER

That part of the district of Keewatin, added by Act of Parliament of Canada in 1912 to the territory of the Province of Ontario, and now known as the district of Patricia, consists of over 146,400 square miles.[1] Its area is about one and one-fifth times that of the British Isles, and nearly three-quarters of that of France or Germany. Heretofore the districts of the Province lying north of the main line of the Canadian Pacific Railway and lakes Huron and Superior contained approximately 182,900 square miles, or, excluding the water area of Lake Superior, 171,000, the whole of Ontario having had an area of about 260,862 square miles. The new district adds over 56 per cent. to the area of the Province.

According to statistics published by the Department of the Interior, the three largest Provinces of the Dominion now are Quebec, including Ungava, 706,834 square miles; Ontario, 407,262, and British Columbia, 357,600.

The district of Patricia is bounded on the west and northwest by the Province of Manitoba, on the south and southeast by the English and Albany rivers, and on the east and north by James and Hudson bays. Ontario now has a seashore of over 600 miles in length.

From time to time during the last forty years the Geological Survey of Canada has sent parties to explore and report on that part of the district of Keewatin to which the name Patricia has been given. Much valuable information has been obtained by these parties, but, being scattered through the annual reports of the Geological Survey, many of which are out of print and difficult of access, it is not available to the public. Hence it was decided to collect and reprint the reports, with certain of their accompanying maps and illustrations, and to publish them in a single volume, so that officials of the Ontario Government, prospectors for minerals, and other persons visiting the district, can have in handy form practically all the information that has been obtained. This volume may be considered to be a library of the literature on the district. A few other sources of information have been drawn on, in addition to the reports of the Geological Survey.

The reports and extracts therefrom have been arranged, as far as possible, geographically in the following pages. First, descriptions of the Albany river and territory adjacent along the southern boundary are given. Then follow reports on the country lying farther to the northward. Certain reports, however, describe the country along waterways that cross the district in various directions. These reports cannot be

[1] Mr. W. R. Rogers, topographer of the Bureau of Mines, has kindly redetermined for me the size of the district of Patricia. According to his determination, using a planimeter on the map of the Department of the Interior, scale 100 miles to 1 inch, the district contains 157,400 square miles, including lakes and rivers.—W. G. M.

arranged in geographical sequence, but the index at the end of the volume shows on what pages scattered notes on different areas are to be found.

Instead of condensing certain of the reports it has been thought advisable to republish them *in extenso*. While some of the information contained in them is general in character, it may be found useful in the field.

Towards the end of the volume notes are given from reports concerning James and Hudson bays in general, and concerning the much-debated question as to the probable success, or otherwise, of the navigation of Hudson bay and straits.

It may be added that certain of the reports are not confined to the district of Patricia, but cover territory a little beyond the boundaries, belonging to Manitoba or lying south of the Albany river. Inasmuch as persons desiring to visit the district will have in many cases to pass through such territory, it is thought that such information, if published in the volume, will be useful.

In addition to those accompanying this volume, maps published by the Geological Survey of Canada should be consulted, viz., Nos. 239, 578, 814, 815, 846, 895, 915 and 9A.

The following summary of the contents of the reports may be of service. It is arranged under the headings:

(1) General Character of the District, (2) Geology, (3) Soil and Climate, (4) Forests, (5) Fish and Game, (6) Water Powers, (7) Harbours.

1.—GENERAL CHARACTER OF THE DISTRICT

The surface of the district of Patricia is in general much like that of the older northern districts of the Province, or those which lie north of the main line of the Canadian Pacific railway and south of the Albany river. In elevation, the presence of numerous watercourses and lakes, character of rocks, and, over a part of the district at least, the nature of the vegetation, it differs but little from the older districts. Extending farther northward there are certain differences in vegetation and in climate.

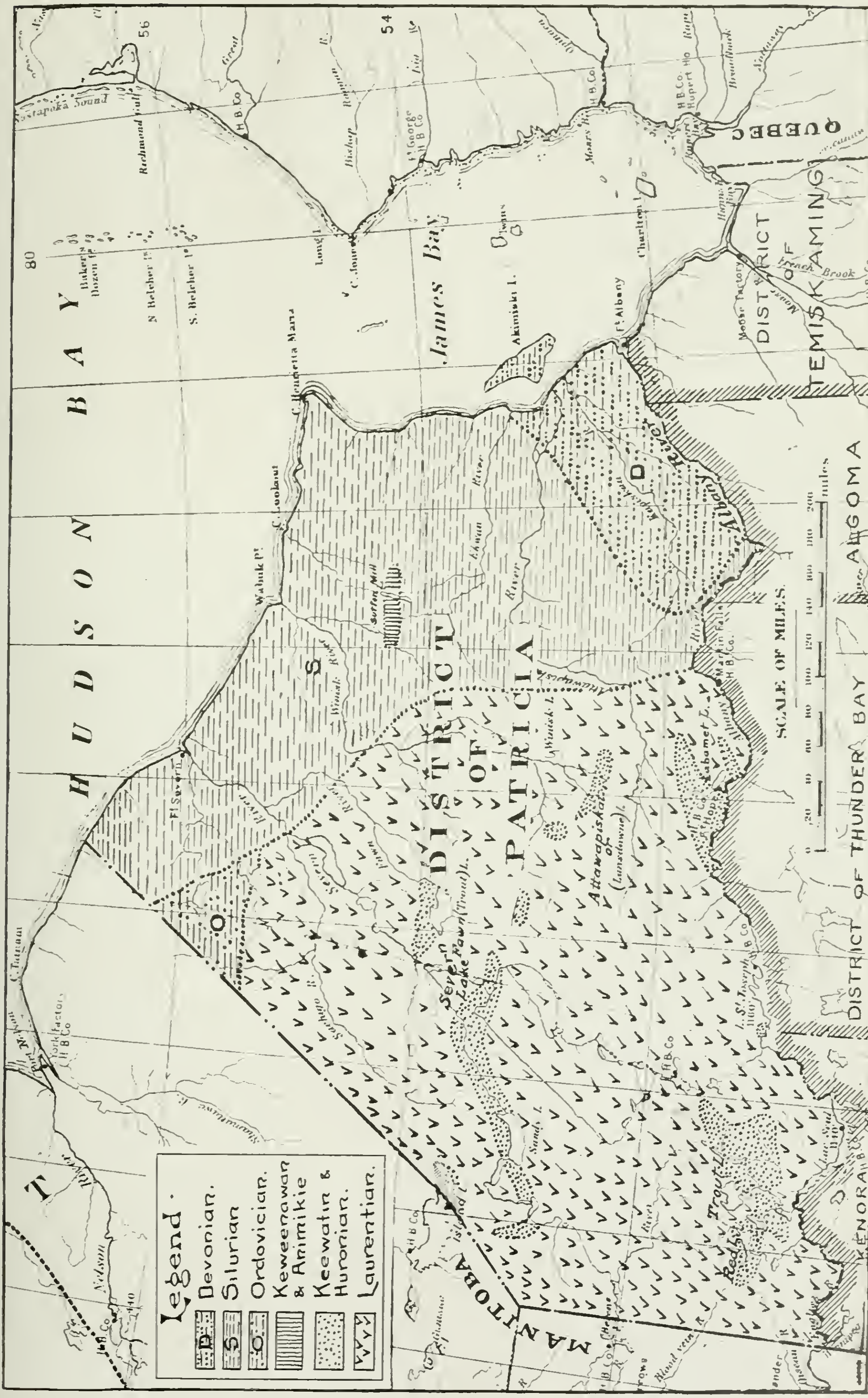
2.—GEOLOGY

The geology of the district presents about the same features as does that of the region which has hitherto been called Northern Ontario. The greater part of the district is underlain by rocks of pre-Cambrian age. However, along the coasts of James and Hudson bays, from the mouth of the Albany river to the Manitoba boundary, the rocks are of Paleozoic age. The accompanying geological sketch map shows the distribution of the various series. Maps that accompany reports on following pages give more details.

Little detailed geological work has been done in the district. The parties that have visited it have confined their attention practically to the water courses. In so far as can be judged from what is known of the geology, the district should contain important mineral deposits.

The Keewatin rocks, which occur in considerable volume, should furnish deposits of gold, iron and other ores such as are found with rocks of this age in other districts of Northern Ontario, Limestones, similar to those of the Hastings and Grenville series of southeastern Ontario, are found at Red lake and in a few other localities. Just south of Nibinamik lake, on a branch of the Winisk river, a large mass of hypersthene gabbro, similar to the nickel-bearing intrusive of Sudbury, occurs in a belt of Keewatin rocks.

Conglomerates of Lower or Middle Huronian age are apparently not present in great volume in the district, although they occur in association with the pre-Cambrian limestone of Red lake and are found in association with Keewatin rocks on Wunnummin lake on the Winisk river, and elsewhere. Rocks comparable to the Animikie, at the head of Lake Superior, or to the Nastapoka series of the east coast of Hudson bay, are found at Sutton Mill lake and outcropping through the Paleozoic on the Winisk river, twenty-six miles from its mouth. At the former locality they are intruded and overlain by diabase, thus giving rise to conditions similar to those which exist in the silver area at the head of Lake Superior or at Cobalt.



Geological Sketch Map of the District of Patricia.

The Animikie or Nastapoka rocks at Sutton Mill lake contain iron ore in such quantity as to justify the hope that deposits of the metal of economic value may be found in the district.

The Paleozoic rocks extending inland from the coast of James and Hudson bays are similar in age to those in the Erie-Huron peninsula of southern Ontario and may, therefore, contain petroleum, natural gas, gypsum, salt and other valuable minerals.

On following pages many of the reports, especially those published some years ago, describe certain rocks as Huronian. In most cases they should be given the name Keewatin, since they consist of greenstones and other types of pre-Huronian age.

The name Keewatin when applied to rocks should not be confused with that of the district. In the former case it is used in an age sense, meaning the oldest group of rocks known in northern Canada. It was not introduced for rocks belonging to the district of Keewatin. The name, with different spelling, is familiar in the lines,

> "Of the North-west Wind, Keewaydin,
> Of the home-wind, the Keewaydin."

Numerous notes are given in the reports on the superficial geology, glacial and recent. Since this does not differ materially from that of other parts of Northern Ontario, comments on it are not required in these introductory notes.

3.—SOIL AND CLIMATE

There being such vast, undeveloped areas of good agricultural lands in other more readily accessible districts of Northern Ontario, the agricultural value of the district of Patricia is scarcely of immediate interest. The following extracts from reports show that the district does contain agricultural resources which will be valuable, especially locally, in connection with mines and other industries that may be established. The extracts also give an account of the summer climate of the district.

The following paragraphs are taken from reports by Mr. William McInnes and other writers, which will be found on succeeding pages. The name of the writer quoted is printed in italics after the quotation, which in some cases is given *verbatim*, and in others in condensed form or with grammatical alterations to suit the context.

A considerable variety in spelling, especially of proper names, is found in the reports. This is due to the fact that when the earlier reports were written the spelling of the Indian names of the lakes, rivers and other natural features had not been standardized.

Though, considered as a whole, the central, elevated region cannot be spoken of as generally adapted for agriculture, there occur basins covered by heavy deposits of stratified sand and clay that seem to have been laid down in lakes held in between barriers formed by the walls of the retreating glacier and ridges of drift. An examination of some of these clays by Dr. Hoffmann shows them to be highly calcareous and somewhat silicious, a composition that, with the admixture of the surface vegetable mould, should produce an excellent soil for general agriculture. The question of climate, which is, of course, of the utmost importance when considering the agricultural possibilities of a district, will be referred to more particularly in another place. It may be said here, however, that the climatic conditions are, if somewhat adverse, not by any means prohibitory to the general cultivation of suitably situated tracts.—(*McInnes.*)

Cultivation of the Land

In the matter of the actual cultivation of these northern areas, we have little to go upon. At the Hudson's Bay Company's posts at Fort Hope and Osnaburgh potatoes have been grown, and small gardens maintained from the time of the establishment of the posts, and little difficulty has been experienced in maturing the common garden vegetables of Ontario, though occasionally the frosts of late summer have cut off all but the hardier kinds. As the posts were located with a view to their favorable situation for the purpose of the fur trade with the Indians, neither one is situated on ground well suited for cultivation, and much better results might reasonably be expected were trials made on more favorably situated tracts.

An Indian cultivating a small garden plot at the head of the Pineimuta branch of the Attawapiskat river succeeds in raising good crops of potatoes and turnips.—(*McInnes.*)

Lake St. Joseph

It would be difficult to estimate the proportion of cultivable soil compared with the worthless area in the country adjacent to the shores of Lake St. Joseph, but the percentage does not appear to be great. In some places, both on the main shores and the larger islands, low banks of sand and of yellowish loam were seen, but, as a rule, the surface appears to be either too stony or too level and wet to give much promise as a farming region. The Indian name of Lake St. Joseph is "the lake of the swampy country."

The climate in the immediate vicinity of the lake, at all events, appears to be sufficiently good to admit of the growth of a variety of crops. At Osnaburgh House, near the east end, where the soil is of a sandy nature, the principal crop cultivated at present is potatoes, but early Indian corn, peas, beans, and a variety of roots and other vegetables, to say nothing of a profusion of flowers, were in a flourishing condition in the end of July. In former years, when cattle were kept at the post, barley was said to have been a regular crop. Hay grows very luxuriantly. I was credibly informed that pumpkins and muskmelons had frequently ripened at this establishment.

Martin's Falls, Albany River

When at Martin's Falls, Mr. McKay, the gentleman in charge of the Hudson Bay Company's post there, kindly afforded me an opportunity of looking over the journals of the last forty years, which had been kept by his predecessors. From these I ascertained that the river between this point and James bay is open, on an average, six months of the year. Hay, turnips and potatoes have been successfully cultivated for a long time at this post, and cattle kept there thrive well.—(*Bell.*)

Fort Albany

Gardening is carried on successfully at Moose and Albany. We never had better potatoes than those from Albany.—(*O'Sullivan.*)

Berens River Valley

The agricultural possibilities of this valley seem to be limited, and the areas suitable for cultivation are only to be found in isolated patches. These are principally in the neighborhood of the larger lakes. The Indian reserves have been located with this end in view, as they seem to cover about the best land seen. The soil is a light gray clay, with a little vegetable mould, and the gardens made by the Indians produce potatoes of fair quality, the only vegetable grown.—(*Dowling.*)

Severn River

Between Severn and Trout lakes, and for 100 miles down the Fawn river, the country is very flat and swampy, the timber being chiefly black spruce and tamarac of small size.

Beyond this, as far as the sea, the river cuts more deeply into the surface of the country, forming a valley, the banks of which are composed of sand and clay, and vary in elevation from 50 to 200 feet. Beyond the valley the soil appears light and poor, and in many places swampy, sustaining a small growth of black spruce and poplar.

Favourable Lake, Severn River

Favourable lake is very irregular in shape, the two portions forming a T, the stem of which lies north and south, with a crooked head stretching irregularly east and west. The width varies from two to five miles. Hills from fifty to one hundred and fifty feet high surround the lake, more than half the timber on which has been burnt. Along the shores there are considerable areas of good land, the best being on the peninsula and along the southern part of the lake, where the underlying rocks are hornblendic and chloritic schists; the northern portion is more barren, the soil resting on gneiss. The soil is a fine, rich, sandy loam, quite suitable for growing good crops, and summer frosts seem to be the only drawback to successful agriculture. These are said not to occur at Trout lake, though situated farther to the northeastward.

Trout Lake,[2] Severn River

Mr. Tait, the officer in charge of the post, says that good crops of peas, potatoes and other roots are raised here yearly, and are very rarely injured by summer frosts. This being the case, the country to the westward, between Severn and Sandy lakes, which is more favorably situated, having all the appearance of a better climate and a richer soil, must undoubtedly be well suited for agriculture, and will at some future time prove valuable land for settlement.

[2] Trout lake, on the Fawn river branch of the Severn, should not be confused with Trout lake in the southwest corner of the district which drains into the English river. There are other duplications of the names of lakes in the district, two on the Severn river being called Sandy.

Fort Severn

The soil around the post is a heavy clay and very swampy. The climate is so cold and the season so short that nothing but a few small turnips is grown here. On August 8th we picked strawberries on the clearings around the post; at that time they were only beginning to ripen.—(*Low.*)

4.—TIMBER

These notes on timber have been taken almost *verbatim* from reports on following pages. Since several of the reports were made from ten to twenty years ago, or more, timber in localities to which reference is made may have since been destroyed by fire. The notes are fragmentary, but it is hoped that they will serve the purpose of giving a general idea of the timber resources of the district. It should be borne in mind that the timber described is found chiefly along the better travelled routes, where it has been more subject to fire. The notes show that the district formerly contained more timber of merchantable grade than now, the constant recurrence of fires having brought about destruction of the forests in this as in the districts to the south. If protected in the future, the greater part of the district should furnish an important supply of timber. The northern limit of a number of the common trees of northern Canada falls within the district, and of one species both the northern and southern limits.

The notes are arranged in a general way, geographically, the more southern areas being described first and then the more northern.

Lac Seul to Red Lake and Part Berens River Basin

The country is well covered by timber, but of small average growth. The sandy tracts are generally wooded by Banksian pine, but in river valleys and on the heavier land poplar, birch and spruce are abundant. White and red pine are found in small groves south of Lac Seul, and are of good average size for timber. On the lake are scattered trees of both varieties. The northern limit of red pine extends to Red lake, where a few trees were observed. Cedar of inferior growth occurs in isolated localities and extends northwest to the height-of-land, but none was seen within the Berens river basin.

The timber on the banks of the upper part of Gull Rock river, vicinity of Red lake, is mostly poplar of a fair size, with a sprinkling of birch and black spruce. The birch average twelve inches in diameter, but only a few of the spruce trees were found over eighteen inches.

The forest about Red lake is somewhat varied, spruce and Banksian pine alternating as the dominant trees. On all the dry and sandy ground a thick growth of slender Banksian pine is found, and no trees of large size are apparently to be seen in such areas; but in the valleys and near the lakes black spruce is occasionally met with, forming small groves scattered through the forests of deciduous trees. Individual trees of larger size are common on the islands and points over which forest fires have not run, and such trees may attain in some instances a diameter of twenty inches, but the average is under eighteen inches. Birch and poplar are almost always present wherever the soil admits. On the richer and lower ground, between Red lake and Gull Rock lake, and farther down the river, the poplar trees are well grown and appear in groves, in which nearly all the trees average eighteen inches in diameter near the base. Farther to the westward on the higher ground, the soil being sandy, the Banksian pine is more abundant, and near the western end of Pipestone bay some trees of red pine form a small grove, which appears to be the northern limit of the species in this basin.

For the first few miles along Trout lake river, from its mouth, the trees near the river are mostly poplar, with slender spruce on the lower land just beyond.

The timber in the vicinity of Trout lake does not appear to be of importance, as the size is generally too small for commercial purposes. Banksian pine is the prevailing tree, and this generally grows in thick masses, so that the trunks are very slight. A few fair-sized spruce trees are occasionally seen and, wherever there is sufficient soil, a thick forest of small birch and poplar is found growing. Much of the low rocky country is covered by muskegs, with stunted spruce and tamarack.

The timber on the islands and surrounding hills of Bluffy lake, on the Wenasaga river, is principally black spruce, with Banksian pine showing occasionally on sandy tracts in the river valleys.

The shores of Moose lake, on the Berens river, have all been burned over long ago and are now characterized by brulé and second-growth. On other parts of this river, as far as Sandy lake, some good tamarack has been seen, occasionally twelve to fourteen inches in diameter. Spruce is about the same size, while Banksian pine is not larger than ten inches.

The Indian reserve on Pekangikum lake, Berens river, appears fairly well timbered—principally with Banksian pine of slender growth, and some spruce. The Indians have been able, in building their houses, to obtain timber of suitable size for the walls and rafters, and spruce of a diameter of fourteen inches is fairly plentiful.

Along the Berens river, near the junction of Windfall creek, there are groves of Banksian pine and tamarac and spruce, small in size, growing in the low, swampy ground. Occasionally a small knoll is seen, with poplar and birch.

The height of land portage, on the head waters of the White river, the southern branch of the Berens river, starts in a tamarack and spruce muskeg, but eventually reaches higher ground with mixed timber, mainly hills of sandy, boulder-strewn materials. The prevailing tree is Banksian pine, and towards the end of the trail this has been thinned out by fires and wind storms, leaving a grove (at the far end) averaging ten to twelve inches in diameter.—(*Dowling.*)

Lac Seul to Cat Lake

In general the timber is rather small; in most parts of the district at present too small even for pulpwood or ties. Occasionally along streams the trees are larger, especially north of the east end of Lac Seul. Another area of good timber, chiefly black spruce and tamarack, occurs along the Root river between Lac Seul and Lake St. Joseph.

Forest fires have swept over the region, probably on the average once every 35 or 40 years. On the islands and in certain protected localities one frequently finds fairly large trees, and there is, therefore, no reason to attribute the small size of the majority of the trees wholly to adverse climatic conditions. Around Lake St. Joseph an unknown extent of forest has been fire-swept, and in many places completely destroyed within a few years. North of Slate lake, around Big Portage and Gull lakes and northward, large areas have recently been burned.

The commonest and most widespread tree is the black spruce, *Picea nigra.* Associated with this, but in very much smaller number, is the Canadian balsam, *Abies balsamea.* In the muskeg area the tamarack, *Larix Americana*, is found abundantly, rarely more than eight inches in diameter. Many of larger size are found along the Root river. The only specimens of the red pine, *Pinus resinosa*, observed were isolated trees near the east end of Lac Seul; probably there are others in the district, but no important areas are likely to occur north of Lac Seul or Lake St. Joseph. The Banksian pine, *Pinus banksiana*, however, occurs wherever the soil is suitable. The white cedar, *Thuja occidentalis*, is found occasionally along the Wenasaga river and on the Cat lake route.

A few specimens of a species of maple were noted around Lac Seul and north of it. The canoe birch, *Betula papyracea*, occurs sparingly throughout the whole region. Specimens large enough to afford bark for small canoes are found on the island in Cat lake. Associated with this birch, but more abundant, are the balsam poplar, *Populus balsamifera*, and the aspen poplar, *Populus tremuloides.* Isolated specimens of the black ash, *Fraxinus sambucifolia*, were noted in several localities, even as far north as Cat lake.—(*A. W. G. Wilson.*)

Albany River

The timber all round Lake St. Joseph has suffered greatly from forest fires at many different times from about a century ago to the present year. Parts of the main shores and many of the islands, especially in the neighborhood of the Grand Traverse, have escaped the fires, and here full-sized timber may be seen. The second growth woods are of all ages, from seedlings of a year or two up to trees nearly as large as those of the original forests. As elsewhere in these latitudes, where the old forests of spruce, tamarac, balsam, white birch, etc., have been burnt, they are succeeded by a growth of mixed aspens and white birch, with a sprinkling of spruce, or else by one consisting almost entirely of Banksian pine. In regard to relative abundance, the trees found around the lake may be mentioned in the following order: white and black spruce, tamarac, aspen, white birch, Banksian pine, rough-barked poplar, balsam, white cedar, pigeon cherry, rowan and black ash. The ground or mountain maple (*Acer spicatum*), which is interesting as an indicator of climate, is common, and it was traced for a long distance down the Albany. Of the above kinds of timber, the white spruce and the tamarac are the most important commercially. The cedar is confined chiefly to the immediate shores of the lake, where it often forms a continuous but narrow border. It has the same habit around the other lakes and along the rivers in the whole of this part of the Dominion. But it is also frequently found in large patches in the inland swamps of these regions. About twenty spruce logs, for sawing into boards, were lying at Osnaburgh House at the time of our visit. They would average eighteen or twenty inches in diameter at the butts, the largest being about two feet. The six largest showed the following number of rings of growth:—113, 97, 121, 116, 107, and 120, or an average of 112, these rings indicating, it is supposed, a corresponding number of years. A new tamarac flagstaff, which was about to be erected, measured about eighteen inches in diameter at the butt and showed 244 rings of growth.

Wherever a view can be obtained over the country along the Albany between Lake St. Joseph and Maminiska lake, long slopes or gentle undulations may be seen, the hillsides being covered with either old timber or a second growth of aspen and white birch. Some small grey elm trees were observed at the inlet of Maminiska lake, being the first noticed since leaving Minnietakie lake, where a single small tree of this species was seen. A grove of black ash occurs with the elms, but this tree is not uncommon along the Upper Albany.

Forest fires have destroyed much of the timber along the banks of the Albany river below the junction of the Kenogami. Old spruces and tamaracs of good size are still green in some sections, but second-growth timber, much of it well grown up, prevails for the greater part of its length. A good deal of both kinds have been only recently burnt. In addition to the spruce and tamarac, balsam, aspen, rough-barked poplar and white birch occur all along. Banksian pine and ground maple were observed in the upper part. White cedar was first seen about twenty miles below The Forks. Grey elm and black ash were noted on the Kenogami just after we left the Albany or some distance farther north than they were observed when surveying this river in 1871. Groves of both these kinds of trees are found on the alluvial flats at the mouths of all the branches of the Kenogami. Cedar of good size is common all along the banks of this stream. It may be remarked that the occurrence, or otherwise, of certain trees along a river like the Albany may be due to the nature of the ground as much as to the latitude.—(*Bell.*)

Upper Parts of Winisk and Attawapiskat Rivers

Green forest of eighty years' growth surrounds the Annimwosh lakes which lie northeast of Lake St. Joseph.

Black spruce and tamarac are sparingly scattered over the muskeg areas; poplar, white birch, spruce and Banksian pine clothe the ridges. The trees are not of large size, averaging from ten to twelve inches in diameter at the stump.

Continuing up stream similar green forests are met with, and in favorable situations, such as flats extending back from bays, the trees are tall, free from branches, and have diameters of from thirteen to fifteen inches at the stump.

Around Ozhiski (Mud) lake, on the branch of the river southwest of Attawapiskat lake, and along the river, fires have destroyed much of the old forest, the ages of the trees on different areas varying from twelve to over one hundred years. Occasional trees, growing in favourable locations, reach diameters of eighteen inches, but the average is small.

Above Nibinamik lake, which lies about thirty miles northwest of Attawapiskat lake, the forest is much the same as that already referred to lower down along the Attawapiskat. Though too small for timber, excepting in limited areas, the spruce would apparently make excellent pulpwood.

The forest growth over the district generally is not large, though on limited areas the spruces reach dimensions fitting them for sawing. At Fort Hope, on Eabamet lake, Albany river, fairly clear nine-inch lumber was being sawn from trees cut near the shores. One tree was felled that gave a log over two feet thick at the butt and 100 feet long. The greater part of the forest is about eighty years old, though in places trees reaching 140 years were found. These old trees were on low-lying areas, that had escaped when the higher and dryer parts were burned, and were not generally large. Their growth-rings showed a rapid increase in size for the first fifteen years, and afterwards an extremely slow growth. The large sandy tracts are now, for the most part, covered with an open growth of Banksian pine, a tree of small commercial value. When the day comes in Canada for reforesting, these districts might be replanted with pines commercially valuable. Over large areas the spruces would apparently, if more accessible, be available for wood pulp.

Specimens of a black birch that was noted last year in this district were brought home and handed to Professor John Macoun, botanist of this department, who submitted them to Dr. C. S. Sargent for determination. Dr. Sargent has named this birch *Betula fontinalis*, Sargent, a species formerly confounded with *B. occidentalis*, Nutt. The range of this tree in the subarctic region is not yet known.

Specimens of this birch were found last year as far north as lat. 53° 35′ south of Weibikwei lake. This summer occasional trees were noted on the upper branches of the Attawapiskat river and in about the same latitude between that river and the Winisk.

The depredations of the larch saw-fly upon the tamaracs along the Winisk river were noted in last year's report. Since that time the ground covered by this insect has been extensive, and some idea of the damage they have done may be given. Last season all trees along the Winisk river, from a point near the mouth to a point within a few miles of the Weibikwei lake, which lies about 50 miles north of Attawapiskat lake, were stripped; south of that area they were untouched. During the present spring and early summer their ravages extended southward to the Albany river and westwards for sixty miles up the Winisk river and to about midway between Eabamet lake and Lake St. Joseph, on the Albany, an area of about 14,000 square miles.—(*McInnes.*)

Boulder River

Along the Boulder river on the dry ground the timber consisted of black spruce, tamarac, balsam, aspen and white birch, but on the wet level tracts it was principally black spruce. All the rapids on Boulder river were overhung by thick groves of good-sized white cedar, and the same tree was met with in groups in some of the swamps at a distance from the river. The rough-barked poplar occurs near the stream, but was seldom seen inland.

Lake Lansdowne, Upper Waters of Attawapiskat River

The shores and islands of Lake Lansdowne are well wooded with large spruce, tamarac, aspen, and rough-barked poplar, with fair-sized cedar and white birch; and the same kinds of wood continue along the banks of the river for many miles down, but the timber at a distance from the water is of smaller size. In the low, level country, not only along the lower parts of this river, but on the west side of James bay generally the greater part of the area between the rivers appears to consist of open sphagnum plains, with some small spruce and tamarac trees, either in groves or scattered singly, while the immediate banks of the streams are well wooded. In places the better class of timber forms belts extending for some miles back from the rivers.

From a point down the river about 20 miles below Lake Landsdowne to 50 miles below, the surface of the country on both sides is low and level, as indeed it has been all the way from Lake Lansdowne. Except where the timber has been destroyed by fire, there is a good growth of spruce, tamarac, balsam, poplar, and white birch along the banks of the river, but it does not extend far back, the country generally being open sphagnum swamps with small scattered tamarac and black spruce trees.

Along the upper part of this stretch (of sixty miles), on the Attawapiskat river, immediately below the lake of that name, the timber is mostly green, and some of it is of fair size, but throughout the greater part of the distance the woods have been burnt at different periods many years ago, and, whether original forest or second growth, the trees are generally of small size. In some parts, spruce and tamarac are mixed with the poplars and white birch, but in others the coniferous and deciduous trees occupy separate areas. The sections of old timber and second-growth alternate at intervals of varying length with others more or less recently burnt and not yet reforested. The white cedar is scarce, but an occasional tree is found in favorable situations much farther down the river. The last black ash observed on the Attawapiskat was passed in this section. An Indian from the Wai-nusk river, who was ascending this stretch, and who had never before been so far south, informed us that he had here seen the cedar for the first time in his life. He had not yet noticed the black ash, and had never even heard the Indian name of the tree.

Throughout the long stretch from Black Fence river, a tributary of the Attawapiskat river about 90 miles below Lake Landsdowne, to the sea, the country on both sides maintains the same level and swampy character which has been described as prevailing higher up. The timber on the borders of the river, where still green, is smaller along this section than along the upper parts. Some portions, consisting principally of spruce and tamarac, appear to belong to the original forest, but much of it is no doubt second growth, and these two species are then usually mixed with poplars and some small white birch. The growing timber, whether original or second-growth, is not often continuous for any great distance, being interrupted nearly the whole of the way by frequent sections of burnt ground.—(*Bell.*)

Winisk River

The average size of the trees growing within the country explored is not great. On exceptionally favorable tracts the spruces attain sizes quite large enough for commercial use as sawn lumber, and large areas would afford good pulpwood. Evidence of the constant recurrence of forest fires over the area is everywhere plainly seen. The brulé areas, varying from quite small patches to large tracts, are of every age; some are so old that the forest has attained the full height of the old growth, and the newer age of the trees can only be ascertained by a reference to their rings of growth, and others so recent that no vegetation covers the blackened surface. These fires are generally the result of the carelessness of Indian travellers, but may sometimes be traced to the igniting of a dry, standing tree-trunk by lightning. The oldest trees found in the whole area were growing on a till-covered island, about fifty miles from the mouth of the Winisk river. The complete isolation from the mainland by broad channels ensured its protection from fires having their origin outside its own borders. The spruces growing here were found by their rings of growth to be between 270 and 280 years old. The diameters and ages of the trees, growing in a number of different localities throughout the region, were noted and are given in the list below:—

	Diameter in inches, 3 ft. from ground.	Age, by rings of growth.
Tamarac, Winisk river, 32 miles from mouth	9	100
Black Spruce, " 32 " "	12	125
" " 32 " "	12	153
" " 32 " "	8	75
" " 50 " "	10	275
" " 65 " near bank	8	130
" " 65 " "	6	115
" " 65 " 10 chains back	3	105
Tamarac, " 65 " "	3	80
Black Spruce, " below Wapikopa lake	10	130
" " Wapikopa lake	9	145
" " "	6	135
" " Nibinamik lake	9	75
" " "	5	75
" " above "	15	130
Aspen Poplar, " " "	15	130

The rings show that the growth in generally rapid for the period between five and thirty years, and afterwards exceedingly slow.

The northern limit of a number of the common trees of northern Canada falls within the district, and of one species both the northern and southern limits.

There is a black birch that the Indians call the squirrel-bark birch. Specimens of the wood and foliage of this tree were submitted to Professor John Macoun, by whom they were forwarded to Dr. Sargent, of the Arnold Arboretum, for determination. Dr. Sargent has named this birch *Betula fontinalis.* It was not seen growing in abundance anywhere in the district, though occasional trees were noted at various points between the Albany and Winisk rivers, the most southerly occurrence being in N. lat. 51° 28′ on Dog-hole brook flowing into Lake St. Joseph, ana the most northerly in N. lat. 52° 40′ on the Wapitotem river flowing into Weibikwei lake on the Winisk river. The largest tree noticed had a diameter of six inches at three feet from the ground, and a height of about thirty feet. Where seen it was growing near the banks of rivers or lakes, in moist localities. A table is subjoined of the observed northern limits of a number of species.

Northern Limits of Trees

White elm, *Ulmus americana*, Albany river	N. lat. 51° 30′
Black ash, *Fraxinus sambucifolia*, Eabemet lake	N. lat. 51° 50′
Mountain maple, *Acer spicatum*, between Attawapiskat and Winisk rivers	N. lat. 52° 25′
Mountain ash, *Pyrus americana*, between Attawapiskat and Winisk rivers	N. lat. 52° 38′
Banksian pine, *Pinus banksiana*, Weibikwei lake	N. lat. 53°
White cedar, *Thuja occidentalis*. Weibikwei lake	N. lat. 53° 5′
Balsam spruce, *Abies balsamea*, Winisk river	N. lat. 54° 15′
Canoe birch, *Betula papyracea*, Winisk river	N. lat. 54° 25′
Aspen poplar, *Populus tremuloides*, Winisk river	N. lat. 54° 45′

The northern limits of balsam poplar, tamarac, and black and white spruce lie beyond the mouth of the Winisk river, the most northerly point examined.

Weibikwei Lake, Winisk River

Around Weibikwei lake forest fires have swept the country excepting a few places where spruces remain. Many of these are 12 inches in diameter, with trunks 30 feet clear of branches. Tamaracs and Banksian pine of good size are found in the unburnt areas and cedars of small size fringe the shore. Going down the Winisk river, the last white cedars were seen at the north end of the lake, and the last Banksian pine about halfway down the western side, and some distance to the south of the lake the last black birch, mountain ash or rowan, and mountain maple were passed.

Near the junction of the tributaries, Asheweigkaiegen and the Atikameig, with the Winisk, the last balsam trees are seen and the last white birch ten miles farther down.

Along the Winisk, the last 25 miles from the mouth, the marine clay of the banks is capped with from 6 to 10 feet of sphagnum moss that shows little evidence of decay. Back from the banks the same moss-covered plain with scattered spruces and tamaracs extends for long distances. Sections of trees growing along the river showed very small annual growth. A black spruce 10 inches in diameter was found to have 270 rings of annual growth, and one 6 inches in diameter 110 rings. Two 12-inch trees growing on a dry knoll showed 120 and 148 rings respectively.

For 28 miles up from the sea the Winisk river has an average width of about three-quarters of a mile, increasing to over a mile in places, and is dotted with a continuous line of islands. These islands support a growth of large spruces, down to within 12 miles of the mouth. Below this, they are covered with grasses and small bushes, with only an occasional grove of large balsam poplars. On the mainland there is the same stunted forest down to within three miles of the sea. A level, sandy, treeless plain, sparcely covered with grasses and various other plants, forms a fringe along the coast.

In 1902 the tamarac trees along the river were suffering from the depredations of the larch-saw fly.—(*McInnes.*)

Kapiskau River

Along the Kapiskau river, which flows into James bay south of the Attawapiskat, a narrow ridge is well wooded where not burned over. The trees consist of large spruce, poplar, and at some distance from the coast, canoe-birch, fir, balm of Gilead, and an occasional tamarac and cedar. The tamarac here (in 1902) has escaped the ravages of the larva of the imported larch-saw fly that has done so much damage to it farther south, so that where it does occur it is green and healthy. Back from the river five or six chains the trees are much smaller, and in many places nothing is seen but muskeg thinly covered with stunted spruce and tamarac, two to eight inches in diameter, and an abundance of laurel (*Kalmia augustifolia*) and Labrador tea (*Ledum latifolium*).—(*W. J. Wilson.*)

Ekwan River, Sutton Mill Lakes

The general surface is very even on that part covered by the marine deposit, and is a gently sloping plain covered for the most part by a thin forest of black spruce and tamarac. In the river valleys, especially near the streams, other trees occur, notably the poplars (*Populus tremuloides* and *P. balsamifera*), and birch. In the case of the latter tree few large ones occur north of the Albany river, and the Hudson's Bay Company have established a canoe-building industry at Albany post to supply the Indians coming from farther north. On the Ekwan a solitary birch was seen, and that was only a small sapling on one of the islands. Five individuals of the Banksian pine were seen in one group on the north bank fifty miles up the river, so that the northern limit of both birch and Banksian pine may be said to be south of this stream. Poplars follow the valleys of the streams nearly as far north as the spruce. The country behind Cape Henrietta Maria is treeless, as is also a strip of the coast both to the south and the west of the cape.

In the southern Sutton Mill lake limestone pebbles are also numerous, but they are mixed with fragments of other rocks and are derived from the boulder-clay of the banks, while marine shells from the upper marine clay are also mixed with them. The timber seen along this lake is mostly spruce and tamarac. The heaviest growth is in the valley at the southern end of the lake and along the small streams draining into it from the west. In going up the lake the timber gradually becomes smaller, though at the portage between the two lakes there is a fair grove of spruce, and a few poplars form a fringe along the southern slope and on the lower ground south of the narrows. In the northern part there is one grove of poplar on the western side, four miles north of the narrows, growing on a ridge which seems to be made up of limestone fragments, and therefore well drained. This grove is quite park-like, it being carpeted by grass instead of the almost universal moss which seems to cover the whole country. The spruce is mainly the black species (*Picea nigra*), and scarcely any trees of the white spruce are seen. Of the poplar, both species are found on the Ekwan, but on the lake *Populus tremuloides* seems to range farthest north. Near the north end of the lake the spruce trees become not only small, but are separated from one another by mossy openings, as if they had been set out artificially. Along the top of the bank the fringe of trees is thin, and at the outlet, Trout river, a patch of burnt country will in a few years be bare. —(*Dowling.*)

Wenasaga River and Head Waters of Severn River

Spruce, poplar, Banksian pine and birch are found everywhere over the whole district. White and red pine were only noted in the southern part of Lac Seul. One solitary white pine tree occurs on Slate lake, on the Wenasaga river, and this appears to be the northern limit of the tree in this district. Ash trees were observed here also for the last time on our way north. The white cedar is a rare tree, but it occurs on the east end of Slate lake, on Sesikinaga lake, on Cedar (Kishikas) lake, and also on Greenshields lake. On the shores of the last a few rusty-looking trees are growing, and this is their northern limit. Mr. Williams, in his traverse across from Osnaburgh to Cat lake, reports seeing ash trees for the last time on the east shore of Elbow lake.

Large areas have been burnt along the route of the Wenasaga river, notably at Wenasaga lake, ten or twelve years ago, and at Big Portage lake about five years ago; also on Gull lake. North of Cat lake we enter, at the lower end of Cedar (Kishikas) lake, an area that has been burnt probably eight or nine years ago, and this extends to a few miles below the mouth of the Francis river, or a distance of over thirty-five miles. Eastward it extends at least to Windigo lake, ten or twelve miles to the right of the river, and westward as far as could be seen from the tops of the highest hills. This is generally being reforested with a second growth of Banksian pine and poplar.

In a very few places, either on the north or the south of the height-of-land, do the spruce and tamarack attain such a size as to make them economically important to the lumbering industry. On the shores and islands of Birch lake the best timber occurs; that on the branches of the Severn river is generally small.—(*Camsell.*)

Severn River, Southwestern End

The shores on Black Birch lake rise from thirty to fifty feet almost perpendicularly above the lake. Nearly seven-eighths of the timber has been burnt.

The hills surrounding Deer lake have been almost entirely burnt over by fires of different dates, and present all the different appearances of a burnt country, from the standing blackened trunks, left by recent burning, to the small second growth of poplar, and Banksian pine of earlier fires. The soil is very thin, and the timber correspondingly poor, except on a few low points where some white spruce, balsam and poplar exceed fifteen inches in diameter.

The trees around Favourable lake consist of white and black spruce, aspen and balsam poplar, white birch, balsam and tamarac, many of which exceed eighteen inches in diameter. At the end of the peninsula the foundations of several old houses were discovered, out of which trees twelve inches in diameter are growing.

Around Musk-Rat Dam lake the timber, with the exception of that growing on the points and islands, corresponds in size and variety to that described around Favourable lake. The islands, many of which are quite large, are rocky, and covered chiefly with a dense growth of black spruce.

The shore of Sandy lake is higher and more rocky than that of Musk-Rat Dam lake, but much good land and many trees of white spruce, poplar, birch and balsam were seen, exceeding eighteeen inches in diameter.

Between Sandy and Severn lakes, a distance of 114 miles by the river, there is some good soil supporting a growth of black and white spruce, tamarac, poplar and birch, slightly smaller than those seen around the lakes.[3] Approaching Severn lake the timber becomes poorer, and good trees grow only on the islands, the shore having a thick growth of black spruce, poplar and tamarac of small size. The shores and the numerous islands of Severn lake are all low and swampy, covered chiefly with black spruce and tamarac.

Along the canoe route between Severn and Trout lakes the country is for the most part swampy, with a few rocky hills almost destitute of soil, the whole covered with small trees of black spruce, Banksian pine and tamarac, few exceeding six inches in diameter two feet from the ground.

On Trout lake the prevailing trees are black spruce, with tamarac, aspen, poplar, white spruce and birch, a few being eighteen inches in diameter.

Fawn Branch of Severn River

For about sixty miles down this river from Trout lake much of the surface of the country is swamp covered with thick, wet moss, and supporting growth of small black spruce and tamarac, with a few poplar clumps. On the islands is a better growth of white and black spruce, poplar and tamarac; the last white birch was seen near the end of this course. The only timber large enough for buildings grows on islands and in the bottom of the river valley, where the soil is better and the high banks form a protection from the cold winds.—(*Low.*)

[3] The map shows two lakes, on the Severn river waters, to which the name Sandy is applied. The context shows which of these is referred to in the above paragraph.

James Bay Coast, Fort Albany to Cape Henrietta Maria

Inland from high water mark is generally found a strip of low, dry mud, in places a mile wide, and covered with grass, with occasional sand and gravel bars. To the rear of this fringe of alders and juniper bushes, of from ten to sixty chains wide, reaches the spruce swamps and muskeg areas, which is the character of the ground overlying the Devonian and Silurian formations extending for 150 miles west of the James bay coast.—(*O'Sullivan.*)

Mouth of the Severn River to York Factory

From the mouth of the Severn to near Cape Tatnam no trees are seen from the shore; beyond this small black spruce come to within a mile or so of the water. The distance of the trees from the shore is due to the unfavorable soil rather than climatic influences. Between high water and the tree line the sand and gravel are almost bare, while the mud between the ridges is covered with a rich growth of grasses, affording fine feeding grounds.—(*Low.*)

5.—FISH AND GAME

The following notes on fish and game are taken from the reports of Messrs. McInnes, Dowling, Low, Bell, Camsell and O'Sullivan, and refer to sections of the country widely enough separated to represent the whole district.

Whitefish and sturgeon are the best food fishes, and occur in most of the lakes. Both are taken in nets, and the latter also by spearing from scaffolds built over rapids in the rivers. Doré and pike are also generally distributed over the whole area, and form an important source of food supply, though the sucker among the fishes, like the rabbit among the mammals, holds the most important place, as it can be caught everywhere, not only in the larger lakes but also in the smaller ponds and streams.

Brook trout were actually caught only in the Winisk river near its mouth, and in the streams running into the Albany river, but were seen in the rapids below Weibikwei; the Indians assert that they occur also in the lake itself.

Lake trout were caught in large numbers in Trout lake, at the head of the Severn river, but are not found in either the Winisk or Attawapiskat waters.

The moose (*Alces americanus*) has been found as far north as the southern shore of Weibikwei lake, in N. lat. 52° 50′, though tracks were actually seen during our exploration only as far north as the Attawapiskat river. Even here it is not nearly so plentiful as farther south in the belt of country lying near the Canadian Pacific railway, and extending for about 150 miles north of it.

Caribou (*Rangifer caribou*) range all over the district.

No red deer are found anywhere throughout the region.

The fur-bearing animals, though not so plentiful as they once were, are still fairly abundant throughout the district; the otter and the beaver, from long-continued trapping, are less numerous, perhaps, than any other species.

Bears (*Ursus americanus*) seem to be able to hold their own pretty well, and are still taken in good numbers. There is probably only one species of the common black bear, though the Indian and traders differentiate from this the brown bear, which they claim differs from the black, not only in color and size, but also in disposition and habits.

Wolves (*Canis lupus*), though scarce, are not unknown.

Foxes (*Vulpes vulgaris*), including the red, silver, black and cross varieties, are numerous, though they vary in numbers with the periodic increase and decrease in the numbers of the hares.

Lynxes (*Lynx canadensis*) are fairly plentiful.

Otters (*Lutra canadensis*) and Pine martens (*Mustela americana*) are taken in good numbers, and beavers (*Castor fiber*) occur more sparingly.

Minks (*Putorius vison*), and muskrats (*Fiber zibethicus*), are plentiful. These, with skunks (*Mephitis mephitica*), weasels (*Putorius vulgaris*), and wolverines (*Gulo luscus*), make up the number of the merchantable furs.

The rabbit (*Lepus americanus*) occurs abundantly all over the district, and is, perhaps, the most useful of all to the Indians, as it affords, during the winter particularly, both food and clothing.

That the raccoon occasionally strays as far north as N. lat. 52° is shown by the fact of one being taken by an Indian woman on the Upper Attawapiskat river in 1903.—(*McInnes.*)

Headwaters of the Severn River

Moose and caribou are fairly plentiful in the Shabumeni and Birch lake section; and bears were frequently seen on the lower parts of Cedar river. Whitefish, pike and pickerel were caught with a net in all the larger lakes; but no trout were got anywhere. Sturgeon ascend Cedar river as far up at least as the mouth of the Windigo river, and in several places the natives have gone to a great deal of trouble in building weirs across the river to catch them.—(*Camsell.*)

Trout Lake, Severn River

The water of the lake is remarkably clear, cold and deep, and is abundantly stocked with large whitefish and lake trout, which form the principal food of the Indians and Hudson's Bay Company's people living around the lake.—(*Low*).

Attawapiskat River

Sturgeon are abundant in the lakes of the Attawapiskat, and they appear to constitute the principal food of the few Indians who inhabit the country. Whitefish are also caught both in the lakes and along the river itself. Pike and suckers are abundant in all the waters. The Canada goose breeds in considerable numbers in the open swamps behind the wooded borders of the lower section of the river, and the young birds, ready to fly, were congregating in flocks, all along the lower stretch, in the end of August and the beginning of September. The dusky and other species of ducks were also numerous, and the yellow-legged plover was very abundant. We saw a few caribou and several black bears while descending the lower part of the river.—(*Bell.*)

Ekwan River and Sutton Mill Lakes

In the interior the game birds are all very scarce, the fall hunt for ducks and geese being confined to the shores of the bay. The rivers afford a limited supply of whitefish, and a small species of this fish is caught by the tide-water along the west shore of James bay. The nets are set or hung on stakes on the tide flats, and are covered by the tide for a few hours each day. Sutton Mill lakes are well supplied with a slender variety of grey trout, and the streams running to the north into Hudson bay are, at certain seasons, well stocked with brook trout. In August the stream draining Sutton Mill lake was full of these fish, and several fine specimens were caught on the lake above at the narrows.—(*Dowling.*)

Coast of James Bay, Moose Factory to Cape Henrietta Maria

Game was very plentiful; black ducks by the thousand breed in the southern part of Hannah bay, and the pintail and teal, in even greater number, breed north of the Albany. A few ptarmigan were shot near Cape Henrietta Maria and, on our return, a large number of geese were also shot.

Speckled trout and whitefish, averaging three pounds in weight, are caught in nets at the mouths of all the rivers.

At Ekwan point, while having lunch, I counted over one hundred porpoises passing close to the shore. Seals were often seen, and numerous skeletons of walruses and seals were lying on the beach north of the Albany.

Whales were not seen during the expedition, probably owing to the shallowness of the water all along the western coast of James bay.—(*O'Sullivan.*)

6.—WATER POWERS

The following paragraph is from a report, reprinted on another page, by Mr. William McInnes, of the Geological Survey of Canada. It gives a clear idea of the distribution of the drainage areas of the district. Notes, by other authors, on a few water courses follow Mr. McInnes' description. Details will be found in the reports.

The region may be roughly divided into three great areas, each with characteristic features: the Archean area of the high interior plateau; the boulder clay area; and the limestone area of the Hudson bay basin. The Archean, of the three, comprises by far the largest extent of country. It consists of an elevated, undulating plain, with an average height of from 700 to 1,000 feet above sea-level. The effects of long-continued subaerial decay and denudation, supplemented by the later cleaning up and smoothing action of a great glacier, are everywhere noticeable in the gently rounded outlines of the very moderate elevations. On it all the larger rivers of the Hudson bay watershed, and many of those flowing south and west, have their sources, the great muskeg areas acting as storage reservoirs, from which, even in the dryest season, the volume of drainage is large. It is along the parts of their courses lying within this area that the quickest descent occurs, falls and rapids that would afford water-powers being thus largely confined to the upper stretches of the streams. This condition is in contrast with that obtaining everywhere throughout eastern Canada, where the streams flow for the greater part of their length over the Archean, and only come tumbling down from the elevations when low down in their courses, after they have attained almost their maximum volume, thus making the eastern portion of Canada probably unequalled in the world in the matter of water-powers. It must not be thought, however, that throughout the area now under consideration there is any scarcity of good water-powers. They occur in great number, but owing to the distribution of the Archean highland before referred to, they are situated mainly far inland rather than near the coast.

Albany River

In size, the Albany is comparable with the Ottawa, and at high water it might be navigated by powerful river steamers from the mouth to Martin's falls, where the first portage occurs, a distance of about 250 miles, following the general trend of the river.

From Deer Lodge lake we followed the northern and larger channel, which is broken by numerous rapids. Portages are required at four of these, the first being the Smooth Stoney portage on the north side at four miles, 715 paces long, with a fall of thirty-six feet. The others are called the three Kagami portages, and all occur in the last mile before arriving at the junction of the two channels.

The first Kagami portage, on the north side, has a fall of five feet, and is 100 paces long.

The second Kagami portage, on the south side, has a fall of 27 feet, and is 750 paces long.

The third Kagami portage, on the north side, has a fall of 18 feet, and is 570 paces long.—(*Bell.*)

Cat Lake to Lake Seul

By this route are altogether 27 portages from Cat lake to Mattawa, varying from one chain to about a mile in length. The highest single fall would not exceed 30 feet of a direct descent, but altogether the stream from its source to Lac Seul must fall from 400 to 500 feet; and as the stream is a large one, with a plentiful supply of water, it would afford any amount of force in the form of water-power, which could be utilized should the country ever become a manufacturing one.

White River, Southern Branch of Berens River

The greatest fall on this river is that at the first long portage, which is 60 feet.—(*Dowling.*)

Cedar River, Branch of the Severn

The discharges of all the larger streams were taken, and the fact established that what was considered to be the main branch of the Severn river is really not so large as the Cedar river branch. The discharge of these two streams was taken near the end of August, when the water was at its lowest stage. Cedar river was found to give 735 cubic feet per second, and the middle branch 503 cubic feet. At the junction, the middle branch is wider and deeper than the eastern branch, and it would appear to carry much more water; but there is a great difference in the relative velocities.—(*Camsell.*)

Kapiskau River

The Kapiskau river is about a quarter of a mile wide for some distance from the mouth, and has a width of from seven to ten chains at the forks. At forty miles up a section was made which showed that the volume of water at this point was 566,000 cubic feet per minute (July 4th). The width is seven chains, with an additional three chains for ordinary high water, and the greatest depth is eight feet.—(*W. J. Wilson.*)

Winisk River

The Winisk is with little doubt the largest of the rivers discharging into the west side of Hudson bay or James bay between the Severn and Albany rivers. It may be confidently stated that the total length of the river is well over 400 miles.

Its volume was estimated to be about 25.000 cubic feet per second in midsummer, at a point twenty-five miles above the bay. The volume of water in the river during the spring freshet must be quite ten times as great as at low water in midsummer.—(*McInnes.*)

7.—HARBOURS

On the Ontario shores of James and Hudson bays there are no good harbours. The general coast line is low and flat, with shallow water deepening very slowly outwards. At the time of low water, when the tide is out, along the shores of James bay only mud flats, strewn with large boulders, can be seen to seaward from high water mark. The same description applies in a general way to the Ontario shore of Hudson bay. The large rivers, the Albany, Attawapiskat, Ekwan, Trout, Winisk and Severn, together with smaller ones, flow into James and Hudson bays along the shore of the district of Patricia.

Descriptions of the harbours at the mouths of some of these rivers will be found on following pages.

REPORT ON THE

COUNTRY IN THE VICINITY OF

RED LAKE AND PART OF THE BASIN OF BERENS RIVER[4]

By D. B. Dowling

The present report contains a summary of the results of an exploration, undertaken during the summer of 1893, in the southern part of the district of Keewatin. The area comprised in the report lies just to the east of the eastern boundary of Manitoba and north of the Province of Ontario. It extends from the English river and Lac Seul northwards to Berens river, the eastern branch of which forms, approximately, the northern limit of the area. To the east, the exploration includes the heads of streams flowing eastward to Cat lake, and on the west the White river, a southern branch of Berens river, with the western end of Red lake, confine its extent in that direction.

The map which illustrates the area shows it to be situated between latitude 50° 30′ N. and 51° 50′ N., and between longitude 92° 40′ and 94° 15′ west of Greenwich, an area of 6,300 square miles.

A sketch map,[5] showing the position of this area and its principal streams and lakes, accompanies the Summary Report of the Geological Survey for 1893, in which is also a brief description of the routes followed.

All the bearings mentioned in this report are with reference to their true meridian.

PHYSICAL FEATURES

The larger part of the area forms a basin draining to the south to English river, and thence to Lake Winnipeg. In this are situated the largest lakes of the district, comprising Red lake, Trout lake, Gull Rock lake, and Shallow lake. The northern portion drains northward to Berens river and thence westward to Lake Winnipeg.

A small area containing a few lakes on the east side is found to drain to the eastward, forming a part of the Albany river basin, which empties into Hudson bay.

Southern Basin

The basin drained by the streams flowing south to English river is almost an amphitheatre in form, facing the south. The several streams converge to the convex line followed by the valley of the English river. The watershed forming the outer boundary or rim of this area rises gradually from the west toward the east, having, probably, its highest point between the waters of Cat Lake river and Lac Seul. To the west, in the vicinity of Long-legged lake, it rises to 1,200 and 1,300 feet, or sixty feet and upward above Lac Seul. North of Red lake, the portage at the height-of-land to White river is at 1,300 feet, while north of Trout lake it is considerably higher, as this lake itself stands at nearly 1,300 feet. The Woman portage, between Shaboomene and Woman lakes, is estimated to be at 1,350 feet above sea-level.

The general surface of all this basin is of a rough, rocky character, with small areas between the ridges of alluvial and glacial deposits. Across the northeastern part a strong ridge of glacial material forms a long and nearly straight line, through which two streams have cut. It is much more strongly marked near Trout lake, and there clearly forms a dam, retaining the waters of that lake. All the other lakes are evidently in rock basins, surrounded by rocky hills.

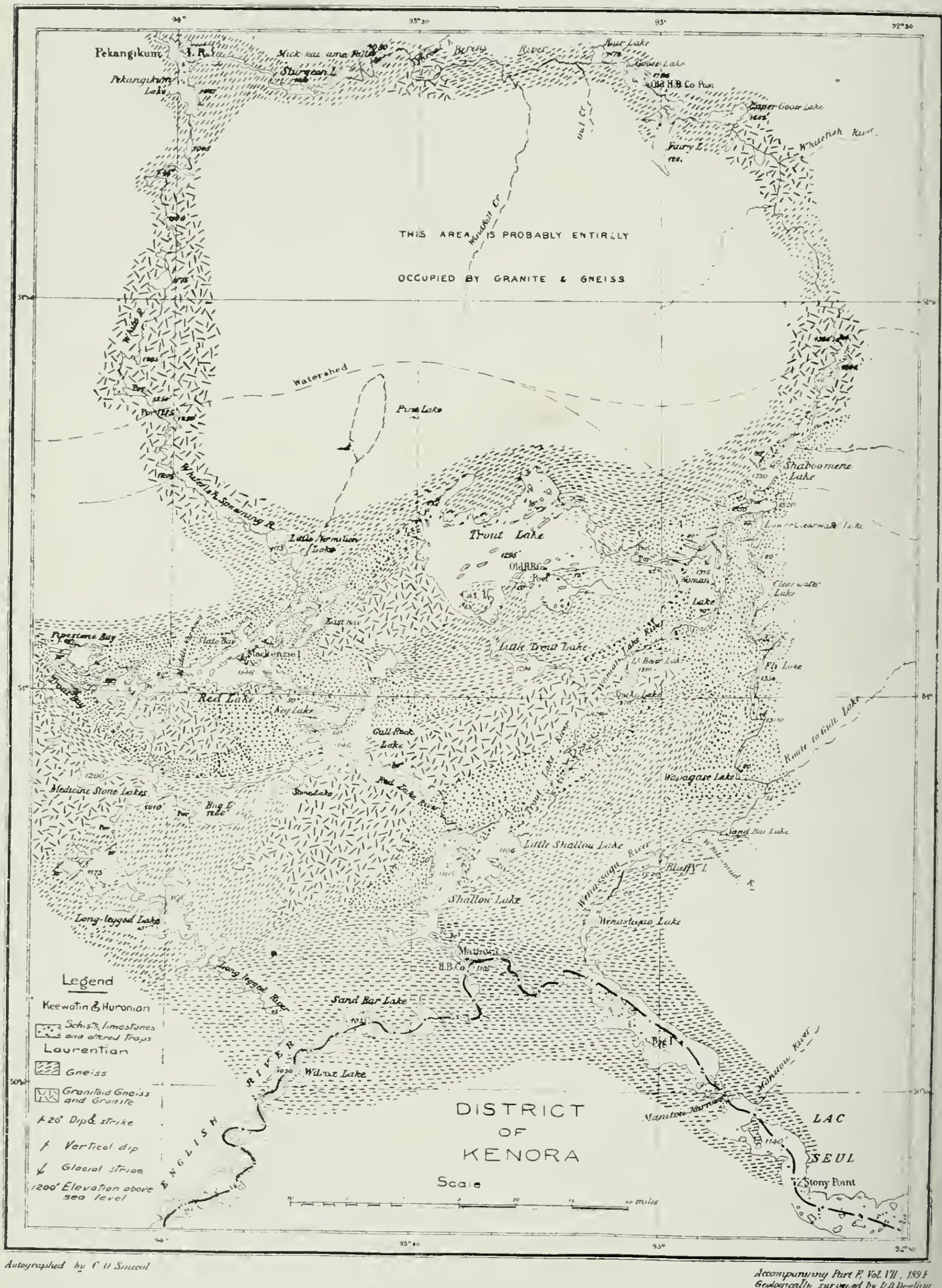
The higher parts of the rocky country forming the remainder of the basin show very little covering of drift material of any sort, except a few boulders, with sand in the valleys. North of the Trout lake ridge the most noticeable feature is the enormous number of boulders on the shore of the lake.

Effect of Geological Conditions on the Topography

In general, that part of the country in which the surface is of gneiss and schist is lumpy, with hills aligned in ridges, but the surface-level is more or less a sloping plane. In areas in which light-colored intrusive granite prevails the surface is, however, considerably raised above this plane. The Huronian areas here, as usual, show more pronounced denudation and greater irregularity in surface feature. The narrow, crooked lakes in the Woman lake region occupy gaps and gashes between high ridges. The high angle at which these rocks stand admits of a greater disintegration of the softer beds, such as limestones and chloritic schists

[4] This report forms Part F., Vol. VII., of the Geological Survey of Canada. All the bearings mentioned in this report are with reference to the true meridian.

[5] Annual Report, Geol. Surv. Can., Vol. VI. (N.S.) 1892-3, p. 22 A.



Geological sketch map of the southwest corner of the District of Patricia, with part of District of Kenora.

These areas can hardly be described as forming basins. The general surface of the country is apparently higher than elsewhere, but it contains deeper depressions, which are occupied by lakes. In tracing out the line of contact of the granite with the green Huronian schists of Red lake, it is found that nearly half the area of the lake is underlain by granite, so that this lake is not properly described as a basin in the Huronian rocks, though the greater part of its northern arms and bays are entirely within that area.

It will be noticed on reference to the map that, although the Huronian areas are evidently well sprinkled with lakes, still the largest basin of all, Trout lake, is altogether beyond them and is most probably not a rock basin at all, the southern side being a dam of morainic material. The suggestion that this is the case arises from the fact that not only are there but one or two low rock-exposures along the northern foot of this ridge, but that the lake lying only three or four miles to the south of Trout lake, over this ridge, is estimated to be about one hundred and fifty feet below, and is fed by two small streams having their origin in the hills between, and carrying relatively more water than the small area they are supposed to drain would naturally produce.

Relative Heights of Lakes

In order to obtain a relative scale of heights for the lakes and hills in the district an estimate of all the various falls in the rivers and on portages was carried from the railway through to Berens river by both routes followed. The aneroid barometer was used on long portages and in measuring the height of hills.

The estimated heights above sea-level of the principal lakes in this area, obtained in the above manner, are as follows:

	Feet.
Lac Seul	1,140
English river at Mattawa	1,105
Shallow lake	1,105
Little Shallow lake	1,106
Sand Bar lake, English river	1,035
Wilcox lake, English river	1,030
Long-legged lake (Lower)	1,173
Long-legged lake (Upper)	1,175
Gull Rock lake	1,146
Red lake	1,148
Little Red lake, or Little Vermilion lake	1,173
Lake at height of land north of Red lake	1,250
Bug lake, south of Red lake	1,266
Upper Medicine Stone lake	1,210
Lower Medicine Stone lake	1,200
Trout lake	1,295
Snake lake	1,270
Little Bear lake	1,310
Woman lake	1,315
Fly lake	1,356
Bluffy lake	1,220
Sha-boom-ene lake, draining to Cat river	1,330
Head of eastern branch Berens river	1,350

Long-Legged Lake and River [5a]

A small stream enters the western end of Wilcox lake, draining a series of closely connected lakes known collectively as Long-legged lake. The lower part of the stream flows through low swampy country gradually rising to the west. The channel is wide and deep, with sluggish current, and the course is crooked, but with long bends. This character continues for five miles, where a fall of eighteen feet over a ledge of dark gneiss is reached. At the time of our visit (August 30) very little water was running, forming a thin veil the whole width of the ledge, but in high water it must be a fine fall. A portage of one hundred yards is on the east side.

The stream above the fall continues of about the same character, but flows through a sandy country with few rock exposures. The timber is mostly Banksian pine of small size. Between the falls and short rapids there is a very light current, so that it is easily navigated, except that in the upper part, near the lake, there are numerous short portages which take time to surmount. Two miles beyond the eighteen-foot fall

5a. The routes here described are shown on maps on following pages of this volume. W. G. M.

is another of twenty feet, with a portage of seventy yards; this is followed in a quarter of a mile by a fall of thirty feet, with a portage of one hundred yards.

From a short distance below this fall to near a small lake expansion two miles above, the borders of the river are fringed with rushes and wild rice, with sandy country behind covered by a close growth of slender Banksian pine. Occasionally, on lower ground, small patches of spruce and tamarack occur, in which are seen a few trees over eighteen inches in diameter.

The small lake which the river passes through has originally been a basin of two miles in length and a quarter of a mile in width, lying in a trough between gneiss ridges running east and west. The river-valley enters this basin on the middle of the northern side, and flows out at the eastern end. The sediment brought down and deposited by the river has formed a delta, by which the lake has been divided into two parts, separated by a low, marshy flat through which the river now winds in a very irregular course. The older part of the delta is higher ground and produces fine wild hay, while the immediate banks of the stream are lined by rows of ash and elm, as commonly found in Manitoba.

Above this lake the river bears north-westward, through level country, and in a mile turns westward, winding in the bottom of a low flat valley or depression between higher ridges and knobs of gneiss. The stream passes near a high steep rock of gray gneiss, in vertical beds, running to the west. The banks are clay, and on the north side of the valley, half a mile east of the steep rock, the stream has cut into a hill which shows sixty feet of stratified clay.

The river now becomes irregular in its course to the outlet of the lake, descending in a distance of two miles over several ledges of gneiss, in falls and rapids, successively of 1 foot, 5 feet, 3 feet, 30 feet, and 3 feet, or aggregating seventy-two feet, at all of which short portages are necessary in low water, and in high water at five of them.

The lakes, forming a group at the head of this stream, are all of irregular shape, but generally lie northeast and southwest, or across the general direction of the drainage, following somewhat the strike of the rocks. Long bays run in the same direction on either side of the lakes. The ridges or hills of the surrounding country also mainly run with the strike of the gneiss.

The first lake of the series is four miles long and one and a half wide. Two large islands are found in the northern half. A long narrows, of nearly two miles, connects this with the second, which is of the same length in a northeast and southwest direction, but a mile wider, having few islands in the central portion but a number scattered along the shores. A crooked narrow lake, running from the western side towards the north, and then turning west, brings us to the north end of a small lake terminating at the south end in three long finger-like bays. On the northwestern side, at an opening leading to a small lake, we find a swift current, with a fall of a foot over gneiss rock. Here the Indians have constructed a fishing weir or dam, to which they resort in the autumn. After crossing a small bay or lake expansion, half a mile in diameter, a narrow opening admits to the upper or most western lake of this series.

This is the largest of the Long-legged lakes, but still is of no very great extent. It might be called a rectangle in shape, with one diagonal running east and west, and having sides of three miles each. The river leaves by the eastern end, just north of which runs a narrow arm of a mile and a half in length to the northeast. At the south end a short bay breaks the regularity of the shore, but at the west end there are two bays, the one forming a small lake with a narrow entrance. This bay is a mile in diameter, while the one on the north is smaller and likewise nearly cut off from the main lake. The islands are mostly narrow ridges of gneiss running northeast and southwest. The hills surrounding this western lake are much higher than to the east, and it appears to be at the extreme western limit of the watershed. A stream enters the west bay, but it is a very small one fed by two or three large muskegs and small lakes lying immediately behind the first ridge, west of which again higher ridges are seen.

We climbed several hills to the west of these two bays and found them to be principally composed of horizontal beds of gneiss, broken and fissured by large dykes of pinkish granite. The most western hill was almost entirely granite, sending out wide dykes of pinkish colored granites through the broken gneiss to the eastward.

Mattawa River

The largest stream joining the English river on the north side, below Lac Seul, is the Mattawa. This enters at what was formerly an Indian reserve, but where there is now only a Hudson's Bay Company's trading post, called Mattawa. The river to which the name applies is but a short strip of sluggish water connecting the English river and Shallow lake. Above this there are two streams whose waters discharge by the Mattawa. The Trout Lake river empties into Little Shallow lake lying to the east, and thence flows to the northeast corner of Shallow lake. At the extreme northern end of this lake is found the mouth of Red Lake river. These two are both fair sized streams, so that the flow of water in the Mattawa is considerable, but, owing to the large size of the channel, the current is very slight. From the river to the lake, a distance of four miles and a half, this strip of water occupies a wide valley enlarged into lake-like expansions, which apparently often serves as an overflow channel from the English river, at times of high water. As an example, during the summer of 1893, between June 30th and July 17th, the waters in the Shallow lakes and English river at Mattawa rose six feet; this rise was not occasioned by increased flow in the Trout Lake and Red Lake rivers, but altogether to the increase of volume in the English river, showing that the formation of the large channel of the Mattawa has been aided by the ebb and flow from freshets on the English river.

This channel is cut through soft stratified beds of sand and clay which occupy the lower country between the hills. The English river, below the junction, is held back by a rocky barrier of gneiss, which, striking to the west, forms ridges running generally in that direction.

Shallow Lake

Shallow lake is a long narrow strip of water, ten miles in length, lying north-and-south. From the south-western angle, a narrow arm runs westward about two miles, widening out and terminating in a round bay containing two small islands. In the main body of the lake a number of islands are scattered in irregular order, numbering in the aggregate about thirty.

The shores of the eastern side are in general of easy slope, the country behind rising gradually to the high land lying north of English river. The narrow strip separating the two Shallow lakes is generally low, but rises in a high narrow ridge to the north, which, with a similar one lying to the west, but starting from the north end of Shallow lake, forms a valley. Through this the waters draining into the smaller lake reach Shallow lake in a wide sluggish stream, bordered for the most part by grassy and rush-grown flats, with a fringe of small willow bushes.

The same gap or valley continues to the north-east, and down it a small stream flows. A continuation of the eastern ridge, which forms a prominent point just west of the mouth of Trout Lake river, parallels the course of that stream for some distance.

The low-lying country on the east and south-east of these two lakes is found to be underlain by gray gneiss, while the change to steeper slopes and higher hills running parallel to the shores of the south and west is principally due to the change in the character of the rocks. Those on the west are mainly a series of fine-grained dark gneisses.

Lying across the mouth of the valley of Red Lake river are two prominent hills, which on examination were found to be morainic, or of glacial origin. These are very noticeable, and are seen for a long distance down the lake.

Red Lake River

This stream empties into a bay at the north end of Shallow lake. A short rapid or fall, of a foot or more, is found at its mouth, caused by a ledge of dark, fine-grained, rusty, green slate or schist. In high water in the lake this rapid is drowned out.

Above this the river makes a long bend to the west, to the north of the prominent hills just mentioned. The hills take the form of narrow ridges, of no great length, lying west-south-west, and east-north-east, with an altitude of one hundred and seventy feet above Shallow lake. The slopes are thickly wooded with small Banksian pine and spruce. The sides of the hill show no rock in place, but everywhere pebbles and boulders of loose rock are seen. The material of the hill is apparently a mass of fairly well rounded pebbles and boulders, with sand and gravel filling the interstices. On the southern slope large blocks and angular boulders are occasionally seen on the surface. Most of this material is of grayish gneiss and granite, with a few scattered pieces of the green felsites and schists of the Huronian.

Northward, the river passes through a low strip of country gradually rising, and at a mile and a half the banks are twenty to thirty feet above the water. Here the first heavy fall occurs, caused by a band of dark schists. The portage past this leads up a steep bank of clay and sand on the west side to thirty feet above the river, and along a level terrace, descending with a more easy slope to the river above. The distance is 250 yards, and the fall in the river fifteen feet.

At about half a mile above this, there is another small fall of ten feet. Although rock in place is seen at the foot of the fall, the obstruction seems to be occasioned by a great accumulation of boulders, and in the river, just above, large angular boulders of granite nearly fill the channel. Their presence is accounted for by the fact that the river here cuts through a ridge of morainic material, which is seen to be a spur from a high ridge running off to the north-east. The portage is on the east side, and is one hundred yards long.

Farther up the stream is wide and has little current to the next fall, the general course being to the north-west, but including a long curve to the south. Here an accumulation of boulders in the bed of the stream causes a rapid with a fall of twelve feet, to pass which there is a portage road of 170 yards on the west side.

The upper part of the river to Gull Rock lake is a succession of small lake-stretches, with a wide river-channel connecting them, in which the current is appreciable in one place only, where there is a hollow bar.

The timber on the banks is mostly poplar of a fair size, with a sprinkling of birch and black spruce. The birch average twelve inches in diameter, but only a few of the spruce trees were found over eighteen inches.

Just to the east of Gull Rock lake a small lake-expansion of less than two miles in diameter is crossed. On this a light granite with slight foliation is seen, and the same rock is probably to be found on the river below, though no exposures were met with.

Gull Rock Lake

This lake, which lies immediately to the east of Red lake, with its longest diameter north-and-south, has a total length of eight miles. The inlet and outlet are on the south-west and south-east sides respectively. The northern part is narrow, but towards the south the lake widens out to four miles. A string of islands runs across south of the middle, and others are scattered along the eastern and southern shores. To the south the shores are high and bold, but to the north more gradual slopes prevail, while on the western side one bold hill of granite is conspicuous. A small creek at the north end leads to another lake of three miles in extent, occupying the same trough, beyond which is a high ridge separating these waters from Trout lake.

A deep channel joins Gull Rock lake with the western end of a small lake called Keg lake, lying to the north-west, and a short portage connects the two, saving about three miles of travel by the river.

Red Lake

About three miles west of Keg lake by the river is the entrance to Red lake. No idea of its size or shape can be formed on inspection, as from the great number of islands and the irregular shape of its shores no great view of any extent of water is seen, and it is only by traversing the whole of its shores that its area can be appreciated. The largest open part is that which is entered first. From this to the west extends a long narrow arm, which contracts in several places to less than a quarter of a mile. At the western end a narrow, crooked channel connects with what is called Pipestone bay, a small expansion of two miles in diameter, where the Indians obtain stone for making pipes. This is a soft compact chlorite, and the pieces they use are from loose boulders, though the rock was seen in place in a thin band in the narrows.

An arm or long bay runs to the north-east from the main body of the lake, and connects by a narrows with a long lake lying about parallel to its course, on the east, joining it at about two miles from its northern end. This addition is about six miles long and less than a mile wide, and lies in a trough in the Huronian, the shores following in the main the strike of the rocks.

The total distance from the extreme north-eastern end of this bay to the western end of Pipestone bay is twenty-seven miles in a west-south-west direction. At right angles to this, the greatest breadth, which is from the outlet northward to the end of a bay on the north side, is roughly seven miles.

The forest about this lake is somewhat varied, spruce and Banksian pine alternating as the dominant trees. On all the dry and sandy ground a thick growth of slender Banksian pine is found, and no trees of large size are apparently to be seen in such areas; but in the valleys and near the lakes black spruce is occasionally met with, forming small groves scattered through the forests of deciduous trees. Individual trees of larger size are common on the islands and points over which forest fires have not run, and such trees may attain in some instances a diameter of twenty inches, but the average is under eighteen inches. Birch and poplar are almost always present wherever the soil admits. On the richer and lower ground, between Red lake and Gull Rock lake, and farther down the river, the poplar trees are well grown, and appear in groves in which nearly all the trees average eighteen inches in diameter near the base. Farther to the westward on the higher ground, the soil being sandy, the Banksian pine is more abundant, and near the western end of Pipestone bay some trees of red pine form a small grove, which appears to be the northern limit of the species in this basin.

Streams Flowing to the Red Lake Basin

The streams flowing from the south to Gull Rock lake and Red lake are all rather small. The first one examined was a small stream draining Stone lake, and emptying into the south bay of Gull Rock lake. This proved to be very shallow, and the lake is of small size, lying between hills of granite, with occasionally fragments of Huronian rock caught up in it, showing at a few points on the lake.

Another lake lying farther to the west, called Bug lake, drains by a small creek to the western extremity of the south bay of Gull Rock lake. The valley in which this lake and stream lie runs west by south-west from Gull Rock lake, following the strike of the gneisses and altered rocks. The distance from lake to lake by the river is about four miles, with two miles of the western part over a lake connected with Bug lake by a short reach of sluggish river. The upper part of the stream is very shallow and is overhung by tall gray willow bushes, making travelling along it difficult. Two portages were made past rapids. The fall at the lower one is seventy feet and at the next forty feet, so that the lake lies at an elevation of about one hundred and twenty feet above Gull Rock lake.

From a bay on the south-west a portage leads to a small lake draining to Red lake. The road is through scrub pine brush with mossy floor, over a slight rise for about 600 yards—the terminal points being at about the same elevation.

The stream which rises here flows through several large lakes, and reaches Red lake about a mile east of a narrows near the middle of the lake (Middle Narrows). The small lake at the head waters is bordered by mossy muskeg, and is about one-third of a mile in length. The stream flowing from its western end is too small for canoes, and the portage to the next lake is through spruce bush for 1,000 yards. The fall is about fifty feet to a lake less than half a mile in length. Two small portages and an intervening pond lie between this and the Upper Medicine Stone lake, which is a long narrow strip of water running to the south-west. Its total length is six miles, with a breadth averaging half a mile. The north-west shore is bold and is of granite, while the south-east is lower and shows fewer exposures, principally altered rocks and dark-green eruptives, with granite in a few places. Between the points the shores are mostly of angular boulders.

The gneisses of the southern part of the lake run in about the average direction of the length of the lake. The stream enters at the eastern end and the outlet is from a bay on the north shore, about two miles to the west.

From the south-western end there is a portage of a mile to the south, to a small lake draining to the upper part of Long-legged lake.

Lower Medicine Stone Lake

A short stream connects the two Medicine lakes falling into the eastern end of the lower. This is somewhat similar in character to the former, in that it is a long narrow lake, but it runs more towards the west. It is about the same length, but broadens out to nearly a mile at the western end. On the southern shore, which is low, is to be found only drift material, but the north side is bold, with hills of gneiss running to the west and rising steeply.

At its outlet, at the eastern end, on a low point surrounded by trees, is a tall boulder of gneiss, left standing on edge by the ice. The dimensions of this stone are: height above surface, fifteen feet; length, fifteen feet; breadth or thickness near the top, eight feet, narrowing near the ground to five. This stone was of course an object of wonder to the Indians, and offerings of tobacco, pipes, and other valuables have been made at its base for years. This lake has evidently derived its name from this "medicine stone."

The elevation of the upper lake is about sixty feet above Red lake, that of the lower one about fifty feet, and that of a long crooked lake below, near Red lake, about fifteen feet.

The stream leaves Lower Medicine Stone lake near the eastern end, and in half a mile reaches a small pond, on an island in which is found an exposure of light green porcellaneous rock, which is similar to some in the Huronian area. The band must be narrow, as on the next small lake to the north granite is seen, and this continues to near Red lake. The long crooked lake lying near Red lake is in a basin in the granite, and the fall at the outlet is across the contact with the Huronian.

In the angle formed between the two streams just described are several small lakes, which drain to the river between Keg lake and Gull Rock lake, but they were not examined. At the extreme west end of Red lake a small stream falls with heavy rapids into the long arm or bay south of Pipestone bay, called Trout bay. This drains a long crooked lake of clear water about seventy feet above and seven hundred yards south of the above arm, and, like the one to the east, lies in an area of granite, the river, as in the former case, falling in rapids from the contact line. The upward extension of this stream, which flows through several small lakes, passes through an area of apparently altered Huronian which has been split off from the Red lake band. The upper lake reached is altogether surrounded by granite.

The streams entering the northern side of Red lake are all of small size, with the exception of one near the north-east corner. This was ascended to near its source, where there is a portage to the headwaters of the southern branch of Berens river. Atick-o-meg wam-en-e-kan Sepi (whitefish-spawn river) is the Indian name for this stream, and it is much the largest entering Red lake. A short distance above its mouth rapids commence, and between Red lake and Little Vermilion lake there are four portages in a distance of less than two miles. These are all short, and at falls, in ascending order, of eight, six, six and three feet, respectively.

Little Vermilion lake, is about four miles in length, in a north-west direction, and is divided into two parts by a narrows. The western part is much the larger and contains many islands. Two small streams drain to this lake. The smaller enters at the north-east corner of the lower part, rising to the north-east in a large lake named Pine lake, while the other rises in several small crooked lakes lying to the north-west and empties into the north-west corner. Pine lake was not seen, but the Indians describe it as a fair-sized lake, having very few rock-exposures on its shores, with a surrounding country very sandy in its nature and clothed with scrub pine. The stream entering Little Vermilion lake on the north-west forms part of the through route northward to Berens river. For a couple of miles west it is wide and deep to a small lake divided by a narrow passage in the middle, the western part containing a number of islands. Above this the river is very crooked, and in its upper part it falls in a number of rapids, at which there are short portages. Gradually the hills approach the river, sandy ridges covered with scrub pine being succeeded by hills of granite. The stream is then a series of dead water stretches, separated by short falls. The average course up to the lakes at the height-of-land is north-west, and the distance from Little Vermilion lake to the portage at the height-of-land is about fifteen miles. The estimated fall from its source to Red lake is 100 feet.

The trail leading to White river, the southern branch of Berens river, is one mile in length, crossing ridges of granite and gneiss, fairly well covered by spruce and poplar. By readings of the aneroid barometer, the lakes on either side are at about the same elevation, while the ridge rises thirty or forty feet higher.

Trout Lake River

To the east of the high point, on the north side of Little Shallow lake, lies the mouth of this river in a low marshy bay. To the north-east, for seven miles, the country is low, so that the river runs with wide channel in a fairly straight course. The banks are from four to eight feet, rising gradually from the lake, where they are very low. The trees near the river are mostly poplar, with slender spruce on the lower land just behind. Occasionally Banksian pine is seen on the dryer parts. The first fall met with is over an accumulation of boulders, derived from a ridge of sand and boulders through which the river has evidently cut its way. At the foot of the fall the Indians form large camps in the autumn to catch whitefish as they are ascending the river to the spawning grounds. The banks immediately above are of sand, with boulders at the bottom. These are found of all sizes and colors, the largest being of dark green rock, probably transported but a short distance. The obstruction formed by these boulders, there being no rocks seen in place, causes a fall of ten feet.

For two miles and a half above the first fall the country seems low, and the river runs in a fairly even course from the north-east, but at this distance a heavy series of falls is encountered. Near this are exposed in the banks dark-green rocks, which at the fall are cut by light reddish granite. These are crossed by the river above, and evidently cause the fall, which is estimated at sixty feet, and a portage of four hundred yards is made on the north-west side. Above this a short distance is another series of short rapids round a long bend, amounting to a fall of ten feet. A portage of two hundred and fifty yards is made across the bend. A quarter of a mile north-west is the Manitou fall, where the channel contracts, and the water pours over a band of fine-grained gneiss, making a perpendicular fall of fifteen feet.

The direction of the river between these last two large falls is nearly at right-angles to its general course, and in this distance it appears to cross a wide band or area of intrusive granite. Above the Manitou fall, after a few irregular bends, it regains its former course. Cat fall, the next above, is a narrow chute between dark-green hornblende rock of eruptive origin. The descent is about four feet, and a portage is seldom made. Above this the river broadens and the current is sluggish. Two miles up the stream divides, the western branch coming from Trout lake, the eastern from Woman lake.

The stream from Trout lake leaves it by a bay at the south side, passing by a long narrow lake-expansion to the south-west, and turning east runs through Little Trout lake, following a course parallel to the strike of the gneisses. The outlet from this lake is at the east end, where the river follows a gradually narrowing channel, ending in a heavy rapid. Below, it becomes irregular, making a course of about three miles to reach a point two miles south-east. In this distance the river falls eighty feet and four portages are made, all rather short, the longest being about 300 yards. At the lowest one the trail runs over a ridge rising thirty feet above the river at the upper end, and by exposures on the trail the hill seemed to be principally of boulder-clay. Between this point and the junction with Woman Lake river the course is directly south, but with many minor bends and little falls through a swampy tract, in which hills of granite appear.

Woman Lake River

The stream joining Trout Lake river from the north-east is of about the same volume as that from Trout lake. Just above the junction, it comes rushing through a narrow rocky gorge in the granite and gneiss, falling fifty feet, past which there is a portage-road of half a mile in length. A quarter of a mile above, a small fall of fifteen feet is passed by a portage of 160 yards, when we reach Snake lake, the first of a series connected by short river-stretches, ending with Fly lake, which lies east of Woman lake, near the head-waters of the stream. The second in the chain is Little Bear lake, about thirty-five feet above Snake lake, the ascent being distributed among six small falls, in a stretch of a mile in length. A narrow and crooked lake, six miles in length, succeeds the expansion called Little Bear lake, and by a reach of river a mile in length is connected with the southern end of Woman lake.

Woman Lake

A long narrow lake expansion extends to the north-east for seven miles. Turning north, the lake widens to much larger dimensions, having an average width of a mile, for five miles of its course. This part is thickly dotted with islands, while the shores are bold, rising in high hills behind. The total length is about fourteen miles. At the northern end a small stream leads to a couple of lakes lying to the north-east. This is the most northerly point of the Woman lake basin, as a portage of a mile from the upper lake brings us to the waters flowing north-east to Cat Lake river and ultimately to James bay.

Three lakes to the south, lying east of Woman lake, drain directly north to this point. The first two are called Clearwater lakes, and the last Fly lake. They are long, narrow strips of water, with many islands, and are similar in character and surroundings to Woman lake. The fall from Fly lake, the head-waters of this branch, to Woman lake, is estimated at forty-two feet, or from Fly lake to the English river, at Mattawa, 451 feet.

It is found on passing through these lakes that they occupy a trough or troughs in dark Huronian rocks. Their narrow basins closely follow the strike of the beds.

Trout Lake

The position of this lake is to the north-east of Red and Gull Rock lakes, but a few miles from them. Its extreme length is sixteen miles and its breadth thirteen, with an average width of eight miles. Its greatest diameter lies about east-north-east, or almost parallel to that of Red lake, and nearly in the same general line. It is not, however, of the same broken and irregular character. Numerous islands are scattered through it, but in the central portion is a large open sheet of water. On the northern side are two large bays, the western one being a long narrow arm, stretching to the north-east, with a group of islands at its mouth. At the northern corner another large bay is found, almost filled with islands, and across its mouth a string of long islands extend from the eastern shore. The river leaves the lake at the south-west corner of a large bay on the south side. Eastward, another arm stretches for three or four miles, leaving a long peninsula, on the extreme end of which, in former times, the Hudson's Bay Company maintained a trading establishment.

The south-western shore is regular and is determined by a long ridge of morainic material, chiefly sand and boulders, which extends in a continuous line from the western extremity of the lake south-eastward, bordering the south-western shore of Little Trout lake, and apparently running in the same direction till it crosses the river at the lowest rapid. The height of this ridge just oposite Cat island on Trout lake was found by aneroid readings to be 270 feet above the lake.

Cat island, the only large island in the lake, rises in a high dome-shaped hill about 200 feet and seems to be covered with sand. The shores, especially of the southern part of the lake, differ materially from those of all the other lakes in the district, in that they are almost everywhere piled high with boulders. The peninsula lying between Cat island and the outlet is covered mainly with sand and gravel. The site of the Trout lake trading establishment is at the outlet, on a high ridge of this material about thirty feet above the lake. Good soil seems to have been found there for gardens on a small space near the foot of the slope. The place is now practically abandoned, except in the winter.

The streams entering Trout lake appear to be rather small. A little creek enters the bay at the western end, but a larger one entering at the extreme north of the lake is sometimes used by the Indians as a means of getting to Pine lake. The river is small and only light canoes are used. At the east side a small stream is ascended, and a long portage made to a long lake draining eastward to Woman lake.

The timber in the vicinity does not appear to be of importance, as the size is generally too small for commercial purposes. Banksian pine is the prevailing tree, and this generally grows in thick masses, so that the trunks are very slight. On the ridge to the south the undergrowth is of this scrub pine, and so close that it is difficult to find a way through. A few fair sized spruce trees are occasionally seen, and on the portages on the river below, wherever there is sufficient soil, a thick forest of small birch and poplar is found growing. Much of the low rocky country is covered by muskegs, with stunted spruce and tamarack.

The elevation of Trout lake is estimated as 1,295 feet above the sea, or one hundred and ninety feet above Shallow lake, and eighty feet above the forks of the river.

Wenassaga River

The streams flowing south to Lac Seul are none of them as large as Trout lake river. At the Manitoba narrows, a small stream enters from the north, called Manitou or Manitoba river. This was not explored, but is reported to be navigable for a short distance only.

At a mile from the western end of the lake a larger stream is found. This rises to the north-east, near the head-waters of a branch of Cat Lake river, and by means of a portage made from one to the other a short route to Rat Portage [5b] is formed. The lower part and the western branch were traversed in our trip through from Trout lake via Woman lake and Fly lake. The eastern branch was not explored, but a few notes on it are given by Mr. Fawcett in his report to the Surveyor General, from which the following extracts are taken:[6]

"Having heard of a canoe route from Cat lake to Lac Seul, which could be travelled in a short time, I determined to return that way at once, and started amid a violent snowstorm and before a driving wind, against which, had it been in our faces, we could not have made any headway. We retraced our route until Gull lake was reached, and following a channel for about two miles, which enters the lake on the west side, we came to another large lake, also called Gull lake, as it forms part of the same body of water, and it is about the same size as that part of the lake crossed by the traverse line, or about five miles in diameter. The shores of that part crossed by the line are pretty regular, but the westerly shores are deeply indented with large bays and offshoots from the lake. Ascending a small creek from Gull lake for about six miles, we reached the height-of-land portage, the first part of which was about three-quarters of a mile in length, and muskeg most of the way. We then came to a small lake which was frozen over, and were delayed for a time breaking a channel through the ice. After crossing two small lakes and three portages we reached a small stream, which, after a day's travel, attained the dimensions of a fair sized river, called by the Indians Wenassaga Measibi, which we followed to Lac Seul. By this route there are altogether twenty-seven portages from Cat lake to Mattawa, varying from one chain to about a mile in length. The highest single fall would not exceed thirty feet of a direct descent, but altogether the stream from its source to Lac Seul must fall from 400 to 500 feet; and as the stream is a large one, with a plentiful supply of water, it would afford any amount of force in the form of water-power, which could be utilized should the country ever become a manufacturing one. In a few places I noticed soil of vegetable mould and clay loam, which would be well suited for the growth of grain and vegetables should the climatic conditions be favourable. I also observed here that the best soil generally produced a growth of poplar, and wherever it appeared large and thrifty good soil might be looked for, comparatively free from rock. On the rocky ridges, as usual, scrubby pine was the prevailing timber, while the flats and muskegs were invariably covered with spruce and tamarack. The good land noticed seemed to be in belts three or four miles wide and extending north and south for a considerable distance, as might be expected from the geological formation, the depressions and elevations succeed each other in very regular order and much in the same direction. In places the spruce and tamarack would attain a growth of two feet in diameter and a good height, but this was not the rule—ten or twelve inches was about the average."

In its lower part this stream passes through two moderate sized lakes. The first, Wen-áste-ga-o lake, is situated at a couple of miles from Lac Seul, at an elevation of

5b Rat Portage is now called Kenora.

[6] Annual Report of the Department of the Interior, 1885, part II., p. 37.

sixteen feet above it. This fall in the river occasions three rapids, the first of which has a fall of six feet and is a mile from the mouth. A small rapid just above is next tracked up, above which to near the outlet of the lake the river is deep and easily navigated. Just at the outlet, a band of micaceous gneiss forms a barrier and the river falls three or four feet. A short portage on the west bank leads to the lake, which is three miles long and one broad. On the west side runs a high ridge of hills, of granite and gneiss. On the east the hills are lower, and the exposures of rock form flat glaciated surfaces, while in one locality the waters of the lake have worn into a bank of sand, laying bare fifteen feet of stratified beds. For some little distance up this river and past the next lake a small stratified deposit of sand fills the narrow valleys and depressions between rocky knolls. In the river above, the course of the stream is between ridges of gneiss running south-west. The river breaks through from one ridge to another, but the older valleys between these ridges appear to be filled in with the sand deposit.

Bluffy Lake and White-mud River

The two lakes through which the river runs are of much the same character, except that the upper one, Bluffy lake (Kah-mini-ta-gwa-qui-ack Sakahegan), is dotted with several islands, and one, a mile in length, divides it into two portions. The difference in level between these lakes is about sixty feet, which is found at two heavy falls near the outlet of the upper one. The first or lower rapid has a fall of nearly forty feet; then, at the outlet, is another of twenty feet over a ledge of mica schist. On the portage at the lower fall the rocks are very much twisted and broken into by dykes of reddish granites. At the upper one, less disturbance was noticed, while on the lake the beds are not contorted, but show considerable squeezing.

The total length of Bluffy lake is four miles and a halt, with a width of one mile. The timber on the islands and surrounding hills is principally black spruce, with Banksian pine showing occasionally on sandy tracts in the river-valleys. At the upper end of the lake a stream from the east enters by a wide mouth. The volume of water coming in is not great, as the channel soon contracts to a small stream with muddy water, evidently draining from a valley with soft clayey deposits. This stream was not explored, but with small light canoes it might be ascended for some distance. It is called White-mud river (Wab-an-unkie-Sepi).

The main stream for two or three miles above flows in a wide channel through a low country, with the borders of the stream rush-covered, and in many places wild rice is found growing thickly. A band of mica-schist crosses a bend in the river, causing falls of three or four feet at two places, between which is a small lake or pond. To the east, and connected by a narrow opening, lies a lake of over a mile in length, at the eastern end of which the Sand-bar river enters. This is said to drain several lakes lying farther to the east.

To the south are some sharp hills that have the appearance of being of the same nature as the ridge of gravel and sand seen at the north end of Shallow lake.

From the pond above mentioned to the forks, a distance of five miles, there are four small falls, one with a fall of three feet; two about half way, aggregating five feet; and one of four feet, half a mile below the forks.

The general direction from Lac Seul is north-east, but the main branch from near Cat Lake river seems to be coming more directly from the east, while the smaller branch is from the west-north-west, the two branches meeting in the same valley and the united stream leaving at right-angles to the branches. The western stream flows in a deep channel, bordered by a tall forest of poplar and birch. At two miles west a small lake is entered which has been gradually filling with silt and sand brought down by the stream from above. The inlet is on the western side, where a delta has been formed, stretching nearly across the lake. This is at present only a low grass and rush-covered flat, but shows clearly the effect of a settling basin for a small stream carrying fine sediment.

A series of falls or rapids amounting to twenty feet, just above the lake, is avoided by making a portage from the extreme northern end, 1,300 yards, to the river above. The upper part of the stream becomes very crooked, winding back and forth in the bottom of a valley between ridges of dark green schists running west of south. The immediate banks are low and generally composed of fine silt, the slope back being gradual, through swampy moss-covered ground, to a terrace of sandy material. Occasionally the stream cuts into the sides of the valley and shows stratified sands and silt.

The portage to Fly lake leaves this stream at a bend just below a heavy rapid where the river turns more to the east. An estimate by barometer readings gives the elevation of Fly lake as fifty feet above the stream at the foot of the portage, and the distance by pacing is half a mile.

Berens River Basin

The lower part of this stream was explored and surveyed by Mr. A. P. Low, of this Department, during the summer of 1886, while passing through to Hudson bay via the Severn river.[7] His route to the head-waters of the Severn led by Berens river to Fishing lake, just above the Grand rapids of Berens river. Thence he turned up a small branch coming from the northward, and by a number of portages reached the Severn river. Mention is made in his report of a large branch called the Mattawa, which rises near Cat lake, falling in at the south side of Fishing lake. From the fact that this branch apparently occupies the central position and is longer than any of the streams flowing in the basin drained by Berens river, it would seem that it should be considered the main part of the river. The lower portion is described as being a succession of chutes or short falls, with quiet water-stretches resembling the locks and reaches of a canal.

The larger lakes found on the course of the river to the eastern head-waters are, in ascending order, as follows: Family lake, on which the main Hudson's Bay Company's trading post for the inland district is established; Fishing lake, just above, the waters of which fall to Family lake by a heavy rapid, called Grand rapids, giving the name to the Hudson's Bay post. Above this, on the Mattawa branch, the first large lake is Eagle lake. This is followed by Rocky Island lake, Sandy Narrows lake, on which a Hudson's Bay post was at one time established, and Moose lake. These are generally connected by short river stretches, forming a chain lying in an average east-and-west direction. A long reach of river from the south, in which there are several rapids, drains Pekan-gi-kum (dirty water narrows) lake. Above this are Goose lake, Fairy lake and Upper Goose lake.

The detailed description of part of the river above Family lake to Moose lake is taken from unpublished information, the notes of the late Mr. A. S. Cochrane, who explored it in 1882. A rough sketch of the part above Moose lake to Pekan-gi-kum was made by A. W. Ponton, D.L.S., in 1888, while en route to the latter lake to locate and survey an Indian reserve.

Family Lake to Eagle Lake

The canoe route from Family lake eastward to Eagle lake leaves the main river and follows a string of small lakes in a more direct line, avoiding the long portage at the Grand rapids, and also the difficult navigation of the short stretch of river between Eagle lake and Fishing lake. By following an eastward extension of Family lake and ascending a small stream, with three short portages, a long, narrow lake is reached, which connects by a swampy channel with Eagle lake. The estimated difference in height between these two large lakes, Eagle lake and Family lake, is about fifty feet, and in time of highwater it is reported that an overflow from Eagle lake takes place down this valley. Eagle lake is very irregular in the outline sketched by Mr. Cochrane. The northern part, near the outlet, is full of islands, while the many channels around islands render it difficult to mark the eastern end.

The first rapid above is on one of a possible two channels, and has a fall of three feet. Farther up, the river expands into another lake, likewise full of islands. Mr. Ponton calls this Rocky Islands lake (Ka-sah-pah-wa-ka-muck Sakahegan). Isolated knolls situated near the shores are estimated to attain heights of one hundred and twenty-five and one hundred and fifty feet above the lake. This lake gradually contracts to river dimensions to the east, and a series of rapids occur, at which four portages are made, rising twenty-six feet to another expansion, which forms perhaps the largest or longest lake of the series—Sandy Narrows lake. This, like Rocky Island lake, is of very irregular shape. The route followed was mainly near the north shore, which maintains a fairly continuous line to the east-north-east. Bays running to the south-east, or large expansions partly inclosed by islands, are indicated on the sketch. On a point near the Sandy narrows was some time ago located a trading post of the Hudson's Bay Company. This may have been the "Albany House" marked on previous maps near this latitude. The extreme length given by Mr. Cochrane for this lake is thirty miles, in an east-north-east direction. The shores are flanked by hills averaging one hundred and fifty feet high.

The river enters at the north-east corner and comes from Moose lake, eight miles above, by the course of the river. In this distance the falls aggregate forty feet, with portages at four points. The northern branch above this, Crooked-mouth river, forms a route to Trout and Deer lakes to the north, and enters Moose lake at the north-west corner. The portage at the head of this branch, over the height-of-land, is in direct distance five miles north of Moose lake.

The main stream appears to enter at the south and comes from Pekangikum lake, at a distance of thirty miles. In this distance the river widens out in several narrow

[7] Annual Report, Geol. Sur. Can., vol. II. (N.S.), 1886, part F.

lake-like expansions, dotted with islands. Nearing Moose lake, it makes a long detour to the westward and back again, finally falling into a narrow arm at the south end, at the Eye rapids. There are four other rapids and portages on this stretch of river. The portages are mostly under a quarter of a mile, except one, which is three-quarters of a mile long.

Northern Branch, Berens River

Mr. Cochrane passed down by the northern branch through Moose lake, Sandy lake and Eagle lake to the Grand rapids. A few extracts from his notes serve to show the appearance of the country, on this route, at that time.

"The height-of-land portage (from the basin of Severn river) crosses a very low hill (about forty feet), at the south end, but it is for the greater distance over low marsh ground with some muskeg; and until Moose lake was reached the Crooked-mouth river continued to pass through low swampy ground. The only change in the country noted to Sandy Narrows lake is in its timber, which is mostly better, owing, no doubt, to some good soil being near the river. Indeed, in two or three places good clayey soil was seen, but only in small patches.

"The shores of Moose lake have all been burned over long ago, and are now characterized by brulé and second-growth. On other parts of this river to Sandy lake some good tamarack has been seen, occasionally twelve to fourteen inches in diameter. Spruce is about the same size, while Banksian pine is not larger than ten inches.

"Sandy lake, through which we passed (and at the foot of which I obtained a very satisfactory observation for latitude, 52° 04′ 54″) is, generally speaking, surrounded by rocky hills averaging 100 feet, now fairly covered with the usual second-growth, amongst which is a good deal of green timber. The shores of this lake, as also those of the next below (Rocky Island lake) are mostly rocky, though an occasional short sandy tract is to be seen between the rocky points. About three-quarters of the way down the lake, is what is called the Sandy Narrows, at which the lake becomes constricted and is bordered on both sides by low sandy banks. The bottom, except for a narrow channel at one side, is also sand, and the water too shallow for canoes.

"The river connecting these lakes is a tolerably large one. The portages are made mostly at falls and chutes with steep tracks. They are, however, all short ones and in good order. Soil of good quality was seen at only one point, viz., the second portage below Sandy lake, where it is a stiff grayish-clay with a slight covering of dark sand. It does not, however, appear to extend beyond the point across which the portage has been made."

The notes relative to the rocks of this part of the river and lakes traversed are given below:—

Moose lake, south side: Coarse, dark-gray, massive granite; glacial striæ, S. 85° W.

Eastern end of Sandy lake: Dark-gray and grayish-brown gneiss; dip N. 30°; striæ, S. 75° W.

Two miles from east end of above lake: Dark-gray gneiss containing large quantities of hornblende and some iron; highly polished surface.

Sandy lake two miles east of Sandy narrows: Very coarse dark and light brownish-gray gneiss, containing a few small transparent amber-coloured grains of quartz and much hornblende; dip N.E. at a high angle; striæ, S. 75° W.

Western side of Eagle lake: Coarse dark and light gray micaceous gneiss; dip, N. 20°.

Eastern end Family lake: Dark gray gneiss; dip, E. 25° N.

Dark gray gneiss seems to be the prevailing rock of all this region.

Indian Reserve

The land reserved for the Indians on the upper part of this branch of Berens river is a small tract situated on the north side of a long arm or narrows, running to the eastward, from a lake to which the name Pekangikum is given. The river enters at the eastern end of this area, coming from Sturgeon lake by a short stretch of river half a mile in length, in which there are two rapids. The Indian reserve appears fairly well timbered—principally with Banksian pine of slender growth and some spruce. The Indians have been able, in building their houses, to obtain timber of suitable size for the walls and rafters, and spruce of a diameter of fourteen inches is fairly plentiful. The shores of the lake are rocky, but strips of country appear inland, on which there is probably a fair quality of soil, though the surface is generally sandy. On one of the islands in the larger part of the lake, soil of good quality (clay) was seen, on which the Indians were growing potatoes. No doubt there is better land for this purpose on the reserve they have selected, but as they make their summer camp on a small island near the deeper part of the lake for the purpose of fishing—by which they mainly subsist—they naturally utilize the nearest land for their summer gardens.

The Dirty-water narrows, which runs eastward from the reserve, is about eight miles in length, and averages very little over a quarter of a mile in width. The shores are mostly rocky, but not very high and generally moss-covered, with a thick growth of small spruce and Banksian pine. At the end of the bay or arm, an abrupt turn south is made to the first rapid above the lake. This is in a narrow gorge, but at ordinary water there is very little fall (three feet, 8th July, 1893), and the portage is ten yards across a low rocky barrier, stretching into the channel. In high water, this rock would be covered and the river must fill the whole width of the gorge. Half a mile south of this, at the south-east corner of a small basin, there is a fall of eleven feet over a wide ledge at the western end of Sturgeon lake. The high-water mark in the basin between the falls was six feet above the actual level, an effect due to the contracted channel at the lower fall, compared with the wider one of the upper.

The lake above this is a long narrow one, with a great number of islands scattered along its length, which is nearly seven miles. The width does not average over a mile. The direction of the length of the lake is, for the first half, east by south, then north-east. The shores are mostly high rocky hills, in many places burnt over, and the timber is small. Near the north-eastern end, the shores along the southern side become low and better wooded. The river enters on the west side, one mile from the extreme end of the lake, flowing through low land, evidently a delta deposit. It is now well timbered with spruce, poplar and birch, of fair size.

Above Sturgeon Lake

The river makes three long bends before any swift current is encountered, and at about seven miles the first rapid is met. This is situated about three miles in a direct line north-east from the lake, and is called Mick-kai-ame Pow-estick. There is here a fall of thirty feet over gneiss, very much broken by veins and dykes of red granite. The portage is on the north side, 350 yards in length, over a steep hill of sand and boulders. This appears to be a ridge of drift material which crosses the river at this point, and, by Indian report, continues to the southward to the Trout lake ridge.

Above this the river turns more to the east, and several small rapids occur, up which the canoes are handed, till at three miles the stream divides, the northern branch, Throat river, being the one followed on the route to Cat lake, the southern, the route toward Woman lake. These two branches are of much the same size. Half a mile up the southern branch is the Otter fall, of fifteen feet, where there is a portage of two hundred and thirty yards. Above this the river, to the next fall, comes from the south; the banks are mostly low and rocky and the timber is a mixture of spruce, tamarack, poplar and birch. After following a crooked course of two miles of this nature, there is another fall of eight feet, Pin-un-ge Pow-estick, or Child falls, with a portage of seventy yards on the south side, through small spruce.

From this fall to the mouth of Windfall creek, eight miles in direct distance to the east, the river gradually rises by small rapids, there being three portages, the first at two miles across a sharp bend through woods of Banksian pine to avoid a rough rapid with fall of five feet, the second at a long rapid, and the third a short distance above, where an island, on which is the portage, divides the channel. The banks are mostly low and swampy to past Windfall creek, and with sluggish current to Hair lake. Tamarack and spruce are the principal trees, small in size, growing in low, swampy ground. Occasionally a small knoll is seen, with poplar and willow scrub. The channel from the mouth of Windfall creek to Hair lake is nearly straight, running about east and west, the distance being about eight miles.

Owl creek, a small stream, enters a mile below Hair lake, coming from the south-east. Hair lake is about one mile and a half in length, lying north-and-south. The river enters at the south-east corner and leaves by the south-west. The distance across the southern end is about a mile, and the shore, there low, slopes gradually to the lake, of which the bed appears to be shallow, as most of the southern part of the lake through which we passed is dotted here and there with slender rushes, possibly suggesting the name to the natives. In the northern portion there is deeper water, and whitefish are said to have been caught there.

A distance of only a mile separates this from Goose lake, and at half the distance is the White Dog fall, a descent of eighteen feet.

Above Sturgeon lake, on this branch, there are but three lakes of any size, namely, Goose lake, Fairy lake, and Upper Goose lake. These are all situated near together, separated by short river-stretches. The first is four miles in length, by one mile wide, lying east-south-east and west-north-west. The river enters at the east end and leaves at the west. Hudson's Bay Company had an outpost established at the eastern end in former years, but it is long since abandoned. A short length of river connects with Fairy lake to the south-east. At a mile up this is Woman fall, the highest on this part of the river. Here there is a drop of forty-five feet, in a narrow gorge, over ledges of gneiss forming a series of steps. The portage is on the north side, of one hundred and twenty yards, through poplar and spruce woods. A little farther on another fall occurs, of twenty feet, with a portage of two hundred yards. This ends at a small lake, from which a wide channel to the south connects with the north end of Fairy lake, which is thus at least sixty-five feet above Goose lake. We entered at the north, and travelled a mile and a half along the eastern shore to the mouth of the incoming river. The main body of the lake stretches away to the south, as a narrow area of less than a mile in width and perhaps five miles total length. The south-eastern shores are low, the higher land bordering the western side. The third lake of this series is called Upper Goose lake, or, more literally, "the lake where they kill geese," and is three miles east of Fairy lake. The river connecting them is broad, deep and sluggish. The lake is less than five miles long and is slightly wider than the last. The longer diameter lies east-and-west, the river entering at the western extremity.

Above this are two small lakes through which the river passes, and between them is a fall of four feet at the "Eagle rapid." A mile above the upper one, the river divides, the eastern branch being the Whitefish river while the southern one is the main stream. This then turns south and passes through a low swampy tract for three miles, when, nearing some rugged hills, it becomes less sluggish and small rapids are met with. The main part of the stream then turns to the west, coming from a series of lakes in the hilly region. A small branch falls by a series of shallow rapids to this stream, which branch was followed in order to reach the height-of-land to the east, making two portages of one hundred and eighty yards each, rising ten feet to a swampy tract in which the stream is deep and sluggish but very crooked. Portages are made at several shallow rapids, to the height-of-land. The direction of this latter part is to the south-south-east and a distance of twelve miles, the estimated fall in which is over eighty-five feet.

Southern Branch of Berens River or White River

The largest of the tributaries of Berens river, coming from the south, is the White river which enters at Pekangikum, at the extreme southern end of the lake. This stream comes from a point directly south at a distance of twenty-five miles, and passes through two or three crooked lakes, falling in that distance over two hundred feet. This estimated fall is merely the sum of the falls on the river with an estimate for current. The greatest is that at the first long portage where it is sixty feet, the rest being made up of a number of smaller rapids and chutes. There are twelve portages to reach the height-of-land, mostly short. The last is the longest, being over a mile in length. In following this small stream upwards, it gradually contracts in size, until near the head-waters it is so small that the whole distance between the last two lakes has to be portaged. This portage, over a mile in length, starts in a tamarack and spruce muskeg, moss-covered, but eventually reaches higher ground with mixed timber, mainly hills of sandy, boulder-strewn material. The prevailing tree is Banksian pine, and towards the eastern end of the trail this has been thinned out by fires and wind storms, leaving a grove (at the far end) averaging ten to twelve inches in diameter.

Just below the lake-stretches, near the height-of-land, the river cuts through sand hills, forming a deep valley, and at one of the portages clay was noticed resting directly on the rock, the sand evidently lying above it.

Estimated Heigths of Lakes

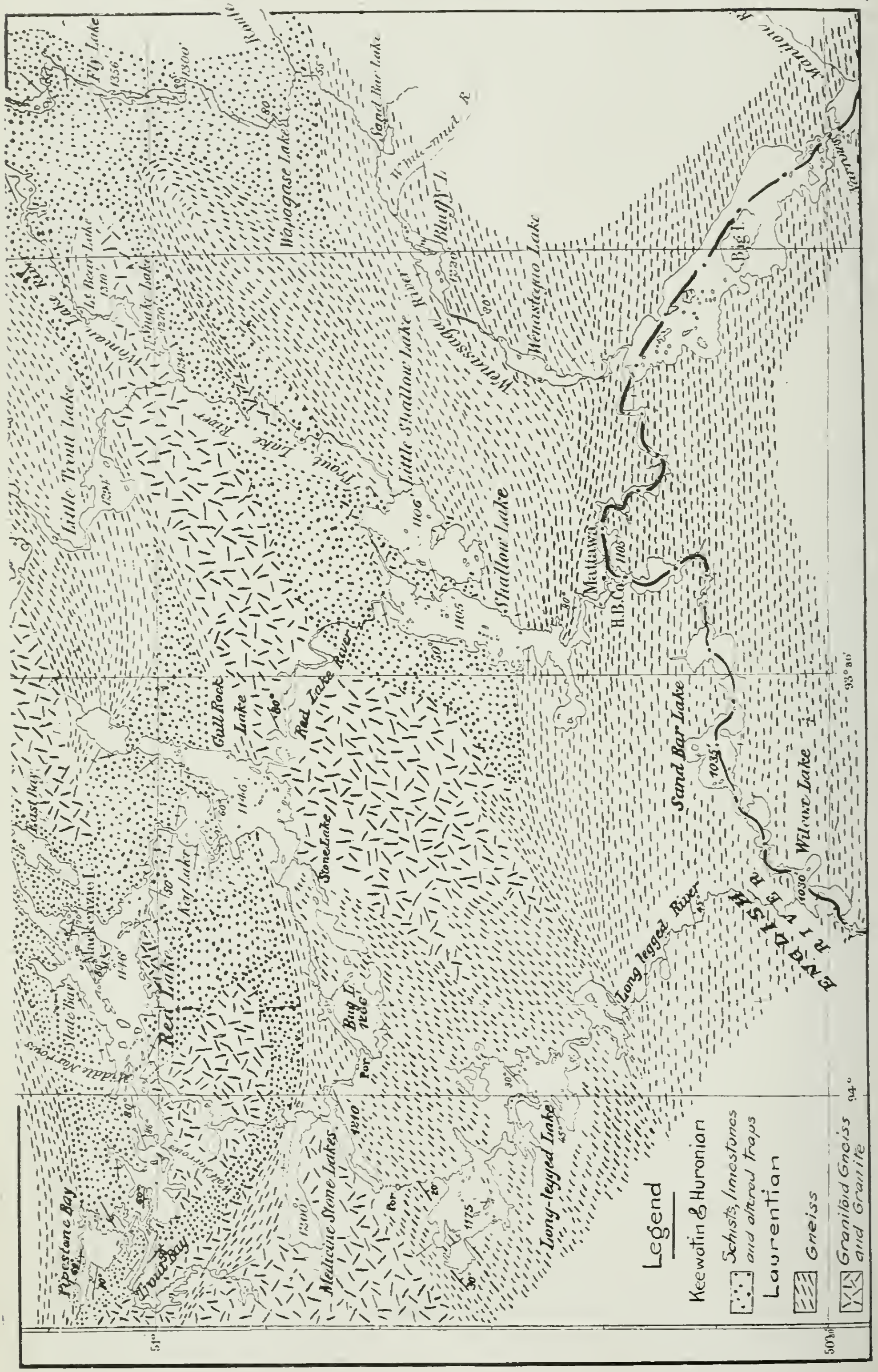
A series of estimations of the falls and rapids in the river was carried through from Lac Seul to Pekan-gi-kum, on Berens river, via White river, and thence up the eastern branch to the head-waters of Cat Lake river, and south by Trout Lake river to Lac Seul.

The results are given for those lakes in the area drained by Berens river, and are the estimated heights above sea-level in feet, assuming Lac Seul as being 1,140 feet.

		Feet.
Lake at height-of-land, White river		1,250
Lake at latitude 51° 25′, on White river		1,225
Lake at latitude 51° 33′, on White river		1,175
Below Long Portage, latitude 51° 37′, White river		1,100
White lake, White river		1,040
Pekan-gi-kum lake, Berens river		1,037
Sturgeon lake,	"	1,051
Hair lake,	"	1,178
Goose lake,	"	1,196
Fairy lake,	"	1,261
Upper Goose lake,	"	1,262
Lake at height-of-land to Cat Lake river		1,350

GEOLOGICAL FEATURES

In the country under consideration, the rocks exposed are all Archæan, consisting of geisses and associated granites, classed generally as Laurentian, and folded schists and greenstones of the Huronian. In many respects these rocks are counterparts of



Southwest Corner, District of Patricia.

those found in the district farther south on the Lake of the Woods and Rainy lake. The northern boundary of the large Huronian (Keewatin) areas already explored there, is roughly on a line from Rat Portage to the foot of Minnietakie lake. North of this a band of gneisses occupying the shores of Lac Seul and the English river, is succeeded by a similar series to that on the south. The irregular form assumed by these Huronian areas, in both districts, is no doubt the result of simultaneous crustal movements. The Laurentian gneisses are the prevailing rocks of the whole region, and their association here with the folded schists, greenstones and rocks of apparent sedimentary origin, is of special interest in view of the auriferous nature of many of the quartz-veins found cutting similar rocks in the vicinity of Rainy lake and Lake of the Woods.

[Most of the rocks classed as Huronian in this report should, under the nomenclature now in use, be called Keewatin.—W. G. M.]

Former Explorations

A part of the area has been briefly referred to in former reports of this Survey:—

Dr. Selwyn,[8] in 1872, in describing a journey from Lake Superior to Lake Winnipeg, passing by English river through Lac Seul, calls attention more particularly to the soil and drift deposits, and instances the sands and clays in the valley of the English river as being of greater extent, than farther south and west on the Winnipeg river, except perhaps on the lower part near Lake Winnipeg. In speaking in a general way of this district he says[9]:—" There are no prominent hills or even ridges; the highest elevations do not probably exceed four or five hundred feet above the intervening waters; and I think it is no exaggeration to say that the latter occupy fully one half of the whole surface area of the region. The surface is gently broken and undulating, and often rocky, but occasionally both lakes and rivers, are bordered either by extensive swampy flats or by banks of stratified sand, silt and clay, which often rise terrace-like at a short distance from the water's edge. The point on which the Lonely Lake Post stands is formed of these deposits, and to the westward of the post, along the north shore, they are exposed in cliff sections for several miles. At the junction of the Mattawa [Shallow Lake river] and English rivers, where a small Indian village and trading post is situated, presided over by Chief Pierre, there are similar banks of sand and sandy clay, resting on the ordinary gray Laurentian gneiss, which is exposed along the water's edge. The banks here rise steeply to about thirty feet above the water, and for some distance inland the country seems to be tolerably level, and the soil on this part of the river appears to be generally of fair quality."

Dr. Bell,[10] who accompanied Dr. Selwyn on this expedition, reports more fully on the rocks met with. Of those seen on Lac Seul or Lonely lake he says[11]:—

" The rocks observed around the shores of the western section of this lake consist entirely of Laurentian gneiss, all having a west-south-westerly strike. We noted many varieties among these rocks, but none of them are remarkable or require special description. . . . About the outlet the gneiss is very micaceous ,and is cut by numerous granite veins, mostly running with the strike which is here nearly due west. The granite, as in many other places, may here indicate the proximity of a band of Huronian schists. The Indians at the mouth of the Mattawa [or Shallow Lake] river showed us specimens of a soft, gray, uncrystalline slate, which they carve into pipes, and informed us that they obtained it from the solid rock at Omimini Sagaigan or Red Paint lake, which, from their description, would appear to lie about five miles north of the junction of the two rivers. These facts appear to show the existence of another band of Huronian rocks, which, judging from the strike, would be identical with the one observed before the junction of the English with the Mattawa river."

In 1883 Dr. Bell again visited this region and made a survey of the Mattawa and Red Lake rivers to Red lake. In the Summary Report for that year, he gives a short account of his route to Red lake. The notes bearing on the geology of this area are contained in the following paragraph.[12]

" A very careful track-survey was next made of Red lake itself, as its shores proved to be of great geological interest. The whole lake (which is of considerable size) lies within a wide belt of Huronian rocks, among which several of the rarer varieties are well developed, and they were found to contain some interesting minerals. The narrow belt of Huronian rocks, which, in 1872, we conjectured would pass a few miles to the northward of the junction of the English and Mattawa rivers, was actually found in the position and strike it was then supposed to have."

The Laurentian

Gneisses referred to the Laurentian were seen on the White and Berens rivers, on Lac Seul and on the English and Mattawa rivers. At the head-waters of Berens river,

[8] Report of Progress Geol. Surv. Can., for 1872-73, pp. 8-18. [9] Ibid., p. 16. [10] Ibid., 1872-73, pp. 87-111. [11] Ibid., p. 103. [12] Ibid., 1882-83-84, p. 5

large masses of unfoliated granite seem to break into the gneisses and in other parts similar granite cuts the darker rocks of the Huronian. In the Lac Seul area the strike is very uniform, generally trending to the west, but this extends northward only a few miles from English river. On the river from Long-legged lake the western trend is maintained to near the outlet, and on Shallow lake, to a point about one-third the distance up the lake. Up the Wenassaga river this uniformity of strike does not seem to continue far from Lac Seul, as on the portage below Bluffy lake the rocks become very much crumpled up. This crumpling is seen in the rocks on the east side of Shallow lake and shows a line of weakness running from south of Bluffy lake to Shallow lake and thence to the outlet of Long-legged lake.

Rocks of Lac Seul or Lonely Lake

The beds from the outlet eastward are generally gneisses and mica-schists, with interbedded light-coloured granites all trending about east and west. Near Big island they run west-south-west and east-north-east, and at the narrows at the western end of the island, many red granite veins break into the beds, altering them to a slightly lighter gray. On the south side of the island is a long exposure of a reddish granite which breaks easily, like a sandstone. This is, however, found to be cut by the red veins of granite which also cut the gneiss. At the Shanty narrows, the rock is a light granite or slightly foliated gneiss interbedded with garnetiferous mica-schists, and the strike bends from west-south-west to south-west, but quickly turns again to an east and west direction. At the Manitou narrows the rock is a whitish granite, with a few streaks of dark foliated rock made up of fragments flattened out and somewhat rounded at the ends. Near the long point west of Stony point, a small island is found to be composed of light-coloured crystalline granite, with slight signs of foliation.

Three miles east of Stony point, a small island, connected by a gravel bar to the mainland, is composed of dark-green bedded rocks. They are standing on edge, striking about east-north-east and are found on several of the islands lying on that line. The main shore to the north is of granite, very like that on Big Island, and it here contains many fragments of the green rocks, forming a brecciated contact. A wide dyke of graphitic granite cuts through the beds on the point, but whether it connects with the granite of the mainland or cuts it as well, was not ascertained.

On English river, the beds at the outlet are very much wrinkled, and at the first rapid, bands of dark mica-schist and dark-gray gneiss, interleaved with coarse whitish granite, are seen. Below the second rapid, on the point opposite the portage, the beds are very much broken and twisted, so that pieces of the darker bands are broken off and carried forward in the mass. A coarse gray granite showing some foliation occurs at Mattawa, and is followed two or three miles up the Mattawa river by dark hornblende-schists with a general east-and-west strike. At the elbow, about half way to Shallow lake, red granite dykes are seen cutting the schists. The south-western arm of Shallow lake is principally surrounded by hills of gneiss and granite of the Lac Seul type, ending at a point three miles and a half north of the outlet, where the gray gneiss is found to contain rounded masses of darker inclusions. Across the lake, half a mile north, dark fine grained mica-schists, very much crumpled, are cut by salmon-coloured granite. These may possibly be altered beds belonging to the same series as the rocks of the north-western part of the lake, and this point would then be about the northern limit of the Lac Seul Laurentian band.

Below Mattawa, the river widens to a small lake that discharges in a series of rapids, along the banks of which light granite-gneiss, running west-south-west is found, and occupies the sides of the stream to the next fall, the river running in a trough parallel to the strike. Bands of mica-schist become frequent, and on breaking through these to the south the river falls into Barnston lake. Gneisses which call for no special remark are seen on the banks of the lakes, forming expansions on this part of the English river.

The stream from Long-legged lake which falls into Wilcox lake was explored and mapped. The rocks are mostly a repetition of those on the English river and maintain a nearly uniform strike to the westward, varying locally, the altitude being generally vertical. but occasionally a dip of 45° south was found as the extreme variation. Fewer exposures are seen on these small rivers, owing to the current not being able to wear away the surface covering.

The northward continuation of the Laurentian of Lac Seul, on the Wenassaga river, is found to show some changes in character. On Lac Seul a series of granites is found interbedded with mica-schists. On the upper part of the Wenastegao lake, and on the river above to near Bluffy lake, little change except that of the strike was noticed; but at the long portage, as noted before, the beds are very much crumpled and folded, over a short distance, and on Bluffy lake return to a uniform south-west and north-east strike. Following these beds north-eastward, they are found to curve slightly more to the east, and at the east end of the lake are running about west-south-west and east-north-east.

The gneisses are generally reddish to gray, and specimens taken from a small island near the eastern end, show layers composed of nearly pure quartz. On a smooth surface, this rock is seen to be made up of a series of lenticular grains which are the result of subsequent squeezing and perhaps shearing while in a plastic condition. The gneisses seem to have the same structure.

At the entrance to the river above this lake, is an exposure of dark gray felspar-mica gneiss. The grains of felspar are very even in size, of a light colour and surrounded by flakes of black mica. Streaks of granular quartz run parallel to the foliation. The next exposures are near the outlet of Sand-bar lake, where a ridge of dark gray gneissic schist crosses the valley. Along the north shore the rocks are mostly a dark mica-schist, cut through by dykes of light, very coarsely chrystalline granite. On the river above, the schists form another dam and fall, where light gray gneiss is followed by a wide band of fine-grained schistose gneiss. The rocks exposed on the river above are probably of Huronian age, but the contact between the two series must be concealed by the surface covering, as the river for a short distance runs through a low swampy flat where no rock is seen.

Rocks of Long-Legged Lake

Just at the entrance to the lowest lake of the series a band of dark fine-grained horneblende-schist is found at the rapid. The strike of the gneisses about a mile below this is almost directly west, but half way between, a dark fine-grained gneiss strikes to the west-south-west, and at the upper rapid, where the fine-grained hornblende-schists are seen, the strike has turned to the south-west, which direction of strike is maintained to the west end of these lakes. It is thus shown by the line of weakness traced to the eastward, by crumpling and a change of strike, that a distinction is here to be drawn between the Lac Seul type of Laurentian, as found in the river, and the gneisses of the Long-legged lakes, which all trend to the south-west, or nearly at an angle of 45° to the former rocks.

On the lower lake are chiefly granites and gneisses. On the south-east shore are gneisses with a light porphyritic granite, and at the south end of the bay, the granite is found to hold dark oval patches or inclusions, while on the point south of the opening to the second lake, are masses of dark hornblende-schist which look like outlying fragments of Huronian, included in the foliated granite. These rocks are immediately followed to the west by dark gneiss. Passing through a narrows, the second lake is entered, and here the rocks are generally gray and red granite-gneiss; the exception being a small island of light-green fine-grained rock resembling that of the Huronian, but its relation to the surrounding gneiss could not be seen. On the west shore, a band of dark schist touches the shore and occupies a long island, but is followed by light-coloured gneiss, and this again by reddish gneiss and granite. On the narrows just at the entrance to the last lake, a band of dark-green coarsely crystalline rock was found, similar to some of those seen on the Red Lake river, and there supposed to be an eruptive associated with the Huronian series. Near the west end of this bay, another band of dark rocks was seen, the intervening beds being generally light-coloured gneisses.

This recurrence of the dark bands at intervals of two or three miles suggests the possibility of their being the lower edges of a series of folds of the Huronian. They seem to be accompanied in nearly every case by a few broken patches of dark inclusions in the adjacent beds, and in the case of the first one, on the west side of the lower lake, the continuation of the band on the south shore was indicated merely by such fragments in the gneissic rock.

On the hills to the south-west the beds are horizontal, but soon take a dip to the south-east; a mile east the dip is south-east 20°, at the second lake it is southeast 30° to 45°, and at the outlet the beds are almost vertical.

The absence of anything in the nature of mica-schist is a character of the gneisses of Long-legged lake and also of those to the north-east on Bug lake and Gull lake, and the grouping of these rocks together, as being of common origin, is suggested from their being nearly on the same line of strike and separated by a very short interval in distance.

To the north-east of this group of lakes, on Gull lake and the small lake lying to the east, is found an area in which light, slightly foliated granite is the prevailing rock. This, at its contact with the Huronian of the west shore, has sent long, finger-like masses between the beds, separting them. Fragments are found in the granite at some distance from the contact, and a band lying to the south of the Huronian seems to be made up entirely of these fragments cemented together by the granite. At a greater distance to the south, these fragmentary rocks gradually assume the aspect of altered beds cut into by the granite in veins and dykes.

On the Upper Medicine Stone lake, a mass of granite forming a triangle between the two lakes, deflects these altered beds to thé south-west, and it is possible that the gneisses of the lakes to the south of this may be a continuation of highly altered beds similar to those above, but in which the gneisses and foliated granites are also cut by a red granite. The larger dykes of granite cutting these gneisses at the western end of Long-legged lake are of a light red, and suggest a possible connection with the large granite mass of the west shore of Medicine Stone lake, while the granites and foliated granites found cutting, and interbedded with, the gneisses and dark-green schists of the middle and eastern lakes, are probably connected with the granite area east of Gull lake.

Rocks of Trout Lake

The Trout lake area is probably all Laurentian, but the existence of Huronian in the immediate vicinity is to be conjectured from dark metamorphosed rocks in fragments and small masses held in the gneisses at several localities.

At the outlet of Little Trout lake, a small band of dark rocks very much seamed by red granite veins, is accompanied by granites and gneisses. This, by reference to the map, will be found to be a probable continuation of the south-west extreme of the Woman lake beds. The south shore on the continuation of this strike was not visited, but it is quite probable that traces of this band might be found connecting this area with the Red lake series.

Another locality presenting somewhat similar features is at the western extreme of Trout lake, where the gneiss contains spotted bands looking like conglomerate pebbles of dark rock with a matrix of lighter colour.

On the narrow water connecting Little Trout lake with the larger one are beds of gray gneiss, the foliation running about south-west. The same strike was found to be common to the gneisses of the south-eastern part of the lake. Few exposures are seen on the south-west side and they are of an unfoliated granite, but on the extreme western end they become more gneissic, running about west.

On one of the points at the entrance to the western bay occurs the spotted band mentioned above. The whole point is foliated in a direction about north-west and south-east, the plane of foliation dipping south-west 60°. Half a mile north-west the point is a mass of reddish gneiss; the foliation is distinct but the mass is lighter coloured than the last and is nearer to a granite. Across the bay to the north, on the extreme north-western shore, the rock is a dark gray gneiss with foliation running to the north-east, cut by many seams of red granite. Eastward on the north shore, the gneisses are light gray and red, and of much the same character, preserving a general north-east and south-west strike.

North of Red lake, the Laurentian rocks are found to touch the northern shore of Pipestone bay, and the hills north of a long arm on the north side look like granite, while on the lake, veins of granite cut the schists. The contact is evidently near at hand, and a short distance up the Whitefish Spawning river is an exposure of somewhat greenish granite, which seems to include small masses and crystalls of a dark green hornblende or pyroxene giving it a darkened colouring.

Farther north, the granites are lighter in colour and show slight foliation. On the small lake above Little Vermilion lake, the rock is a light-red fine-grained granite, and little variation, except in respect to traces of foliation, is observed on the upper waters of this stream. Red granite is observed on the height-of-land portage, and on the lakes forming the head-waters of the streams flowing north and south.

The granite at the head of Pipestone bay, near the contact, shows some traces of green colouration from the Huronian rocks, more especially along cleavage planes. The foliation is slight and the colour is reddish, mottled with gray, fine, granular material which increases near the contact. The broken inclusions of Huronian schists, so common at other contacts, were not noticed along the north side.

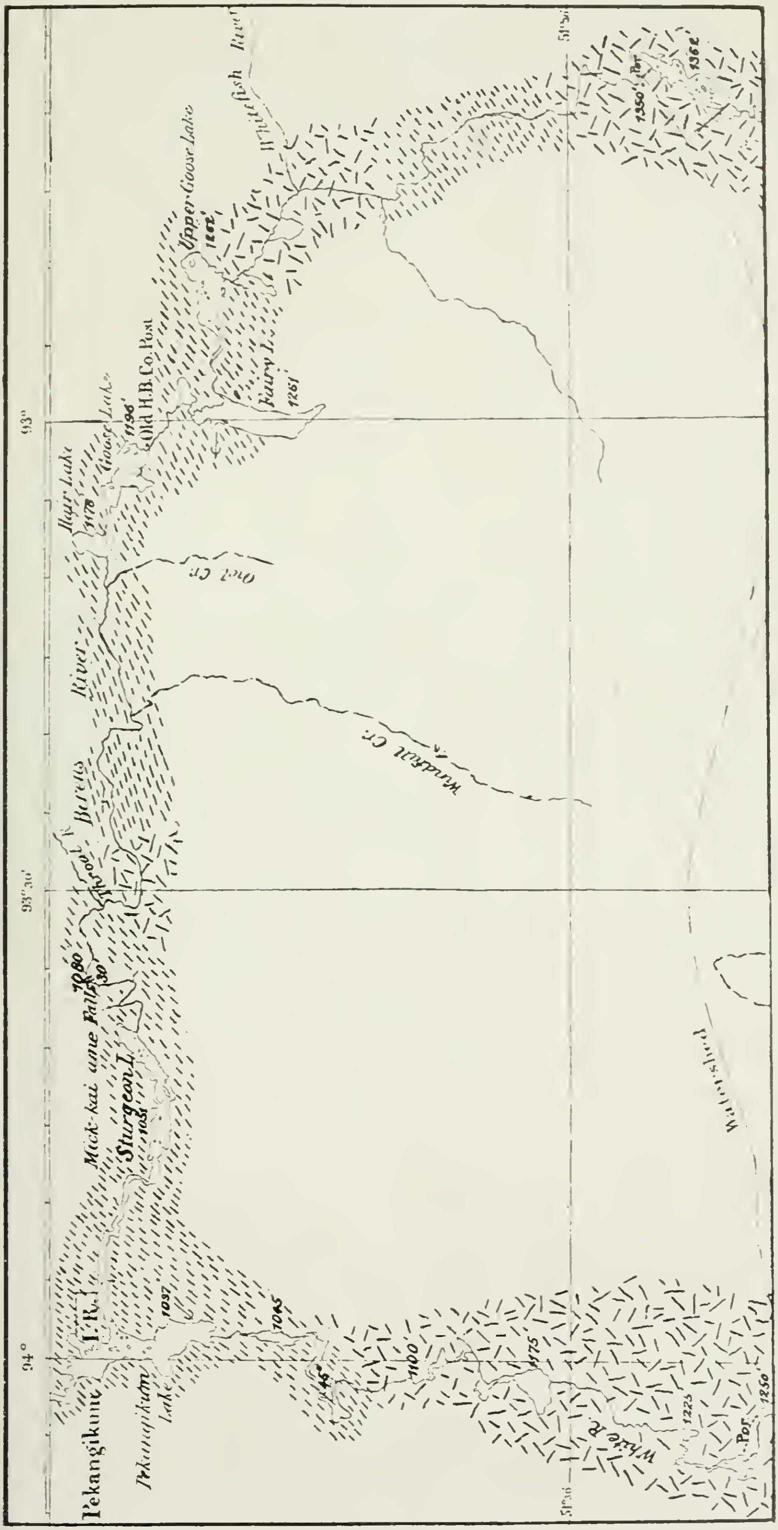
Rocks of Berens River

The geological character of the country lying north of the height-of-land to Berens River is given altogether by exposures of gneisses and granites, with intrusive dykes, and the small areas of reddish granite mentioned as being near the height-of-land and in the vicinity of the Mic-kai-ame fall. A strongly banded gneiss is found on the lower part of White river and eastward beyond Sturgeon lake, when granite of a light reddish colour, possibly intrusive, is followed by gneisses cut by many dykes of granite. The head of the eastern branch explored above Goose lake is in a small lake of which the shores are mostly composed of red granite. This extends southward to near Sha-boom-ene lake, where gneiss is again found in contact with Huronian schists, the contact being of a broken nature, generally following the strike of the schists to the south-west. Angular patches of dark rocks are found, included in the gneisses as at other localities previously described.

Granite Areas of the South Shore of Red Lake

The following notes refer to the granites of the south shore of Red lake:—

The first of these, near the outlet of Red lake, is altogether surrounded by the Huronian of the Red lake area. The contact, as far as it could be traced among the



Pekangikum Lake and Berens River.
(See map page 31 for geological legend.)

islands, is evidently that of an intrusive mass breaking up through a bedded series. Fragments of the beds are included in the granite and alteration of both fragments and adjoining beds is also a feature.

The south shore of the western half of the lake is also found to be of red granite of about the same general aspect, being light in colour and rather fine grained. This appears to penetrate into fissures and cracks in its contact with the Huronian. The line of contact which crosses the arm of the lake, touching the north shore and cutting off points, is found to take a somewhat sinuous course. The break does not always follow the bedding of the schists, but in many places is seen to cut across them at various low angles.

This mass is probably surrounded by the schists and greenstones of the Huronian, making a long oval area lying east-and-west, as at the western end the schists are striking to the south of the granite area, and again on the south side, green fine-grained beds readily correlated with the clastic rocks of Red lake, are met just north of Medicine Stone lake. This probably forms a narrow belt, which, passing north of Bug lake, joins the main mass on the west side of Keg lake.

This mass, with a skirting of Huronian, resembles in shape those areas already mapped in detail near Rainy lake, but the broken nature of the contact on the north side would suggest a rather violent separation of the narrow band from the main series and the interposition of an eruptive mass of granite.

Outlying bands of gneiss south of the narrow band of Huronian mentioned above, are possibly highly altered schists. These are seen on the north shore of Medicine Stone lake, the south shore of Upper Medicine Stone lake, and on the stream south-east of a small lake lying to the west. Other masses of the red granite are found between the two Medicine Stone lakes and on the small lake to the west. The relation of these isolated areas of granite to the Laurentian gneisses of the region to the south-east has not been clearly determined.

Huronian

The series of schists, limestones and bedded materials originally of volcanic origin, here mapped as Huronian, in many respects lithologically resemble the larger areas to the south which have been designated by the local name Keewatin; but the presence of dark-blue limestone and of conglomerates with jasper pebbles, both very similar to those of the typical Huronian area north of Lake Huron, renders the propriety of extending the name Keewatin to these rocks doubtful. The Couchiching, supposed by Dr. Lawson to underlie the Keewatin in the Rainy lake country, is possibly represented here by the small area west of Shallow lake, but strata which most resemble the typical rocks of this series are found on Gull Rock lake, and are seen to be only highly altered beds in contact with the Laurentian, which when followed along the strike, away from the contact, change very materially and resume the general aspect of the rest of the Huronian.

The contact with the gneissic rocks and granites of the region was found to be generally of a brecciated character, the gneisses and granites while in a plastic condition surrounding and inclosing the Huronian schists.[13]

Rocks of the Shallow Lake Area

As before noted in the Summary Report for 1883, a small patch of Huronian rocks was seen on this lake by Dr. Bell. The junction of the Laurentian gneisses with these rocks occurs on the west shore, at about three miles and a half north from the outlet. Gray gneiss, striking westward, occupies the shore to the first large bay. On one of the islands in this bay on which the Indians have small gardens, is a series of black gneisses very much twisted. On the mainland opposite, the gray gneiss gives place to dark gneiss very much seamed with granite veins, and in the gneiss are included fragments which apparently are broken from the darker series. The exact point of contact was not seen, but the attitude of the beds on each side, is that of a dark series very much twisted up by heat and pressure, becoming broken and fissured and finally disappearing in a much altered condition as fragments held in the mass of adjacent gray gneissic rock of which the strike is directly across the general trend of the dark beds.

Following the shore northward, the beds very soon lose their folded character and are found with a uniform strike to the north, afterward turning to the north-east with an easy curve. The general trend of the series is nearly parallel to the shore-line, so that the bed which is found at the mouth of Red Lake river would cross the points at the north-west corner, touching the shore at the bottom of the bays, thence turning south, would pass just clear of the west side and finally would be crumpled up near the contact, thus on the lake shore a very narrow section of the series is found. In going westward, this section consists of, first, dark semi-crystalline schists or gneisses,

[13] With further reference to the nature of the contacts or lines of junction here described, and the inclusion of Huronian fragments in the gneissic rocks, see Lawson's reports on the Lake of the Woods and Rainy River. Annual Reports, Geol. Surv. Can. (N.S.), vol. I., p. 62CC and vol. II., p. 23F.

a band of dark-green hornblende-rock, in places rendered schistose and in others mainly a trap, and lastly the beds at the mouth of the river, which are a dark-green, fine-grained rock, well stratified and apparently clastic,, resembling beds within the larger Huronian areas. On the river, few exposures are to be seen. At the foot of the first rapid, dark hornblende-schists are exposed, followed in a short distance, at the second fall, by coarsely-crystalline hornblendic eruptive rock, which is similar to that on Shallow lake. The thickness of the section can scarcely be estimated, as the western boundary was not seen, but the presence of angular granite boulders, which had evidently not been carried far, containing inclusions of dark rocks, would place this line just above the second rapid, or at a distance of two miles from the mouth of the river. A small eastward extension of the series is found on the narrow point separating the two Shallow lakes. These beds have an average south-west strike, and appear to have formed a nearly separate area from the rocks of the west shore, while a series of granite with a varying amount of foliation has occupied the gap between, which is probably one main break with several lesser ones in the form of dykes, generally cutting into the mass along the bedding planes. The islands in the centre of the lake and near the east shore are all of gneissoid granite. The main shore at the outlet of Little Shallow lake, is a light granite with greenish tinge and numerous small crystals of light-green hornblende. This rock probably occupies the trough or valley of the connecting stream, as it is found again at the mouth, on Shallow lake.

The Huronian rocks extend to the eastward on Little Shallow lake, nearly to the mouth of Trout Lake river and occupy the west shore to near the south-west corner. The division line passes not far from the west shore making a light curve. The long point from the east shore appears to be mainly reddish granite and the small island opposite, near the shore is composed mainly of gneissoid granite. At the contact, near the south-west corner of the lake, the beds are found to show a great amount of metamorphism which decreases as the line of contact is left. A coarse-grained, whitish, gneissic granite, containing silvery scales of mica and whitish felspar, is found in contact with a dark gray gneissic schist, which is succeeded by dark-green, rusty-weathering, coarse-grained schist and a dull fine-grained gneiss. The shore northward for a couple of miles is occupied by a fine-grained, dark gneiss which resembles that of the west shore of the larger lake. From opposite the long point to the outlet, several beds are found of a dark, fine-grained stratified rock containing a great amount of magnetite and specular iron. These beds may prove to be of future use as ore-deposits.

The north-eastward extension of the series follows the high ridge west of Trout Lake river, crossing this stream somewhere below the big fall. The first exposure is of a light grayish-green, quartzose mica-schist, which is probably a squeezed gneiss. This is associated with beds of a dark green to gray fine-grained material which is probably an altered sedimentary rock.

The granite dyke, which breaks into the mass at the fall, is followed above, on the river, by dark-green hornblende-schists, and by a coarser crystalline hornblende-rock resembling the bands of eruptive rock on the north side of Shallow lake. The northward extension above is hidden, and we next see the granites which extend to Trout lake. It is quite possible that the beds, which here are striking north-east and south-west, may continue to the north-eastward and join the area of Huronian exposed around Woman lake, but of this there is no certainty.

Rocks of the Woman Lake Area

Our explorations in this district were along two routes near together and probably at the extreme western edge of the Huronian area, as the beds very likely run much farther to the eastward than we had the opportunity of seeing.

Our routes were from Shaboomene lake (in the Cat lake basin) through Woman lake and down the Trout Lake river, and again from Trout lake eastward via a long narrow lake to Woman lake, thence up stream to Clearwater lake (lying east of Woman lake), directly south up stream to Fly lake and thence down by the Wenassaga river to Lac Seul. On the former route, we met with the western boundary of this series on the Shaboomene lake, where a series of foliated granites are found in contact with dark-gray schists and garnetiferous gneisses, which appear near the western border of the series. The gneiss is cut by dykes of light-coloured greenish-gray trap which is not seen in the foliated granites to the north. The beds following this are of green schist. The western boundary of the Huronian, includes a narrow strip along the west shore and cuts across a bay to the south side of the lake, leaving the northern part and a small patch on the south-western side, in the Laurentian; while part of the west shore, the south and the southern half of the east shore are composed of Huronian rocks. The bay at the south end, from which the portage is made, is surrounded by rather steep shores of light-green altered volcanic rocks, fine-grained and compact, with many small shrinkage cracks filled with calcite.

The portage to a small lake above Woman lake is over a high ridge of dark green, squeezed and altered quartz-porphry. The same bed is found again on the north end of

Woman lake on a continuation of the strike to the south-west. Down the west shore, the succeeding beds are evidently of volcanic origin—light-green diorites and ashy-weathering agglomerates. Near the south end, at the narrowest point, a dark series of cherty rocks follows the west shore and passes away to the south-west, followed again at the bend by beds of dark, fine-grained, thin-bedded rocks, of which some are thoroughly filled with iron pyrites and magnetite. Medicine rock, just out of water in the centre of the channel, is apparently a mass of ore, while the weathered pyrites supplies the Indians with "medicine."

In the river at the outlet of the lake, the last rock-exposure is of a dark green-felsite, and on the first lake below—Little Bear lake—the rock is a gray gneissoid granite with included fragments of a dark colour which were supposed to be highly metamorphosed pieces from the Huronian.

The route from Trout lake through this area is up a very small stream to the eastward for about five miles to a small lake. Here dark, green eruptives are seen, but the portage of two miles to the south takes us back again into gneiss, and the long lake there reached runs along the strike of these rocks. The contact with the Huronian occurs on a narrow strait leading northward to another arm of this lake, and its occurrence was indicated in advance by the presence, in the gneiss, of an increasing number of dark patches, apparently inclusions.

The attitude of the beds is somewhat similar, the schists first found dipping north 45°, while the gneisses near the contact are very nearly in the same position.

Along the eastern extension of this lake the rocks are principally green and massive, but in places rendered schistose by pressure and then frequently splitting into thin plates. Near the eastern end, seams of white calcite are found generally interlaminated with the beds, but sometimes breaking through them and holding fragments from the sides. The massive green rocks often show small blots and lenticular patches of easily weathered material, which leaves cavities on the surface. On the portage to Woman lake, the rock has the appearance of having been very much shattered and subsequently squeezed into schists along the lines of fracture.

On the first Clearwater lake, the rocks near the north end are massive green diorites, but toward the south they become more schistose and the bedding or cleavage runs south-west parallel to the general direction of that on Woman lake. Very fine grained, gray-green, massive looking porcelaneous rock, breaking with conchoidal fracture, is found on the last portage leading to the second Clearwater lake. This was not seen in contact with the rest of the series, but is probably one of the eruptives found in the Huronian. At the south end of the lake, a light yellowish-green, squeezed quartz-porphyry occurs, which is very similar to the beds at the north end of Woman lake.

The course of the river, through the string of lakes, has been somewhat parallel to the strike or bedding, but from Clearwater lake eastward, for two miles, it cuts across this direction, and another series of long narrow lakes is drained. The first of these lies in a north-east and south-west direction, with a narrow bay extending two miles to the south and connecting by a small stream with another long narrow lake lying farther south. The rocks here are rather fine-grained greenstones, with a fine porcelaneous surface of fracture.

At the portage to Fly lake, a light-green rock, evenly spotted with ash-coloured irregular markings on the weathered surface, is found. It is uniformly dark-green on fresh fracture, a coarsely crystalline hornblende-rock in which the bedding could not be made out.

Fly lake lies in the same trough as the lake north of it, and runs nearly north-and-south, the strike of the rocks following nearly the direction of the shores. At the north end, a dark-green massive rock prevails. Toward the south end, fine-grained bedded rocks which have the appearance of being altered sedimentary materials are first met with.

The strike of the beds is to the south, but near the south end of Fly lake this turns south-south-west, and on the Wenassaga river to the east, varies from south-south-west to south-west.

On the portage eastward from Fly lake, light-green quartzose beds are followed by coarsely srystalline hornblende rock. Down the stream, dark hornblende schists are seen on the side of the valley, and on the long portage to Wapagase lake, several ridges of the same dark-green coarse hornblende-rock are crossed, while at the eastern end, near the lake, schists are found which are apparently of the same composition, but show a secondary crystallization of the hornblende, a common contact phenomenon.

A few exposures of a thin bedded quartzite or quartzose schist are to be found at the small rapids below, all striking south-west to west-south-west, and at the little lake near the mouth of Sand-bar lake, gray gneisses, which possibly belong to the Laurentian, occur. The junction between the two formations was not seen, and the exact southern boundary of the Huronian was therefore not established.

The western outline of the area of Huronian rocks above described is probably very sinuous, beginning to the west of Shaboomene lake, making a long point toward Trout lake and taking in part of a long narrow lake, then forming a long tapering arm including Woman lake and touching the eastern end of Little Trout lake, with a very uncertain southern edge, reaching to near the Sand-bar river branch of the Wenassaga river.

Rocks of the Red Lake Area

The Huronian area of Red lake and vicinity is, on account of the greater variety of rocks included by it, of more interest than those previously described. The exact boundaries of its rocks are determined only by those exposures of contacts which are to be seen on the lake shore and on the streams explored, so that the connecting lines between such exposures are necessarily somewhat uncertain. The northern side of the lake touches the Laurentian only on Pipestone bay, and on Whitefish Spawning river the contact is a short distance from the lake, The boundary is thus conjectural between these points. To the south, the boundary is seen at several places on the lake, as appears by the map appended. There two large oval areas of granite come up through the Huronian rocks, and these granites, by the nature of the contact, are evidently intrusions. The complete section was not worked out, owing to lack of time.

The western bay of the lake, Pipestone bay, affords the best opportunity of studying an almost continuous exposure of the beds across the strike. It was found to present, with Trout bay to the south, a series of highly inclined beds representing possibly many folds which have assumed the general form of an anticline, the axis running east-and-west occupying the area of Pipestone bay. The beds on the north, in contact with the gneiss, dip northward at angles varying from 60° to 80°. At the centre and near the south side they are nearly vertical. Southward through the narrows, the inclination is south, varying from 50° to 80° from the horizontal. A synclinal fold with its axis running north-west, brings the beds up again on the south shore of Trout bay, where they strike along the general direction of the south shore of this arm. The continuation of this to the south-east probably forms a narrow belt, passing near Medicine Stone lake and joining the same rocks at Gull Rock lake.

The composition of the series in these folds appears to be as follows, in ascending order:—

1. Dark green schists, probably squeezed volcanic material, together with a more crystalline hornblende-rock which appears to be eruptive.

2. Yellowish-white, rusty-weathering, dolomitic limestone holding irregular nodules of a cherty nature. These beds in some places are more or less quartzose owing to the greater or less prevalence of the cherty masses. Alternating with them are greenstones which are occasionally altered to a soft chlorite or pot-stone, the pipe-stone of the Indians. In this form, an example is found in the narrows leading to Pipestone bay, where a bed of one foot in thickness lies between beds of rusty dolomite.

3. Beds of slate and schist, mostly black and dark-green, are found to intervene between the first rusty beds and a second series above.

4. The second series of rusty-weathering dolomites is preceded by a bed of squeezed and altered quartz-porphyry of ten feet in thickness. The dolomite is in a thicker bed, and, like the first, very much spotted with dark-weathering irregular masses of cherty quartzose material.

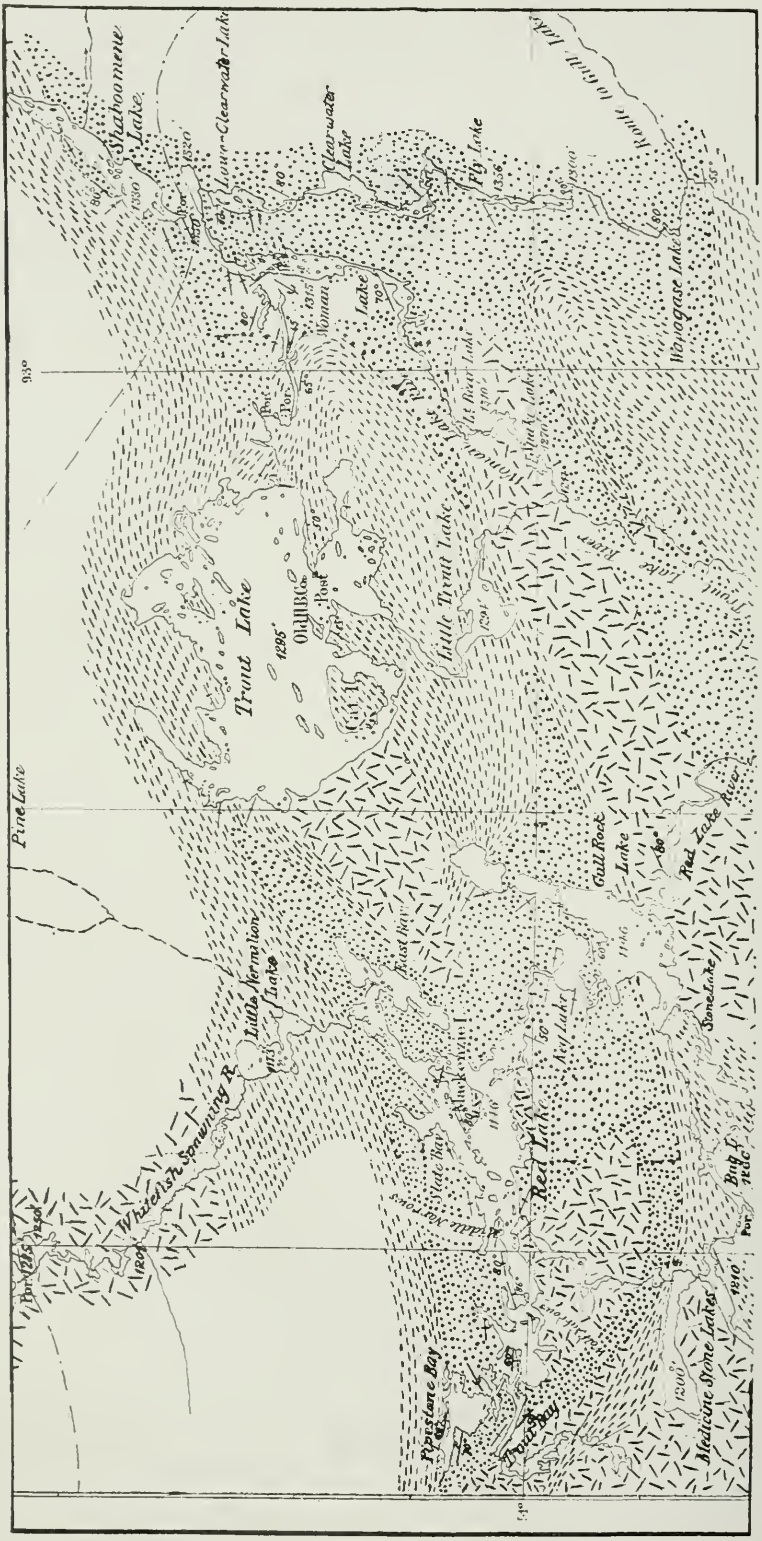
Above this is another band of altered quartz-porphyry, which is in the form of a gray hornstone with numerous blebs of quartz.

In other parts of the section, these beds can be with difficulty followed, but may become altered to varieties of slates, schists and quartzites, while layers of greenstone, perhaps of volcanic origin, are found interstratified or forming lenticular masses between the beds, often seemingly occupying the place of other members of the section.

The beds crossing the central portion of Pipestone bay, possibly representing the lower members of the series, are nearly altogether of alternate layers of greenstone and green schists, often becoming chlorite schist. Succeeding them to the north, a series of highly quartzose felsites, occupying probably a similar position to the lower dolomites of the south side, weather to light colours and assume the appearance of quartzites.

In the northward extension, which should represent the upper part of the section, the first band of altered quartz-porphyries and cherty dolomites only is found in contact with a band of dark diorites and hornblende-rocks, which extends to the contact with the Laurentian.

In a bay just north of the Wolf narrows, a band having the appearance of a conglomerate is found, with occasional pebbles of red banded jasper and others of a light-yellowish quartzite, but the majority of the pebbles are of a dark purplish-gray to green with a matrix of the same colour. The thickness of the band is about ten feet, and the associated rock is of a greenish to gray colour in rather thin beds. The position of this bed is probably represented by a band of conglomerate which follows north of the slates



Red and Trout Lakes Area (See map page 34 for geological legend.)

exposed on the north side of Slate bay. These slates, a fine-grained argillite in composition, are generally black and thin bedded, with many jointage planes dividing them into small pieces less than a foot in length.

At the eastern end of the lake, dark blue limestones are found associated with these beds, but as the strata there are apparently much folded, the relations of the two classes of rock could not be ascertained.

The rocks on the south shore of Granite bay, as well as the points on the north, are all of a light reddish granite in which the foliation is very slight. Wherever noted, this is nearly parallel to the general line of the northern border, dipping towards it at a low angle.

The line of contact of the Huronian schists is seen in many places, beginning on the west at the narrows from Trout bay, where it cuts off two small islands lying in front of the opening. Thence it crosses Marble bay, and the beds on the point to the east are cut at an angle of 45° by the granite, which occupies the point and also the western face of a small round island where the schists abut directly on it. The large island to the south is mainly granite, with only the slender point at the east end of Huronian. At the Wolf narrows, both shores are granite, the line of contact following nearly the line of bedding of the schists, and cuts off the northern point. In the bay to the east, the granite has been eroded to the contact-line, and along the shore small patches of it are found clinging to the face of a high cliff, while seams of the same material occur, running north into the mass of the darker rocks. This shore is thus chiefly composed of Huronian rocks, but generally represented by a dark crystalline rock which looks somewhat like a diorite squeezed in some places to a crystalline schist.

The granite of the south shore is replaced at the Middle narrows by black schists and dark-green rocks which strike south-by-east, apparently the same beds which border the north shore of the bay to the east. The contact line bends around from the north shore, touching the islands, and strikes the south shore just south of the narrows. There the contact is a sharp line running with the strike, but having a few parallel dykes of granite, apparently filling breaks made along the bedding near the contact. A few scattered dark angular fragments are seen in the granite.

The rocks of Marble bay, on the north, are continuations of the altered quartz-porphyry and rusty cherty bed which is seen directly to the west. These are followed to the north-east by fine-grained light-green altered rocks and by a small area of white calcite with many dark irregular markings which are very similar to those in the yellow beds before mentioned. This area of white marble-like rock does not seem to form a well defined bed, but looks rather like an irregular mass. At the end of the bay, dark crystalline rock is seen, altered to a serpentine or something of that nature.

The eastern part of the lake is divided into two parts by a string of islands, with a large one, Mackenzie island, at the north end. The northern part forms a long narrow arm running to the north-east and is named Slate bay, from the many exposures of this rock running parallel to the north shore, and also exposed on the north shore of Mackenzie island. The slate band of the north shore is found to be flanked on both sides by agglomerate. That on the south side is a dark-green mass, in which large lumps of slightly harder rock are cemented together by material similar in colour, but weathering somewhat more readily. Fractures along the bedding show a very lumpy surface. This bed may prove to be of volcanic origin, and it was recognized in two places, on a point at the west end of the bay and on another opposite Mackenzie island.

On the northern edge of the slate band, a narrow strip of lighter coloured slate, holding lumps or grains of quartz, was found. The possibility that this is a much squeezed and altered quartz-porphyry, is suggested not only by its appearance, but from the position it seems to occupy in the section, where it is apparently a continuation of the bed seen on Marble bay. This is followed northward by a bed of argillaceous slate, making a total breadth for the slate bands of nearly a quarter of a mile.

A band of cherty rocks, holding pebbles of much the same nature, occurs at the north side of a bay near the west end, and again appears north of the slates, in a deep bay northward from the centre of Mackenzie island. Still farther north, after passing some dykes of fine-grained diorite, similar pebbly rocks are cut by granite dykes, which are apparently offshoots from a mass that seems to compose the hills at a short distance north of this arm.

On the north end of Mackenzie island and on the mainland to the east, dark blue limestones are found associated with dark schists. These rocks strike to the south of east on Mackenzie island, but north-west this changes gradually, till in the narrows leading to Whitefish bay they are running north-east and parallel to those on the north side. They seem to form a broad curved band coming from East bay and abutting on the schists and slates of Slate bay. In the narrows above, the rocks are fine-grained, black schists, and in East bay the principal rock seems to be a dark-green schist,, which maintains a nearly uniform strike of south-east by south. On the west shore are dark greenish-blue limestones, followed by yellow rusty-weathering cherty dolomites or limestones, which are probable continuations of some of the limestone beds of Mackenzie island. The attitude of these is generally vertical, but occasionally they dip to the west. On the eastern shore of East bay several large dyke-like masses of granite, generally light-gray, cut the beds, and probably indicate the proximity of the granite which occupies the shores of Trout lake to the east.

The northern point of Mackenzie island shows beds evidently very much disturbed. Their strikes converge on a point just west of the island, dipping on the north point at a high angle to the north, to the south of this point, towards the south, and lastly, along the western shore, they dip to the west, apparently passing under the slates exposed on the west side of the island. The position of the dark-blue limestones would appear to be lower in the series than the slates though as there is possibly a great dislocation as well as folding, this is uncertain.

The bay to the south, or near the outlet of the lakes, is found to have been eroded through the centre of an oval area of intrusive granite, which occupies a part of the south shore, several small islands in the middle, parts of islands near the outlet and the southern part of Mackenzie island. The contact with the Huronian on all sides shows the intrusive nature of this granite mass.

The schists on the south strike approximately parallel to the contact, following around the granite, while on the east and north, the beds are more broken up and have been replaced by the granite. Part of the beds which pass to the south do not reappear on the west, and are evidently broken off. The main mass of the rocks of the south shore, west of the granite, are black hornblende-schists and eruptives, and these beds are seen again at the outlet and thence to Keg lake, but a series of fine-grained greenish-gray, thinly laminated, chloritic schists, with lenticular patches and thin partings of calcite, lie to the north. These end at the granite, appearing only on its eastern side.

Rocks of Keg Lake and Gull Rock Lake

On Keg lake, beside the dark schists, a very quartzose, fine-grained, black rock, holding crystals of quartz, is found at the outlet, followed by spotted green rocks, which may prove to be agglomerates. Near Gull Rock lake, after passing fine-grained green eruptives, we find dark green schists at the west side of the lake in a vertical attitude, striking about west-south-west. These beds occupy the eastern part of the narrow neck separating the two lakes, and probably cross in that direction to the west. A mass of granite is found on the extreme south-eastern end of this point. Farther north, beds, which are continuations of those on Keg lake and the river above, are seen crossing the lake, but possibly do not extend much farther. On the small lake to the northward of Gull Rock lake, a small portion only of the shore is of Huronian rock, as the main part to the north-east is of granite and gneiss.

The schists on the west shore near the outlet seem to be vertical, running north-and-south, while a short distance northward, they run east-south-east and west-north-west, showing a good deal of disturbance near their eastern contact with the granites.

On the islands in the southern part of Gull Rock lake, masses of dark schists are found everywhere in contact with the granite, and often completely surrounded, so that the contact line is nowhere definite. The exposures are small, but the larger pieces of bedded rock appear to preserve their strike, so that many are possibly beds separated by finger-like intrusions of the granite; but on nearly all the islands many fragments are found completely inclosed in the granite.

To the south-west, somewhat the same appearance is noticed, especially on the river coming from Bug lake. Fragments are there found in the granite, forming a belt of broken gneissic and granitic rocks, which borders the Huronian along nearly its whole southern and eastern limit.

Superficial Geology

The surfaces of the Archæan rocks in this area are all more or less rounded and sometimes polished by glacial action.

Striæ are not well preserved on the surface of granite and gneiss, but in sheltered spots, as under boulders, they can be made out. On the finer-grained rocks of the Huronian, the surface is generally highly polished and the striæ are more distinct. The general direction is 22° to 40° west of south. The variations are caused by deflections in the direction of valleys or depressions through which the ice flowed. On the higher ground, the direction is more uniform and averages S. 30° W.

The material left by the glacier is of two types, an unmodified till or boulder-clay, and a stratified or re-assorted deposit in the form of fine clay, silt, and stratified sands. The till is found rather sparingly spread over nearly the whole area, immediately on the surface of the harder rocks, and has been in turn covered, in some localities, by the stratified sands and silts. A high ridge of sand, boulders and well rounded gravel, is approximately the northern and eastern boundary of these silts.

This ridge, or series of ridges, as found bordering the south side of Trout lake, is seen again south of Little Trout lake, and crosses the valley of Trout Lake river above the first rapid. Hills, which are supposed to be similar in character, are seen south of Sand-bar lake on the Wenassaga river, and it is believed that the ridge may extend eastward to the head of Lac Seul. Northward, its extension is uncertain, but the Indians report a continuation from west of Trout lake to Berens river at Mick-kai-ame fall, or just east of Sturgeon lake, where there is a ridge of sand and gravel with boulders crossing the valley.

The top of the ridge, south of Trout lake, is a series of closely placed narrow hills or parallel ridges, steep on the northern face and more gradually sloping to the south, averaging about 270 feet above Trout lake or 1,575 feet above the sea. The material seen on the northern slope is sand and gravel with rounded boulders. Several steps or terraces are also noted, but they continue but short distances, and from the lake no such continuous line can be traced. On the surface of the ridge, large boulders are found, the crest being well covered with them, but they occupy a narrow belt only, as the slope to the south, though less abrupt than to the north, commences immediately. The general appearance of the ridge is not that of an ordinary land moraine, but suggests a moraine or accumulation along the front of an ice-sheet terminating in water of considerable depth, in which the débris has been somewhat evenly distributed.

To the north of this ridge, in the Trout lake country, there is a light coating of sand and gravel, but a much greater number of boulders is seen on the surface than to the south. The same in a less degree is true of the region to the east. On Trout lake, the large island named Cat island is capped by, and appears to be mostly composed of sand and gravel similar to that of the big ridge, and is of about the same elevation. Other hills immediately north of the ridge may possibly be of the same nature.

South of the ridge, the boulder-clay is found in a great many places to be covered by stratified deposits, and a number of occurrences may be cited.

On Lac Seul, at the Hudson's Bay Company's post, terraces of sand show sections on the lake shore of twenty to thirty feet of clearly stratified beds with clay partings. In one instance, several feet in length of a thin bed is contorted, evidently from the pressure of a large mass of floating ice. The beds beneath and above are not so disturbed.

On the south shore, cliffs of sand, which reach a height of about eighty or one hundred feet, are apparently continuations of the terraces at the post, and are no doubt stratified likewise.

On Wenastegao lake, just north of the western end of Lac Seul, stratified beds of sand, fifteen to twenty feet thick, are seen on the eastern shore. The valley of the Mattawa is characterized by stratified material containing more clay or silt, but capped by sands at about the level of Lac Seul. Again, on the streams coming from the north, the country cut through is found to have a considerable depth of stratified deposits in the valleys, which, although partly river deposit, is nevertheless often spread over a wide plain, as at the east of Little Shoal lake, and then seems to be earlier than the present river-valley.

On Gull Rock lake, beds of sand averaging twenty feet are shown in cliffs on the south-west side, and similar deposits are also found in some parts of Red lake. To the south, on Long-legged lake, there is not apparently so much of this stratified material, but local examples of sand-banks are found on the English river below Mattawa.

It might seem probable that the high ridge to the north indicates the eastern limit of the great glacial Lake Agassiz, because of its great elevation and the undoubted lake-deposit on its western and southern front. There appears to be, however, no definite information that these deposits continue beyond the basin occupied by Lac Seul, Shallow lake, Gull Rock lake and Red lake, and they may thus indicate a lake of much smaller dimensions. At present, there seems no reason to suppose that the outlet of this basin through the valley of the English river, had ever been dammed up to a greater extent than eighty feet by morainic deposits, but a possible barrier might have been formed by the presence of two small confluent glaciers on the higher ground on either side.

Between the hills bordering the west shore of Shallow lake and the ridge running north-east from the northern end of the lake, there is a wide, low flat, through which the Red Lake river runs, but two rather prominent hills seem partially to bar the exit of this stream, and it finally reaches Shallow lake by making a detour to the east around them. They are seen to be narrow ridges lying about west-south-west and east-north-east, and from exposures on their slopes, are known to consist almost wholly of boulders and gravel, well polished and rounded. Their height above the surrounding low country was found to be about 170 feet. The crest of each is a narrow ridge sloping abruptly on each side. Large angular boulders of gneiss and granite are found on the southern slope. The northern is in the form of three or four narrow terrace-like steps, showing only the well-rounded gravel and boulders on faces of the steeper slopes. The origin of these hills is probably the same as that of the Trout lake ridge, except that the position and direction would appear to indicate that they are lateral moraines. Smaller ridges of morainic material are crossed or cut through by the same stream a short distance to the north-west.

In the valley of the upper waters of Berens river, the mantle of drift is of a variable thickness. On the height-of-land on the south and east, there seems to be very little but loose boulders, with some sand and clay. Lower in the basin, there is more sand with the same abundance of boulders. In one place on the lower part of White river, dark clay was found lying immediately above the rock, with sand on the surface.

Glacial markings and polishing are here again everywhere noticeable, but on weathered surfaces not very distinct. The general direction of glaciation appears to have been from the north-west. At the south end of Pekangikum Lake the striæ run S. 36° W., but farther to the east on Fairy lake they run west, thus showing considerable local deflection.

At the first fall above Sturgeon lake, a ridge of sand and gravel seems to be cut by the river. High banks of sand and gravel are shown at the portage and a ridge is said to extend to the south a long distance. On the White river, about south-west from the above place, the stream cuts through a deposit of sand and boulders. No section was seen, but the bed of the stream contains an increased number of boulders.

The agricultural possibilities of this valley seem to be limited, and the areas suitable for cultivation are only to be found in isolated patches. These are principally in the neighbourhood of the larger lakes. The Indian reserves have been located with this end in view as they seem to cover about the best land seen. The soil is a light gray clay with a little vegetable mould, and the gardens made by the Indians produce potatoes of fair quality, the only vegetable grown.

In the southern part of the district, better land is found and in greater extent than in the Berens River valley. On Lac Seul, at the mission and trading post, there are several very good gardens in a flourishing condition, with all the ordinary vegetables growing very satisfactorily. The Indians appear to care little for any gardening except a very primitive attempt at raising potatoes.

Land suitable for gardening was seen at Mattawa, and indeed the best and largest extent for this purpose is to be found between Lac Seul and Shallow lake. The country is well covered by timber, but of small average growth. The sandy-tracts are generally wooded by Banksian pine, but in the river-valleys and on the heavier land, poplar, birch and spruce are abundant. White and red pine are found in small groves south of Lac Seul and are of good average size for timber. On the lake are scattered trees of both varieties. The northern limit of red pine extends to Red lake, where a few trees were observed. Cedar of inferior growth occurs in isolated localities and extends northwest to the height-of-land, but none was seen within the Berens river basin.

REPORT ON A

TRAVERSE THROUGH THE SOUTHERN PART OF THE NORTH-WEST TERRITORIES

FROM LAC SEUL TO CAT LAKE, IN 1902[14]

By Alfred W. G. Wilson

INTRODUCTORY

On May 24, 1902, I received instructions to make a reconnaissance traverse across the unexplored area, some 15,000 square miles in extent, lying to the north of Lac Seul and east of Trout lake in the North West Territories.

Owing to the unsettled weather and irregular character of the shore-lines of the water bodies the work was confined to the southern portion of this area, to the survey of Cat lake, and to a short traverse northward from the east end of Lac Seul intended to locate the belt of so-called Huronian rocks lying north of this lake.

Throughout the season the topographic portion of this work was undertaken by Mr. J. F. E. Johnston, C.E., of the office staff; while the writer had charge of the geologic work.

Reports on the areas adjoining this unexplored district have been made by Fawcett,[15] Bell,[16] Low,[17] and Dowling.[18]

Topography

According to recent investigation, the Archæan areas of Canada have probably never been completely submerged since early Cambrian time. The nature of the rocks and their geologic structures show that they must at one time have been buried below the surface; hence, it must be inferred that these areas have been subjected to degradation, and that a great volume of rock has been removed. Quite recently Schuchert has shown that in all likelihood the areas immediately to the south of James bay were submerged during the middle Palæozoic time; while those in the district of Keewatin and the adjacent regions have probably existed as land barriers since their pre-Cambrian emergence. The greater portion of the erosion in the central parts must have taken place before the Palæozoic submergence.

During the period of partial submergence processes of marine planation may have locally modified the surface previously formed under the operation of sub-aerial processes. Within comparatively recent geologic times the surface of the country has been greatly modified by processes of glacial erosion and deposition.

The surface, as seen to-day, is thus the product of the operation of two, or possibly three, imperfectly known geologic processes, sub-aerial degradation, marine planation, and glacial erosion.

A Modified Peneplain

It is probable that the first of these has played the most important part. Under normal conditions sub-aerial processes, acting through a long period of time, would produce smooth or gently undulating surfaces. To such surfaces produced by sub-aerial processes the name peneplain has been given.

On a peneplain, however, one would expect to find the larger streams wandering in broadly open valleys; there would be no lakes: and the soil cover would be composed of mantle rock of considerable depth, in situ, very fine in texture at the surface, and gradually changing in depth into unaltered rock. Normally, also, the surface would not be elevated very much above sea-level.

None of the Archæan areas of Canada exhibit all these features. In the remarkably even sky-lines we find evidence of the existence of a planation surface which truncates the structures of the metamorphosed rocks; but in other respects the features of the area are not those of a peneplain. There are numerous lakes, and irregular streams with frequent rapids; scarcely any residual soil is found in situ, though a

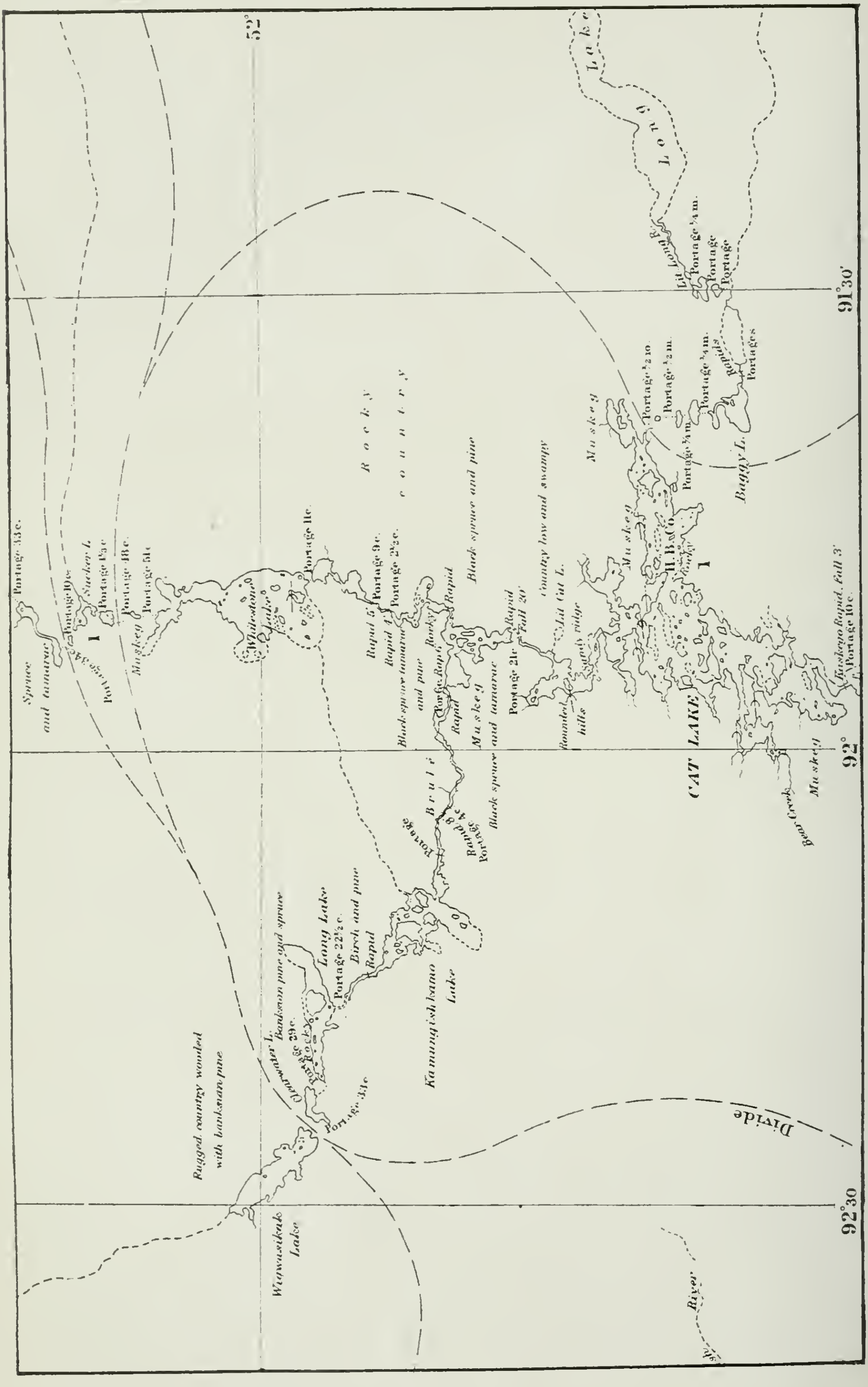
[14] This report, published in 1909, is known as No. 1006 of the publications of the Geological Survey of Canada. A preliminary or summary report is contained in Vol. XV., Part A., pages 203-208.

[15] Report of the Department of the Interior (Can.), 1885, pt. 2, p. 37 *et seq.*

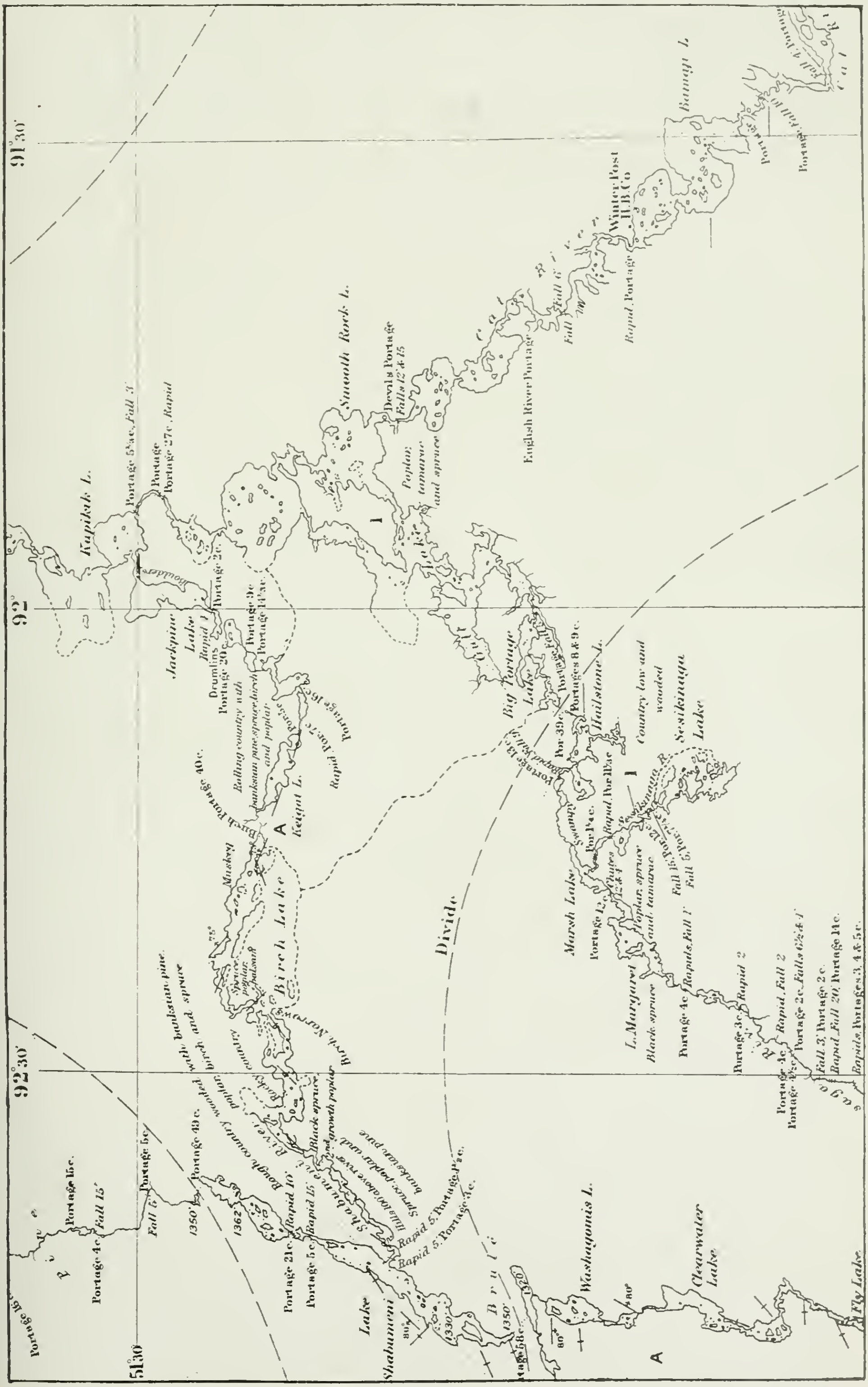
[16] Ann. Report Geological Survey of Canada, 1886, Pt. G.

[17] Ann. Report Geological Survey of Canada, 1886, Pt. F.

[18] Ann. Report Geological Survey of Canada, 1894, Pt. F.



Cat Lake Area.



Wenasaga and Cat Rivers.

considerable amount of soil material has been deposited by glacial ice; and the central parts of the region stand high above sea-level. Yet it may be that this was once a peneplain area, and that its surface has been modified by other processes. Before or during the period when these other processes—chiefly glacial, possibly partly marine—were in operation, the region has been elevated to a considerable height. By their action the old soils were almost completely removed, new exotic material was deposited, parts of the old peneplain were dissected by the renewed activity of the rivers, and the present features were produced.

The modification has been sufficient to remove all traces of this original surface. This ancient peneplain, now modified, has been called the Laurentian Peneplain, and the present surface features exhibited by the Archæan areas may thus be spoken of as those of a modified peneplain.

The area through which the exploration lines of the present survey passed is near the centre of the Keewatin or western arm of this Laurentian Peneplain, which extends from Labrador around Hudson bay to the Arctic ocean north of the district of Mackenzie. The general topographic features of the region are those which everywhere characterize the Laurentian Peneplain. The rocks within its boundaries represent a portion of the earth's crust which at one time must have been far below the surface. Owing to its central location it might even be inferred that these rocks represent the deepest portion of the earth's crust with which we are ever likely to come in contact. A noticeable feature of nearly all the rocks of the area, especially of the granites and granitoid gneisses, is the presence of a relatively large amount of microcline and the absence of the other feldspars.

Lake Basins

Throughout this part of southern Keewatin, the various water bodies lie in shallow basins on the peneplain surface. The maximum relief in the interior, except in the case of a few monadnocks, is rarely over 50 feet; near the southern boundary it rises to about 200 feet. In a few places, ridges or isolated, dome-like masses rise something less than 100 feet above the general level. One of the most striking of these lies to the west of Cat lake, about 90 feet above lake level. Several other similar ridges were observed in the country to the south.

All the lakes studied were shallow, marshy, and very irregular in outline; some were surrounded by large areas of muskeg. The inter-stream areas are either bare rounded, or undulating surfaces of rock; or, are clothed, especially in the hollows, with a thin drift cover of sand, clay, and boulders, overgrown by a dense mat of moss (generally *Hypnum triquetrum*) and interlaced roots. As a rule the drainage is very imperfect. Occasionally there are small areas, underlain by a thicker cover of till or by a glacial sandplain, where the drainage is better and the moss cover is absent.

The Wenasaga river flows in a general southwesterly course, and it presents the usual characteristics of the streams flowing upon the uplands, viz., an alternation of long shallow flooded basins and short stretches of rapids.

The stream—particularly above Bluffy lake—flows in the lowest part of a drift-covered rock basin, through the deposits in which it has cut a well-defined channel sometimes to bed-rock.

Wenasaga lake, Bluffy lake, Slate lake, and the several minor lakes along the course of the stream are typical examples of the partly flooded upland basins. It is possible that in some of the basins the water is maintained at its present level, not only by the controlling rock ledge which outcrops at or near the outlet of each of the lakes, but also by a partial drift dam located over some lower portion of the margin of the rock basin.

The lake basins are generally rock-rimmed shallow depressions, studded with numerous islands, representing the unsubmerged portions of the ridges between the minor basins, and are a good index of the general character of all the other minor basins.

Islands

The form of the islands varies from that of a slightly rounded dome—characteristic chiefly of those which are composed of homogenous rock—to an arched dome with elliptical ground plan. The longer axis, except in a few cases where the islands are low and flat, lies in the direction of the strike of the rock. Even in these exceptions the longer axis of the island makes only a slight angle with the strike of the structure. In many cases the strike of the structure is approximately parallel to the direction of ice movement, and hence the form of the ridges sometimes seems to have also been a function of the direction of that movement. In many instances, however, where the structure of the rocks lies at an angle to the direction of ice motion as indicated by the striæ, the dominant factor in determining the form of the dome was not ice-scour but rock structure. Many of the ridges are of the typical roches moutonnées type with an ice-scoured surface, sloping gently in the direction from which the ice came, and a steep, scarped face in the opposite direction. There are, however, numerous instances where steep, sometimes ice-scoured, cliffs face in the direction from which the ice came.

The basins are the counterparts of the ridges, and their form and direction bear the same intimate relation to the rock structure.

Owing to the partial submergence of some eskars, there are a few islands, particularly in Gull and Cat lakes—of a second type—to which reference will be made later on.

The intricate ramifications of the shore-lines, as shown in the accompanying map, are a necessary feature of the gently undulating topography characteristic of the whole region.

A number of minor streams, sometimes connected with chains of lakes similar to those through which our line passed, are tributary to the Wenasaga.

The amphitheatre-like basin drained by the Wenasaga consists of a number of minor basins, each with its quota of local basins having their own drainage systems which converge towards the meridian line of the main basin, and its discharge point near Lac Seul.

The Cat river—a river typical of the Laurentian Peneplain—flows southeasterly, and enters Lake St. Joseph about 20 miles from its western end. Northward as far as the line was run, it was found to be not a single stream but a long chain of lakes with short intervening stretches of river. In a few of these reaches the waters move with a steady flow in a well-defined, drift-filled valley, through which they have cut a distinct channel; for the most part, however, these stretches are rapid, broken, frequently braided, and usually occupy chance channels generally parallel to, but sometimes cutting across the ridges between the basins.

The lakes, on the other hand, contain numerous islands and have exceedingly intricate shore-lines. Numerous bays with narrow entrances and irregular back channels, running apparently in all directions, but actually directly associated with the rock structures, often make it very difficult for canoe travellers to find either inlet or outlet. The area of the marginal bays often greatly exceeds the area of the main portion of the lake itself.

Gull lake is an interesting example of one of these upland lakes. Fawcett's line traversed its eastern portion, and on his plan the south-east part appears as Smoothrock lake, and the northeast part as Gull lake.

Our exploration shows that the land to the northwest of these two divisions of what is really one large lake, is a large island, and that there are two other equally large water bodies, one to the northwest and the other to the southwest, each with an intricate shore-line and many islands.

The four water bodies, together with a number of ramifying bays, make a single large lake, in the centre of which is an island of nearly 20 square miles. The four divisions are connected by narrow channels in which there is only a perceptible current when the water is low; at such times the shallow channel between the two eastern portions of the lake may become almost dry.

Cat lake is an irregular body of water with a length of 14 miles between the inlet on the north, on the route to Severn lake, and the outlet to Cat river. Along a northeast-southwest line, to the ends of two long bays the distance is 18 miles. The lake, with its numerous islands and intricate shore-lines, is a typical example of the flooded upland areas. The ends of most of the bays are shallow marshy areas overgrown with reeds and sedges, the home of numerous waterfowl. The shores are rocky, and the ground is generally strewn with boulders and cobbles, the whole covered with a tangled mass of moss and roots, and overgrown with coniferous trees, usually black spruce, and occasionally poplar and white birch.

Small sandplains, generally well forested but with poor soil, are found around the shores and on a few of the islands. The Hudson's Bay Company's post at Cat lake is located on one of these. Most of the islands of Gull and Cat lakes are portions of Archæan ridges; a few of them are portions of eskars.

In Gull lake there are several islands which consist wholly of coarse cobble stones heaped in long narrow ridges trending northeast-southwest. These are completely bare of vegetation, rise not more than 6 feet above water level, and have a remarkable resemblance to artificial embankments.

Another well-defined eskar, of similar composition, but with a small amount of soil covered with spruce, forms a point which is nearly half a mile long and often less than 20 yards across. This point lies about 4 miles above the entrance to the lake on the direct route northward, and is known to the Indians as Peshe-asho-kummig, or Lynx bridge. It is much used as a causeway by moose and other animals crossing the lake.

Elevations

In the following table the approximate elevations above sea-level, of the larger lakes and of the divides crossed by the traverse line are given from barometric determinations. Dowling's determination of Lac Seul as 1,140 feet above sea-level was taken as the datum plane.

	Feet.
Wenasaga lake	1,172
Bluffy lake	1,240
Oganie	1,244
Slate	1,260
Margaret	1,300
Marsh	1,310
Hailstone	1,318
Height-of-land	1,325
Big Portage lake	1,270
Gull lake	1,263
Jackpine lake	1,278
Cat lake	1,285
Cross lake	1,225
Blackstone lake	1,204
Lake St. Joseph	1,200
Height-of-land	1,250

GENERAL GEOLOGY

The rocks of the region belong wholly to the Archæan; gneisses and schists predominate, granites occur, but are less widespread. The schistose structures are vertical or nearly so, and the prevailing strike is northeast, though there are minor local variations. Near Cat lake, and in a number of localities around Gull lake, the strike varies from N 38° W to N 80° W.

The oldest rocks are all metamorphosed, and are chiefly hornblende schists and amphibolites containing large amounts of hornblende, smaller quantities of quartz and a plagioclase feldspar closely related to oligoclase, and sometimes also a smaller amount of orthoclase. Several accessory minerals are frequently found, such as sphene, ilmenite or leucoxene, pyrite, and garnet. With the amphibolites are associated certain micaceous schists, but it has not yet been possible to define their areas.

Hornblende Schists and Amphibolites

All the hornblendes appear black in mass, and the amount varies from about 50 to 90 per cent. of the whole rock. In thin section the absorption colours vary from pale yellowish green to dark blue-green. The absorption scheme is c b a; the parallelism of the hornblende plates with the structure of the rocks is well developed. The relative amounts of quartz and feldspar vary considerably in different localities.

The quartz, when present, is almost invariably in small anhedra; the feldspars occur in larger anhedra, and are frequently altered to kaolin..

Biotite is found associated with the hornblende, but it generally forms only a small percentage of the minerals present. In this section the absorption colours vary from pale greyish-brown to deep brown.

Leucoxene, ilmenite associated with titanite in considerable amount, pyrite, and possibly a small amount of magnetite are also present. Near the southwest angle of Slate lake the compass was considerably affected by the local attraction.

Garnet, usually of a pale pink colour when in thin section, occurs in a number of localities in the amphibolite areas, both in symmetrical crystals and in strings and masses drawn out in a direction parallel to the foliation and filled with inclusions of the other constituents, usually quartz anhedra.

Occasionally small prismatic or radiating crystal-aggregates of a dark tourmaline, blue in basal sections, are found; less often the tourmaline has lost its crystal outlines and occurs in masses parallel with the foliation. The absorption colours in section are various tints of grey, except when the vibration plane of the nicol is transverse to the axis of the crystals, then the colour is black.

Other varieties of metamorphic rocks containing biotite, sericite, another mica seemingly related to the phlogopites, quartz, and other accessory minerals, but little or no hornblende, occur, sometimes with the amphibolites, sometimes apparently alone.

These amphibolites and associated schists occur both in belts extending for long distances, and as detached masses, varying in size from a few cubic yards upwards, and completely surrounded by the more acid rocks described below. Lack of time prevented a detailed examination of the contacts between the schists and the acid rocks, but in the several localities noted the contacts were similar to those already fully described by Dr. Lawson as occurring in the Lake of the Woods region.[19]

The first and broadest of these bands begins about 21 miles above Lac Seul, and is about 25 miles in width. This is the belt of Keewatin rocks, shown on Dowling's map of the Red lake district.[20]

The contact between the schists and the acid rocks to the south seems to lie beneath a large muskeg area through which the river runs, as the first outcrop of the schists occurs some miles below Slate lake. The northern contact crosses the course of the river 10 miles above Slate lake, the basin of which lies almost wholly upon the schists; the direction both of the longer axis of the lake and of the longer axis of the island is parallel with the strike of the rocks outcropping on its shores. The adjacent rock on the northern boundary is a coarse pegmatitic granite containing inclusions of amphibolites similar to those of the main area. Detailed study of this area may show the schists to be divisible into several belts of different origin and composition, now all metamorphosed.

Along the southern portion of the band the schists, as already noted, are very rich in biotite and another associated mica; while northwards they are chiefly amphibolites, in some cases containing little else than hornblende. The other large belt of these rocks crossed in our traverse lies over 100 miles directly northeast of Slate lake along the Cat river route and north of Lake St. Joseph, in the vicinity of Blackstone lake, but its boundaries were not accurately determined.

There is at present no evidence that this belt bears any relation to the similar belts found farther west, though the relation of each to the adjacent acid rocks is similar. Between the northern boundaries of the schists on Slate lake, and the most northern point reached by our line, there are several narrow belts with amphibolites, rarely exceeding a quarter of a mile in width. Whether these are metamorphosed sediments or dikes is not at present determined. Probably both types are represented; except near Slate lake they never underlie dominant topographic features.

One of these belts, about 1½ miles wide, is crossed by the trail between Hailstone lake and Big Portage lake. The rock is a hornblende-plagioclase amphibolite carrying small amounts of biotite, garnet, sphene, ilmenite, and leucoxene. It strikes about N 80° W. and stands at a high angle.

Gneisses and Granites

The acid rocks of this region consist of gneisses and granites, and underlie most of the area under review. They range in colour from a light grey to a decided red, the prevailing tints being shades of pink. When the percentage of basic constituents becomes greater the colour is dark green or almost black.

Of the seven different varieties of Laurentian gneisses, as classified by Barlow,[21] only four are found in the area. The unrepresented gneisses are those in which muscovite occurs alone, those in which muscovite and biotite occur alone, and those which contain garnet. Several specimens showed augite as an accessory constituent, and one specimen contained biotite, hornblende, and augite.

These rocks differ in no essential feature from the typical rocks described by Barlow, and a detailed description of each type is, therefore, unnecessary.

Quartz is prevalent in all the gneisses, appearing invariably as irregular anhedra between the feldspar crystals.

Orthoclase often occurs in considerable amount, generally in irregular grains interlocking with the other minerals. Sometimes it has partly decomposed to kaolin or muscovite, and occasionally to zoisite or epidote.

In many specimens microcline is seen in large amount, and seems to be directly associated with orthoclase.

Plagioclase is abundant, and occasionally forms the bulk of the feldspathic constituents. The angles of extinction indicate that it is usually related to oligoclase.

The primary biotite, in a few cases partly chloritized, occurs both in large plates (in aggregates of several crystals) and in small isolated plates (generally oriented parallel to the rock structure).

When hornblende or muscovite is present the biotite is closely associated with it.

Hornblende occurs in a few specimens of these gneisses. In thin section the colours vary from pale yellow through green to bluish green, and are much lighter than the hornblende of the amphibolites.

Augite was found in two of the specimens collected in the field. In one it is unaltered, in the other much of it is altered to a hornblende which occurs both as small fibres or plates scattered through the mass of the augite crystals, and as large masses nearly surrounding them. The augite in thin section is pale green in colour.

[19] Lawson, A. C., Can. Geol. Survey Report, Vol. I (N.S.), 1885. Part CC, page 10 et seq.
[20] Dowling, D. B., Can. Geol. Survey Report, Vol. VII. (N.S.), 1894. Part F. map.
[21] Barlow, A. E., Can. Geol. Survey Report. Vol. X (N.S.), 1897, Part I, page 71.

Epidote is present, presumably as a primary constituent, since it is closely associated with unaltered biotite or hornblende. It is usually of a pale yellowish colour and slightly pleochroic.

Muscovite, both as a primary constituent and as a secondary constituent from the alteration of the feldspars, occurs; and a few specimens also contain chlorite.

Apatite is frequent in irregular grains and stout crystals.

Titanite is also found, usually in irregular grains of varying size or as small well-formed crystals.

Garnet appears in fresh irregular grains or masses, and as small crystals in specimens from the southern part of the region. It is usually much fractured and almost colourless.

Leucoxene is of frequent occurrence when titanite is present, and ilmenite is probably represented in these rocks by a black opaque mineral always associated with leucoxene.

Apart from structure there is little difference between the granites and the gneisses of the area. In some few cases the feldspar of the granites is almost wholly microcline. The prevalent granite is a hornblende-biotite granite, but there are other varieties sparingly distributed in which either or both of these constituents are lacking. In some localities there seems to be a gradual transition from true granites through granitoid gneisses to gneisses, and no definite line can be drawn between them. The granites frequently occur as large batholithic masses, dikes from which penetrate the surrounding rocks.

The largest single area of these gneisses and granites underlies all the country between Cat lake and Gull lake, and extends a considerable distance to the south and west. Just north of Slate lake our traverse line crossed a large area of coarse pegmatitic granite, which continues to Gull lake; other areas are found around Cat lake. The change in the strike of the gneiss at Cat lake, from the north-east direction found prevailing south of the lake to a north-west and nearly western direction, may be due to the intrusion of these granitic masses, though it has not been possible to work out the relations in detail.

Both gneisses and granites occur in the district immediately north of Lac Seul and Lake St. Joseph.

On an island in Lake St. Joseph, about 5 or 6 miles from the outlet of the Cat river, there is a belt of grey-white schistose rocks about 5 chains wide, strike N. 50° E. and dip at 79° toward the north-west. Microscopic examination shows that this is a highly altered quartzless porphyry, consisting mainly of sericite mica in which are altered phenocrysts of orthoclase and a small amount of less altered plagioclase, with, in one instance, a little apatite.

Glacial Debris

At many points along the route the bed-rock is obscured by loose debris of glacial origin. The greater part of this material, which presumably has not been carried very far, invariably consists of boulders and cobbles derived chiefly from the country rock. Along the rivers and in the lake basins this coarser material is frequently overlain by finer sands and gravels in the form of sandplains, generally small, but sometimes several square miles in area.

In a few cases along the Wenasaga river, on Cat lake, on the height-of-land between Lake St. Joseph and the Root river, and in an area north of the east end of Lac Seul, arenaceous clays, probably also of glacial origin, were observed.

Everywhere the hummocky ridges of the Archæan show the usual smooth rounded surface due to glacial action. Striæ and deeper grooves were noted in a number of localities. On the west arm of Gull lake small concentric cross-fractures were observed with the convex side turned toward the north-east so that a normal to the chord of the bow strikes S 54° E.

Near the east end of Cat lake a few flat plates of a sectile, finely crystalline, grey-white dolomitic limestone were found among the drift cobbles on the beach, and were recognized by our men as similar to rock they had previously seen in situ on the Severn river. The inference is that the fragments have been brought to Cat lake from the Palæozoic areas in the Hudson bay basin to the north-east.

The following table contains a record of the location and direction of the glacial striæ and grooves noted during the traverse. The bearings are magnetic.

Slate lake, island near middle	striæ	S 50° W
Slate lake, upper end	grooves	S 74° W
Near eighth portage	"	S 43° W
Marsh lake, north end	striæ	S 59° W
Gull lake, south end, concentric cross fractures (normal)		S 54° W
Gull lake, north end of south lake	groove	S 50° W

Gull lake, east lake, north side	"	S 48° W
Smoothrock lake, near inlet	striæ	S 52° W
Cat lake, northeast bay, north side, near Hudson's Bay post	striæ and grooves	S 74° W
Cat lake, northeast bay, middle of north side		S 75° W
Cat lake, northeast bay, island near east end		S 80° W
Cat lake, northeast bay, south side near middle, younger		S 87° W
Cat lake, northeast bay, south side near middle, older		S 72° W
Cat lake, northeast bay, south side		S 70° W
Cat lake, northeast bay, south side, opposite Hudson's Bay post		S 74° W
North bay, east side		S 72° W
Cat lake, north bay, on island in upper arm of lake about 3 miles northwest of the end of Fawcett's line		S 82° W
Cat lake, west side of main lake, west of Hudson's Bay post	striæ and grooves	S 74° W
Cat lake, west side of main lake, southwest of Hudson's Bay post		S 73° W
Cat lake, east side of main lake, point 2 miles below Hudson's Bay post		S 65° W
Smoothrock lake, southwest side above rapids	grooves	S 50° W
Lake St. Joseph, 2 miles south of Cat river	"	S 28° W
Lake St. Joseph, 2½ miles south of Cat river	"	S 38° W

ECONOMIC GEOLOGY

There seems to be little prospect of finding valuable economic minerals in the region in paying quantities. In almost all the bands of basic schists small, less often large, veins of quartz occur. At the surface these veins and the associated schists present the usual rusty appearance due to the decomposition of the pyrite. The granites are occasionally cut by pegmatitic dikes. Near the head of Cross lake, a rock, apparently of this character, carries a small amount of molybdenite in crystals varying in size up to an inch and a half across: it is uncertain whether the mineral is of economic importance, but the small size and the poor character of the specimen seen, and the difficulties of transportation point to the deposit being economically unworkable. The extent of the vein is not known. The property is at present (1902) in the hands of Mr. C. W. Ross, of Dinorwic, to whom the writer is indebted for specimens of the minerals.

Near the inlet into Slate lake, about three-quarters of a mile from its northeast end, on the eastern shore, is the only place where magnetic minerals were found sufficiently segregated to produce a noticeable local variation of the compass. Here, stringers of a metallic mineral, probably magnetite, were found. Though this metal is sometimes a constituent of the basic rocks, the more common occurrence of iron ore is in the form of ilmenite. No hematite was noted in the district.

BOTANICAL NOTES

The following notes, while not exhaustive, give a fair index of the phanerogamic plants of the area. The forest growth is found chiefly around the lakes and streams. The sands, sandy gravels, or clays, usually of glacial origin, are generally forested, the trees varying with the character of the soil. There are large areas of nearly bare rock where only a few stunted conifers or poplars grow in the crevices. Where the soil is sparse, and the country low-lying but yet fairly well drained, there is an open forest, chiefly black spruce, and the ground is covered with a dense mat of moss interlaced with fibrous roots. The soil covered, and the swampy areas, are usually thickly overgrown with small shrubs, mostly alder.

In general the timber is rather small; in most parts of the district at present too small even for pulpwood or ties. Occasionally along streams the trees are larger, especially north of the east end of Lac Seul. Another area of good timber, chiefly black spruce and tamarack, occurs along the Root river between Lac Seul and Lake St. Joseph.

Forest fires have swept over the region, probably on the average once every 35 or 40 years. On the islands and in certain protected localities one frequently finds fairly large trees, and there is, therefore, no reason to attribute the small size of the majority of the trees wholly to adverse climatic conditions. Around Lake St. Joseph an unknown extent of forest has been fire-swept, and in many places completely destroyed within a few years. North of Slate lake, around Big Portage and Gull lakes and northward, large areas have recently been burned.

The commonest and most widespread tree is the black spruce, *Picea nigra*. Associated with this, but in very much smaller numbers, is the Canada balsam, *Abies balsamea*. In the muskeg area the tamarack, *Larix Americana*, is found abundantly, rarely more than 8 inches in diameter. Many of larger size are found along the Root river. The only specimens of the red pine, *Pinus resinosa*, observed were isolated trees near the east end of Lac Seul; probably there are others in the district, but no important areas are likely to occur north of Lac Seul or Lake St. Joseph. The Banksian pine, *Pinus banksiana*, however, occurs wherever the soil is suitable. The white cedar, *Thuja occidentalis*, is found occasionally along the Wenasaga river and on the Cat Lake route.

A few specimens of a species of maple were noted around Lac Seul and north of it. The canoe birch, *Betula papyrifera*, occurs sparingly throughout the whole region. Specimens large enough to afford bark for small canoes are found on the islands in Cat lake. Associated with this birch, but more abundant, are the balsam poplar, *Populus balsamifera*, and the aspen poplar, *Populus tremuloides*. Isolated specimens of the black ash, *Fraxinus sambucifolia*, were noted in several localities, even as far north as Cat lake.

REPORT ON

AN EXPLORATION OF PORTIONS OF THE

ATTAWAPISKAT AND ALBANY RIVERS

LONELY LAKE TO JAMES BAY[21]

By Robert Bell

Routes Followed[22]

Before entering into details of my exploration and its results, the description will be rendered clearer by the following short sketch of the routes followed throughout the season. From Wabigoon, a general north-easterly course was followed, via Lake Minnietakie and Lake St. Joseph, the Albany and Attawapishkat[22a] rivers, to James' bay. The water-shed between the rivers just named was crossed from the highest of the chain of lakes on the Eabamet branch, by which we left the Albany at about 90 miles in a straight line below the outlet of Lake St. Joseph. On crossing the height of land we struck the headwaters of a branch of the Attawapishkat, having a north-easterly course. This we followed with much difficulty to its junction with the main river, a distance of about thirty miles.

Soon after passing the height of land, I decided to send back Messrs. MacMillan and Murray with two of the men from Sault Ste. Marie to make a geological exploration of the route from Lake St. Joseph to Cat Lake and thence by Goose river to the west end of Lonely lake. They explored about two-thirds of Cat river and returned via Lake St. Joseph and the route by which we had entered it.

On arriving at the Attawapishkat river with my four men, I left the bulk of our stores in charge of one of them, and proceeded with the others to explore the river towards its source. Returning to this camp after a few days, we next descended the river to the sea, making a careful track-survey of it, taking numerous latitudes all the way to its mouth, a distance by the general course of the river of about 300 miles. We then coasted in our canoes to the mouth of the Albany river. A detailed track-survey of this large stream was made from James' bay to "The Forks," or the junction of the Kenogami, above which point I had surveyed both branches instrumentally in 1871. The Kenogami was ascended to Long Lake, from which, passing over the Lake Superior height-of-land, we descended the Black River to its intersection with the Canadian Pacific railway. As I was obliged to convey my men home to Sault Ste. Marie, the most direct route for doing so was by way of Port Arthur, which we reached on the 13th of October.

The different parts of the route above indicated will now be described with more particular reference to their geological features, but at the same time the geographical peculiarities, the aspect of each section, the timber, soil, climate, etc., will also be noticed.

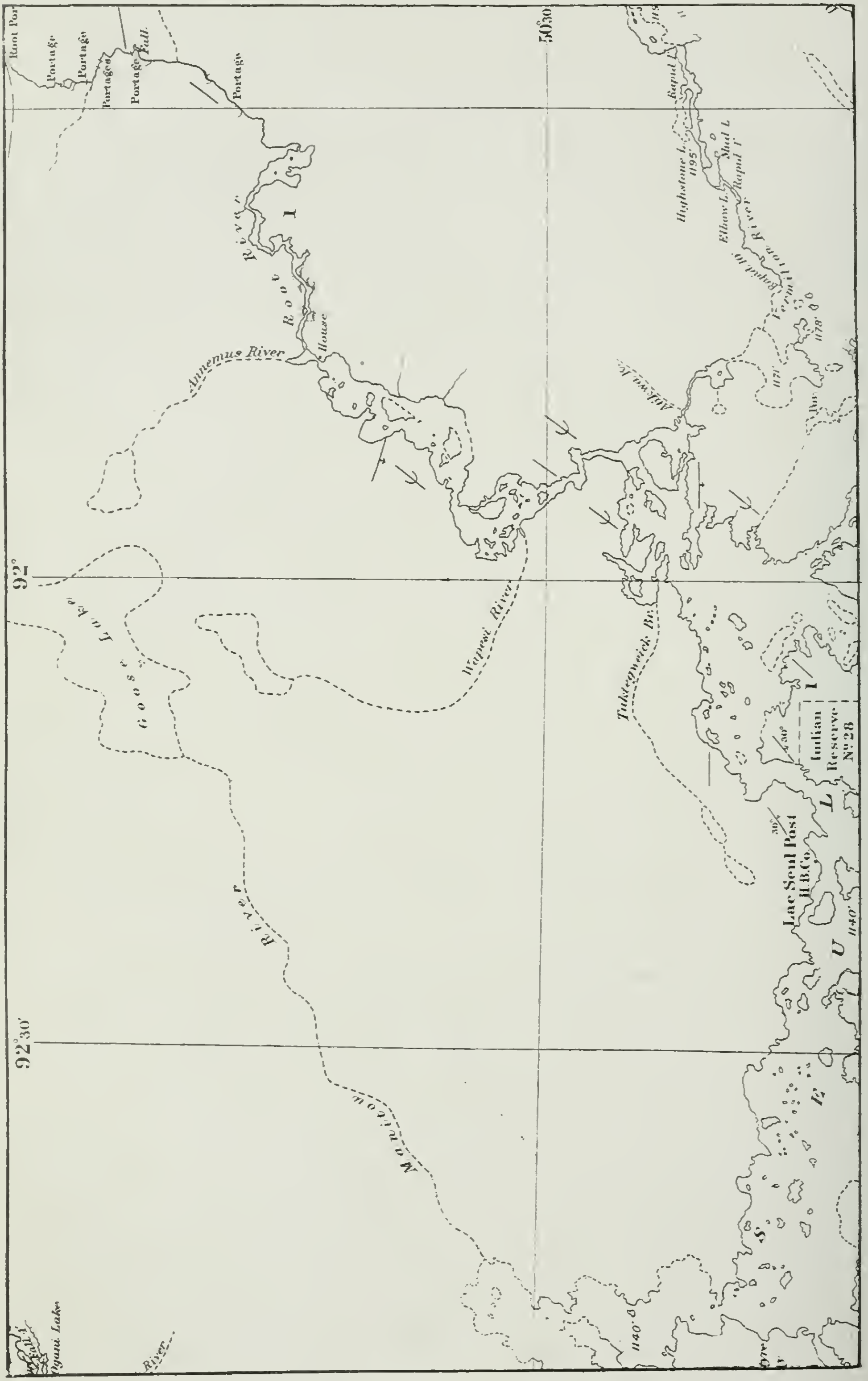
Pelican River and Lonely Lake

As the geology of the route between Wabigoon and Lonely Lake Post, via Frenchman's Head or "Lost Lake," was examined and reported upon in 1872, on this occasion, in order to explore new ground, I followed the main Pelican river from the point at which it turns off at right angles from Frenchman's Head channel between Pelican lake and Frenchman's Head lake, and flows north-northeastward into Lonely lake. The Indians informed me that the outlet of Sturgeon lake, which supplies a large part of the water of Pelican river, enters the north-east bay of Abram's lake, and we ascertained in 1872 that the stream which we then descended, called Sturgeon Lake river, and which enters the eastern part of Minnietakie lake, does not flow out of Sturgeon lake at all. At a distance of six miles, in a straight line, from the above point of divergence from Frenchman's Head channel, we came to the level of Lonely lake at the foot of a slight rapid,

[21] The exploration on which this report is based was made in 1886. The report forms Part G of Vol. II. of the Geological Survey of Canada. The preliminary or summary report on the exploration is to be found on pages 23-26, Part A, of the same volume. Lonely Lake is known more commonly as Lac Seul.

[22] This report describes the Albany river, on the inward trip, from the eastern end of Lac Seul, or Lonely lake, through Lake St. Joseph, to the Eabamet lake branch, about 90 miles in a straight line below Lake St. Joseph. On the outward trip the Albany was followed from its mouth to the Forks or the junction of the Kenogami river. The intervening part of the river, or that between Eabamet lake and the junction of the Kenogami with the Albany, is described on other pages in this volume.

[22a] The spelling is now Attawapiskat.



Lac Seul, or Lonely Lake, and Root River.

down which we ran our loaded canoes without difficulty. The eastern part of Lonely lake spreads itself in straggling channels and bays over a much wider area than has hitherto been represented on the sketch-maps of the region.

The Huronian rocks are everywhere met with from Wabigoon to the south side of Pelican lake, where they gave place to Laurentian gneiss. Near the junction with the latter, the Huronian schists run about west with a straight course, and the distinct banded structure which here characterizes them is nearly vertical. Both Abram's and Pelican lakes are traversed by partially submerged ridges of boulders, having the same south-westerly course as the glacial striæ.

[Most of the rocks classed as Huronian is this report should, under the nomenclature now in use, be called Keewatin.—W. G. M.]

Along the Pelican river, the rocks consist of grey, banded gneiss, of which the strike is for the most part between east and north-east and the lamination is on edge. Gneiss, of common red and grey varieties, continued all along our course through Lonely lake to its eastern extremity, but a marked change was noticed in the strike in the narrow north-westward "jog," where its course was about north with a dip to the east of from 10° to 50°. About the middle of this section of the lake, the gneiss is much broken and mixed with granite. The shores of the eastern part of the lake are mostly marshy, but at the eastern extremity, massive gneiss is seen, and at a point on the north-west side, two miles from the extremity, the strike of a similar variety was observed to be north-west. It may be here incidentally remarked that gneiss with a little granite and a few trap dykes are the only rocks which have been observed on any part of this sheet of water, which is nearly 100 miles in length.

Pelican river is the largest feeder of Lonely lake, and as its waters are tolerably clear, they impart the same character to the lake west of its mouth, but to the eastward the water of the lake acquires the brownish colour of Root river, which empties into its eastern extremity.

Root River

The general upward course of Root river, which is followed in going from Lonely lake to Lake St. Joseph, has a north-easterly bearing, but the stream is very crooked, and it curves considerably to the south-eastward of a straight line. We followed this river to a point eighteen miles in a direct course from its mouth. Here the main stream bends off to the west, and we turned up a small branch from the north-north-east, which having no other name, we called Pond Lily brook, and at the end of three and a half miles, in a straight line, came to the height-of-land portage, half a mile long, leading over to the western extremity of Lake St. Joseph. The lower half of the eighteen miles of Root river, which we followed, is a sluggish stream, expanding in several places into small lakes with wide marshy borders. On the above route, massive gneiss is exposed in many places all the way from the east end of Lonely lake to the west end of Lake St. Joseph. On the top of the nearly bare hills of gneiss, on the west side of Pond Lily brook, half-way between its junction with Root river and the height-of-land portage, some angular fragments of fine-grained siliceous magnetite were found. The height-of-land portage, which rises only a few feet above the level of Lake St. Joseph, passes over bouldery and clayey ground, with a bog in the middle.

Lake St. Joseph

In 1885, Mr. Thomas Fawcett, D.L.S., measured a zig-zag line through Lake St. Joseph by means of the Lugeol micrometer, the angles being taken with the transit. In constructing the accompanying map, his distances have been adopted, while the details are taken from my own sketching, based on a track-survey made by a floating boat-log and careful timing of the speed of my canoe, all bearings being taken by a good compass.

The mean of ten barometric observations, noted on as many different days, on Lake St. Joseph, give its elevation as 1,172 feet above the sea. Its general course is east-north-east, true, and its length from the western extremity to the northern of its two outlets at its opposite end, is fifty-eight miles, and to the more southern outlet fifty-five miles. The breadth varies from a quarter of a mile to three miles, with an extreme width of eight, measuring across points, but the average would be about one mile and a half. It may, therefore, be described as a narrow, straggling sheet of water of the above dimensions, the area of its water surface being much reduced by the points and peninsulas and the great number of islands of all sizes, from three miles in length downward, which it contains. The largest space of open water is the Grand Traverse, at about two-thirds of the distance from the west end, which is three miles wide and measures eleven miles from south-west to north-east.

The country around Lake St. Joseph may, in a general way, be said to be level, although some low rocky hills are to be seen in places. Ridges of granite, nearly destitute of timber, occur around the western mouth of Cat river, not far from the west end of the lake. To the eastward of the first narrows, east of the eastern mouth of this river, rounded hills of gneiss may be seen on both sides; and again on the west side of a northern arm, fifty miles from the west end. In the narrow section towards the east end, which has a general south-east course, but in which all the points and bays run north-east and south-west, a few low ridges of gneiss run parallel with these, and some long rows of boulders or moraines, rising just out of the shallow water, have the same direction. It will be observed that while the general course of the lake is about east-north-east, the bays and points run more nearly north-east and south-west. A table of the directions of the glacial striæ is given further on, from which their average bearing will be seen to be south-west, thus corresponding with the general trend of the depressions in the face of the country. At the "Fall Fishery Station," forty-four miles from the west end, the surface of the quartzose gneiss, which occurs there, is thoroughly planed off, and along with the striæ, running S. 30° W., the bruised crescent-shaped marks, indicating great pressure, may be seen following each other in rows, their concavities looking south-westward, showing that the glacial movement was in that direction.

It would be difficult to estimate the proportion of cultivable soil compared with the worthless area in the country adjacent to the shores of Lake St. Joseph, but the percentage does not appear to be great. In some places, both on the main shores and the larger islands, low banks of sand and of yellowish loam were seen, but, as a rule, the surface appears to be either too stony or too level and wet to give much promise as a farming region. The Indian name of Lake St. Joseph is "the lake of the swampy country."

The climate in the immediate vicinity of the lake, at all events, appears to be sufficiently good to admit of the growth of a variety of crops. At Osnaburgh House, near the east end, where the soil is of a sandy nature, the principal crop cultivated at present is potatoes, but early Indian corn, peas, beans, and a variety of roots and other vegetables, to say nothing of a profusion of flowers, were in a flourishing condition in the end of July. In former years, when cattle were kept at the post, barley was said to have been a regular crop. Hay grows very luxuriantly. I was credibly informed that pumpkins and muskmelons had frequently ripened at this establishment.

The timber all around Lake St. Joseph has suffered greatly from forest fires at many different times from about a century ago to the present year. Parts of the main shores and many of the islands, especially in the neighbourhood of the Grand Traverse, have escaped the fires, and here full-sized timber may be seen. The second growth woods are of all ages, from seedlings of a year or two, up to trees nearly as large as those of the original forests. As elsewhere in these latitudes, where the old forests of spruce, tamarac, balsam, white birch, etc., have been burnt, they are succeeded by a growth of mixed aspens and white birch, with a sprinkling of spruce, or else by one consisting almost entirely of Banksian pine. In regard to relative abundance, the trees found around the lake may be mentioned in the following order:—white and black spruce, tamarac, aspen, white birch, Banksian pine, rough-barked poplar, balsam, white cedar, pigeon cherry, rowan and black ash. The ground or mountain maple (*Acer spicatum*), which is interesting as an indicator of climate, is common, and it was traced for a long distance down the Albany. Of the above kinds of timber, the white spruce and the tamarac are the most important commercially. The cedar is confined chiefly to the immediate shores of the lake, where it often forms a continuous but narrow border. It has the same habit around the other lakes and along the rivers in the whole of this part of the Dominion. But it is also frequently found in large patches in the inland swamps of these regions. About twenty spruce logs, for sawing into boards, were lying at Osnaburgh House at the time of our visit. They would average eighteen or twenty inches in diameter at the butts, the largest being about two feet. The six largest showed the following number of rings of growth:—113, 97, 121, 116, 107, and 120, or an average of 112, these rings indicating, it is supposed, a corresponding number of years. A new tamarac flag-staff, which was about to be erected, measured about eighteen inches in diameter at the butt and showed 244 rings of growth.

The number of Indians living around Lake St. Joseph is not very great. They live principally upon fish in the summer and rabbits in winter, but these resources are supplemented by geese and ducks in the spring and autumn, and occasionally by larger game, such as caribou and bears at any season. The fishes of the lake comprise white-fish, grey trout, sturgeon, pike, pickerel, yellow-barred perch, grey and red suckers, besides some smaller species.

Rocks of Lake St. Joseph

The rocks observed on the shores of Lake St. Joseph will now be described. Leaving the portage at the west end of the lake, massive grey gneiss, striking about east and west, occurs on both sides at between two and three miles, and again on the north side at four miles and a half, where it strikes S. 80° W. About a mile farther on the rock has changed to a light pinkish-grey granite of medium texture, which consists principally of felspar and quartz, the mica being in very small quantity. This rock extends up the channel which forms the western mouth of Cat river, for at least four miles, but the channel was not explored any farther. Along the main channel of the lake, beginning at six miles from the extremity, a soft, glistening, green, calcareous schist flanks this granite on its south side. This schist continues for ten miles, with a strike varying from S. 60° W. to S. 70° W. A small island at eighteen miles, consists of coarse, massive grey silicious schist, striking west. Another small island, half a mile north of the last, is formed of massive dark greenish-grey dioritic schist. A similar schist, running N. 80° W., was found on another island two miles farther on, or about three miles east of the eastern mouth of Cat river. Half a mile east of the last-named island, a grey rusty-surfaced mica schist on a small island was found to run N. 60° W. At the western entrance of the narrows, twenty miles from the west end of the lake, green schists strike N. 50° W. The long island in these narrows consists of dioritic schist and conglomerate. An islet on the north side of the eastern entrance of these narrows, or about seven miles E. by S. of the eastern mouth of Cat river, consists of a massive coarse crystalline hornblende rock, becoming somewhat schistose on the south side. Its strike is east and west.

About a mile east of the last-mentioned islet both shores of the lake were found to consist of gneiss, so that the dividing line between the Huronian and Laurentian, which occurs in this interval, will be about twenty-four miles, in a straight line from the western extremity of the lake. Time did not permit of a fuller examination of the Huronian rocks of the western part of Lake St. Joseph, but the foregoing examples will serve to give an idea of their characters, which, it will be observed, are somewhat varied.

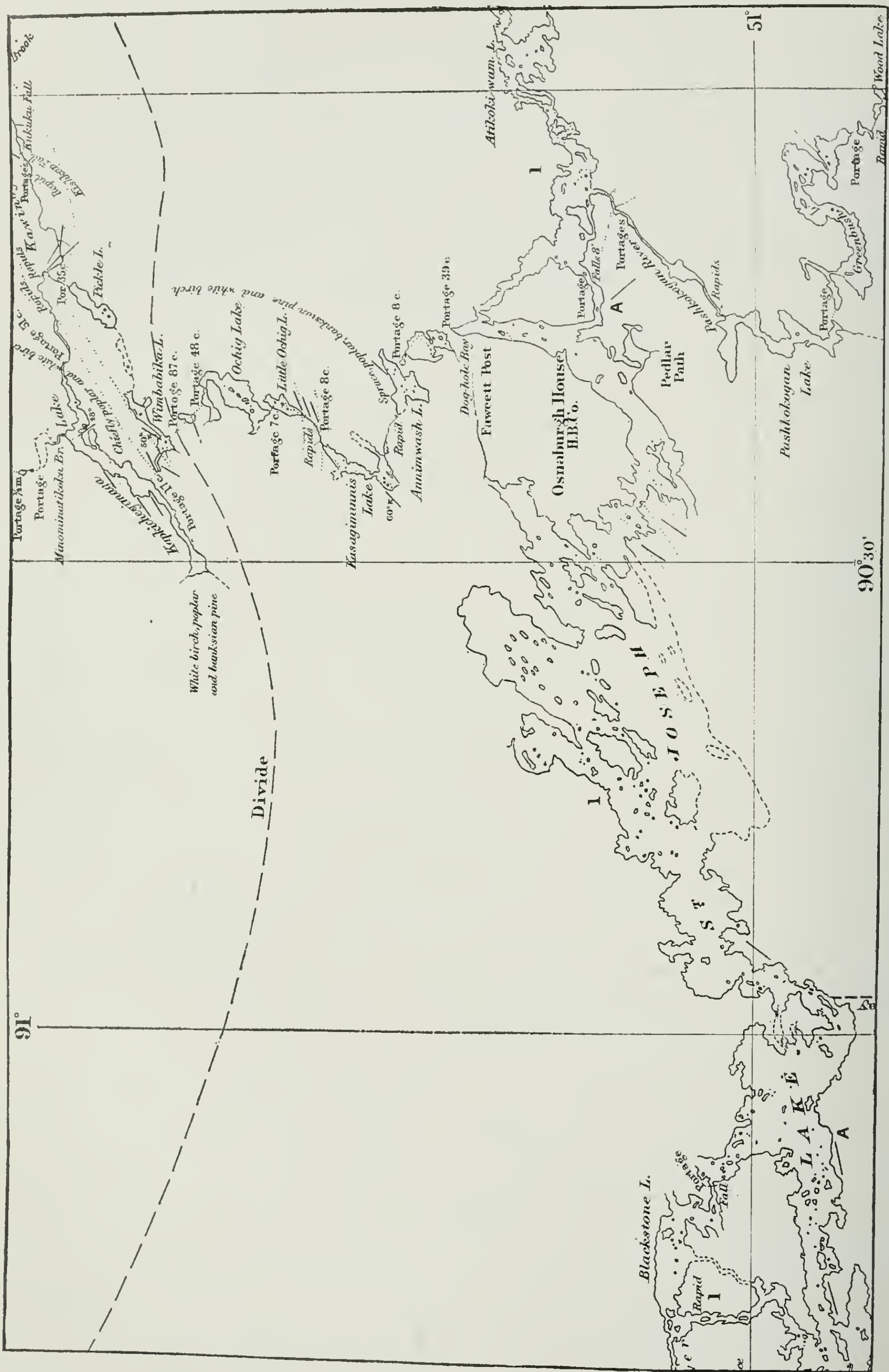
The gneiss near its contact with the Huronian schists, and for some distance onward, strikes east and west, or parallel with the latter. At thirty-eight miles from the western extremity of the lake a long bay runs off to the north-eastward. The gneiss in its vicinity is of a hornblendic character, and its strike is S. 45° W. On the northern shore of the lake, forty-four miles from the west end, is the fishing station, already mentioned, at which large quantities of white-fish are taken late in the autumn or just before the ice forms. At this place the rock consists of light grey gneiss. A northward arm of the lake runs for six miles beyond the fishery, and the massive light-coloured gneiss extends all the way to its extremity.

The rocks of the eastern part of the lake correspond with some of those of the Huronian series. On the northern side, at four miles from the southern outlet, or three miles from the Hudson's Bay Company's post called Osnaburgh House, which is situated opposite to this outlet, a grey mica-schist dips S. 60° E. angle 60°, or strikes 30° W. It is cut by a wide vein of coarse light-colored granite, in which a considerable proportion of mica is mixed with the felspar and quartz. Opposite to this point is the mouth of a small river, called the Pedler's Path, which forms part of a route to Lake Nipigon. My assistant, Mr. Murray, ascended it for about six miles, in which distance he passed through three small lakes. He found the rock at the mouth to consist of rather fine-grained hornblendic schist, striking west. The long bay running northward from Osnaburgh House was examined by Messrs. Murray and MacMillan to the extremity, from which the northern outlet of the lake flows. They found the rocks along the western shore to consist of hornblende and mica-schists with some fine-grained gneiss, all striking about east and west, except at the northern extremity of the bay, where a fine-grained gneiss had a north-westerly strike. The schists are traversed in several places by large veins of coarse granite, which, having resisted denudation better than the surrounding rock, stand out as small points in the lake. On the east side of this bay gneiss was the only rock observed north of the southern outlet, where, however, a grey mica-schist, striking north-west, occurs along with light-coloured coarse granite.

This completes the description of the geology of Lake St. Joseph as far as I was able to investigate it in the limited time at my disposal. It will be observed that the prevailing rocks around it are gneisses, but that Huronian schists, etc., extend between seven and twenty-four miles from the west end, and are again developed around the eastern extremity; also that granite prevails about the western mouth of Cat river, and this rock will be shown to extend from near the southern outlet of the lake for a considerable distance down the Albany river.

Albany River—Upper Section

Leaving Lake St. Joseph by the southern outlet, at two miles down the Albany river, which takes its rise in this body of water, we came to Hugh's Creek portage, on the north side, 460 paces long, with a descent of ten feet in the river. The rock is here dark green, fissile, hornblende schist, strinking N. 65° W., nearly vertically. From the foot of this rapid an expansion of the river, called Deep-and-Shoal lake, extends north-westward to the rapids at the northern outlet of Lake St. Joseph. A river without any recognized name enters the Albany from the south, six miles below the southern outlet. Two miles below Hugh's Creek portage, a light pinkish grey granite makes its appear-



Lake St. Joseph.

ance on the points and continues for nine miles, or to the northern outlet of an expansion. three miles wide, called Atik-o-ki-wam or Deer Lodge lake, which has two discharges that unite again only nine miles further down. The Albany, with its lake-like expansions, from its head at Lake St. Joseph to Deer Lodge lake is shallow, and full of angular and rounded boulders of granite. The shores are mostly low and covered with brush and grass alternating with knobs of granite. The timber farther back was burnt two or three years ago. At the northern outlet of Deer Lodge lake, the rock is a somewhat coarsely crystalline diorite, having a bright fracture, the crystals of black hornblende and white felspar together, giving it a general dark grey colour. It probably belongs to a large dyke cutting the granite.

From Deer Lodge lake we followed the northern and larger channel, which is broken by numerous rapids. Portages are required at four of these, the first being the Smooth Stoney portage on the north side, at four miles, 715 paces long, with a fall of thirty-six feet. The others are called the three Kagami portages, and all occur in the last mile before arriving at the junction of the two channels.

The first Kagami portage, on the N. side, has a fall of five feet, and is 100 paces long.

The second Kagami portage, on the S. side, has a fall of 27 feet, and is 750 paces long.

The third Kagami portage, on the N. side, has a fall of eighteen feet, and is 570 paces long.

Between the diorite at the outlet of Deer Lodge lake and Smooth Stoney portage, granite occurs in several places. At one locality in this interval a granitoid rock showed traces of lamination, running north-easterly. At the portage just mentioned, a massive grey granitic gneiss strikes N. 30° E. At the first and second Kagami portages the rock consists of fine-grained reddish grey granite, in which quartz is the most and mica the least abundant constituent; while at the third of these portages it is a pinkish-grey gneiss striking N. 60° W., with vertical lamination. A great rapid or chute occurs in the southern channel from Deer Lodge lake where it falls into the other branch opposite to this portage.

From the foot of the long island just described, the general course of the river is north-eastward to the junction of the Etow-i-ma-mi river, from the northward, a distance of thirty miles. It is considerably broken by rapids, but we ran our loaded canoes down all except two of them, at which portages were required to be made. Gneiss, which was generally coarse, grey, and massive, was observed in several places in the above thirty miles, and wherever the lamination was apparent, the strike was to the northwestward. At a southward angle of the river, about eight miles above the Etow-i-ma-mi branch, the Mischkow river falls in from the south.

Magnetic Iron Ore

Below the Etow-i-ma-mi the Albany turns south-east for five miles, when it is joined by the Sha-bush-quaia river from the southward. At two and a half miles below the former branch, Huronian rocks make their appearance. They consist of light-greenish, rather finely crystalline hornblende schist, black, with some light coloured schist, together with fifteen or twenty feet of fine-grained banded magnetic iron ore with slaty partings. A specimen of this ore was analysed by Mr. Kenrick of the Geological Survey, and found to contain 42.09 per cent. of metallic iron, and to be free from titanic acid. Along with the magnetite is a band of iron pyrites, a few inches thick, with traces of copper. These rocks are so much disturbed that it is impossible to determine their strike. The joints in the hornblende schist are slickensided, and many of them are occupied by strings of calcspar.

A dark green hornblende schist occurs at two miles before coming to the Sha-bush-quai-a river, and strikes N.70° E., dip 90°. It holds patches of calcspar and quartz running with the cleavage.

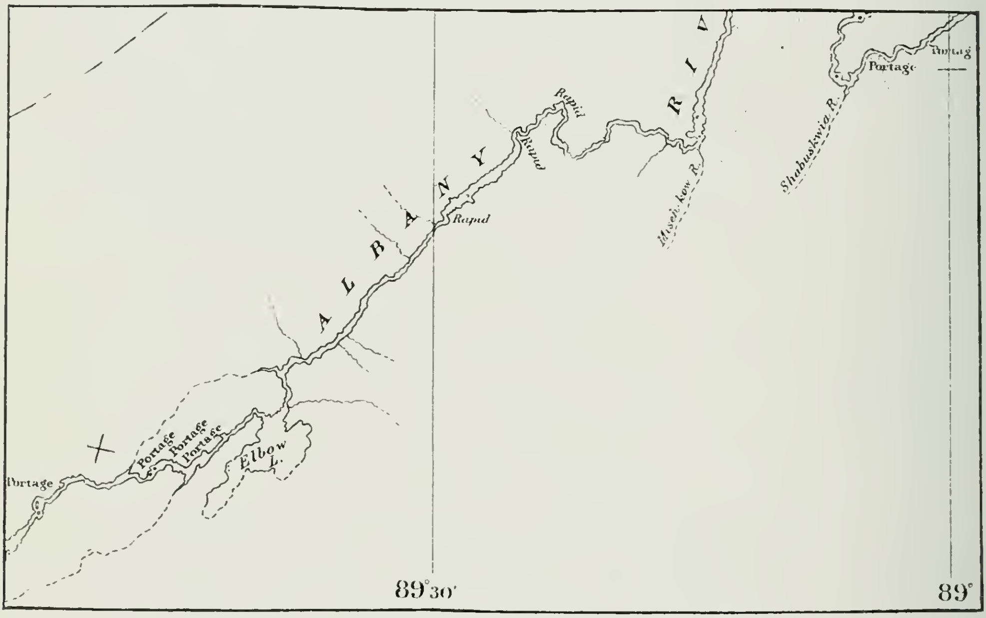
The Eska-qua, or Green Bush Portage, being the 8th from Lake St. Joseph, is met with at a mile and a half below the Sha-bush-quai-a river. It is on the right or south side, and is 505 paces long. There is nearly perpendicular fall in the river of fifteen or twenty feet, and the total descent at the portage is about twenty-five feet. The rock is a soft, green schist, striking N. 85° W. with great regularity. Specks of copper pyrites were found in small quartz veins in the schist at the foot of the fall. A mile below this portage, similar schist and a hornblende rock, having a pitted weathered surface, strikes S. 80° W.

The Lower Eska-qua, or ninth portage, on the right side, and 185 paces long, with a descent of twenty-five feet, occurs at two miles below the last. Soft green schist with calcspar in the joints and cleavage planes is found here. One band shows a concretionary lenticular structure. The strike is S. 65° W., with a south-eastward dip of 75°.

The head of the tenth, or Snake portage (Kenaibik Inigum). on the left side, is a mile and a half below the last. It is 480 paces long, and the descent in the river is ten feet or more. Soft, green schist, striking S. 75° W., is here largely exposed. Much of it has the concretionary structure so often observed in the Huronian schists. It is traversed by a band or dyke of coarse, grey felsite, from nine to thirteen feet wide, in which grains of blue quartz are thickly disseminated. Its general course crosses the cleavage of the schist, but it bends suddenly at an angle of 55°. Large glacial furrows, running in a south-westerly direction, occur at Snake portage. Between this portage and the inlet of Maminiska lake, four miles farther on, chloritic schists are exposed in two places, the strike ranging from S. 10° W. to S. 25° W., the bedding or cleavage being vertical.

Maminiska and Patawonga Lakes.

The country on either side of the Albany river, all the way from Lake St. Joseph to where the Huronian rocks commence, below the Etow-i-ma-mi branch, is generally level, few hills of any kind being seen. The shores of the river are rocky or bouldery, but the banks often show gravel, sand, loam and clay. But from the last-mentioned locality to Maminiska lake and to the south of this sheet of water, numerous earthy-



Elbow Lake, Albany River.

looking hills are visible. Wherever a view can be obtained over the country, long slopes of gentle undulations may be seen, the hill-sides being covered either with old timber or a second growth of aspen and white birch. Some small grey elm trees were observed at the inlet of Maminiska lake, being the first noticed since leaving Minnietakie lake, where a single small tree of this species was seen. A grove of black ash occurs with the elms, but this tree is not uncommon along the Upper Albany.

Maminiska lake runs north of east, and is about sixteen miles long. It is divided by a very narrow place, about half-way down, into two equal parts, each three miles wide. The rock at the narrows consists of a hard, close-grained diorite, of a somewhat concretionary character. An obscurely stratified appearance in it has a west-south-westerly bearing.

Cedar river enters the north side of the lower division of Maminiska lake. An Indian, whose hunting grounds surround Cedar lake, at the head of this river, described it as being about the size of the lower division of Maminiska lake, and containing many islands. It would appear to lie about thirteen miles north of the latter. He said there were six portages on Cedar river between the two lakes.

The outlet of Maminiska lake is on the south side of the eastern half, and, after a rapid descent southward of two miles, the river falls into the head of Patawonga lake.

The eleventh portage, 110 paces long, by which we got past a steep chute with a fall of eighteen feet, is on the left side, and about midway between the two lakes. The rock at this chute is a coarse, grey stratified concretionary diorite, with spots of light-coloured felspar, and a smaller proportion of spots and patches of green epidote scattered irregularly through it. It strikes west, dipping southward at an angle of 60° to 70°, and contains a good many irregular veins of quartz, holding epidote and hornblende, the veins for the most part running with the stratification. A number of these veins, from three to fourteen inches thick, were carefully examined for metallic ores, but none could be detected.

Patawonga lake is about thirteen miles long, with a course bearing to the south of east, and varies from half a mile to two miles in width. It is surrounded by a level country. Two rivers flow into it from the south and one from the north. On the south side, near the outlet, schists, supposed to be Huronian, standing in a vertical attitude, strike east and west. An islet, about midway between the extremities, consists of a gneissoid rock, composed of quartz, hornblende, and a triclinic felspar, striking N. 75° W. Ordinary gneiss occurs on an island in the outlet.

Within the first two miles from the outlet of Patawonga lake there is a strong rapid, with a descent of from twenty to thirty feet, requiring a portage (the 12th) of a few hundred yards, but it varies in length according to the height of the water; and at three miles the river falls into Ka-wi-tos-kam-igamog lake. This is five miles long and has a north-easterly course. It is remarkable for having a straight ridge of drift which forms an island nearly two miles long, running down the midde of its lower part. The thirteenth portage, 290 paces long, crosses part of an island at one mile below the last lake, and the descent in the river is about twenty feet. Gneiss was observed in two places in the next two miles. At the end of this distance we entered a lake measuring about two miles along its north-west side, and which from its shape might be called, for convenience, Triangular lake.

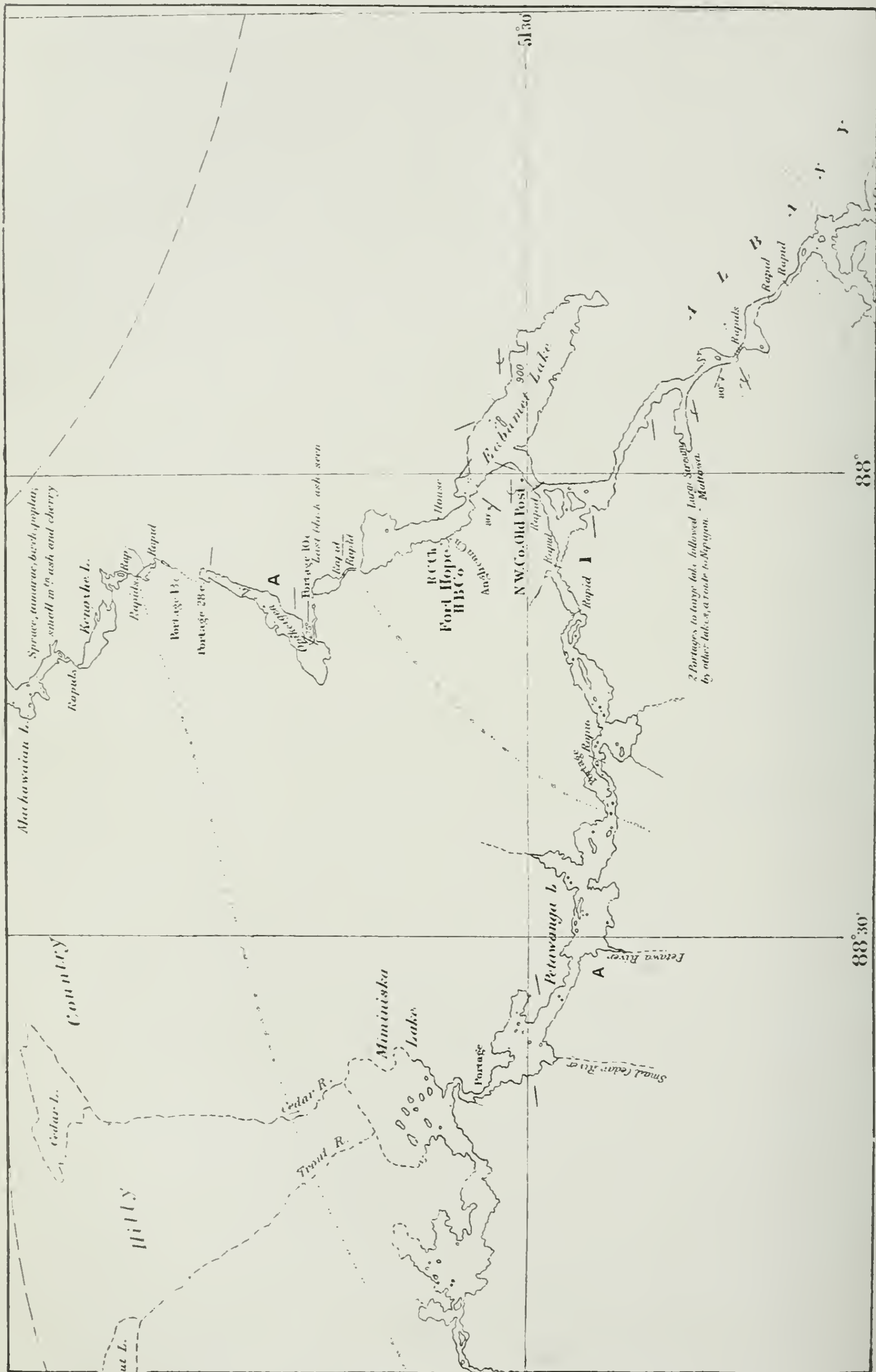
Eabamet River and Lake

The Eabamet river enters the north-eastern angle of this lake, while the downward continuation of the Albany flows out of its south-eastern corner. From the junction of the Etow-i-ma-mi, mentioned above, to this lake, a distance of upwards of forty miles, the general course of the Albany has been about east, but it now turns south-east. Triangular lake is within twenty miles of Abazotikitchewan lake, at which I struck the Albany in 1871 when making a micrometer survey of a canoe-route from Lake Nipigon. From this point, the survey of the river was then carried down-stream to The Forks, or junction of the Kenogami. In order to connect the upper part of the river with the survey, I sent Messrs. MacMillan and Murray to make a track-survey of the intervening link. They found the distance to be about twenty miles and the general course of the river south-east, as just stated, with only one rapid requiring a portage, between the points referred to. In this stretch, the river has the same general lake-like character which it has maintained from the head of Maminiska lake, a distance of twenty-six miles, and which continues to the foot of Makokibatan lake, about thirty-four miles below Abazotikitchewan lake, or for eighty miles in all.

Mr. MacMillan found gneiss here and there on the shores of the Albany for about half the distance from Triangular lake to Abazotikitchewan lake, but in the second part of the distance, hornblende schists, striking east and west, continued to the north side of the latter lake, where I had found similar rocks with granite and trap in 1871. Gneiss, with a west and north-west strike, was then described as occurring all around the southern part of the last mentioned lake. (Report of Progress for 1871, page 109.) The breadth of the hornblende schist belt is apparently between six and seven miles, at right angles to the strike, and it is perhaps connected with the Huronian belt which I found between Lake of the Narrows and Martin's Falls, and which appears to be folded and repeated to the north of the part of the Albany referred to. (Same report, page 110.)

Leaving the Albany and following up the lowest section or link in the Eabamet river, a small stream unbroken by rapids, we entered Eabamet lake, at a distance of only about one mile. This sheet of water runs east-south-east and is about eleven miles long by one mile and a half wide, and the stream by which we entered it flows out near the middle of the south-western side. In the vicinity of the outlet, micaceous gneiss dips S. 80° E., angle 45°. About a mile from the upper end of the lake, on the same side, ordinary grey gneiss strikes north-westward. On the north-east side, four miles from the upper extremity, a very micaceous grey gneiss, passing into mica-schist, strikes N. 60° W. and dips north-eastward at an angle of 70°. It is cut nearly at right angles to the strike by irregular dykes of a coarse, light grey granite, with branches following the lamination, holding considerable numbers of grains and small crystals of a green mineral, which Mr. Hoffmann finds to be apatite.

From the head of Eabamet lake the river is rapid and has an upward north-westerly course of three miles, with Round lake (one mile in diameter) half way, and we then



Eabamet Lake, Albany River.

enter Fishing lake. The rocks between these lakes consist of dark grey compact felsite in very even laminæ and green dioritic schists, interstratified with a grey gneissoid rock, containing a triclinic felspar. The strike is east and west. These rocks are classified with the Huronian.

Fishing lake runs north-north-east and is about eight miles long. No fixed rocks are seen on its shores. The rapid stream flowing into the head of Fishing lake has an upward northerly course of four miles, and flows out of a lake about a mile wide and six miles long, running north-west. Coarse, grey gneiss occurs at the outlet of this lake. This point is thirteen miles north of the last gneiss seen near the head of Eabamet lake, and, as the strike of the Huronian rocks above the latter is east and west, the belt to which they belong has a possible width of the above amount, but it probably does not extend more than eight miles north of the head of Eabamet lake, and it may be connected with the Huronian belt to the south-west, extending along the Albany from near the Etow-i-ma-mi branch to the outlet of Patawonga lake, a distance of about thirty miles. Continuing northward from the six-mile lake referred to, after ascending another short link of river, less than a mile long, we entered a lake which also measures six miles from south to north, but which has an extreme width of about five miles. The shores of this lake, almost all the way round, consist of boulders and shingle. Gneiss was found *in situ* at three places in the northern part. The surrounding country is level, with the exception of an isolated hill about two miles from the south-west side of the lake, which is conspicuous from the rarity of any inequalities in the surface of the country in this region, no other hills having been seen on our route since leaving Maminiska lake.

From the lake last described we would have reached the Attawapishkat river most easily by crossing the height-of-land to the north-westward and descending the Martin-drinking river. We afterwards learned that the first portage leading to this stream leaves the western bay of the lake, and not the north-western, where we searched for it in vain.

Having no guide, we followed the only route we could find—one which left the north-eastern extremity of the lake by a short portage into a tributary lake, four miles long, running in a north-easterly direction. From the head of this lake we crossed the height-of-land by a portage 880 paces long, and came to a lake one mile long, from which the water flowed north-eastward. The variation of the compass in this vicinity, from my observations, would appear to be less than 1° E.

Boulder River

We descended the small river, which has its source in this lake, to the Attawapiskat river, and found the distance, in a straight line, to be about twenty-five miles. The Indians do not navigate this stream, and as they have no name for it, we called it Boulder river, from the very bouldery character both of its bed and the country on either side. Its general course is pretty straight, and bears a little east of north-east. It consists of a series of short stretches of dead water, with bouldery rapids between them. At most of these we were obliged to make portages, on account of the small quantity of water flowing among the closely crowded boulders, although the descent might not be great. In some cases, however, a clear channel, down which canoes could be run, was formed through the midst of beds of boulders. The formation of these curious channels, which I have observed at bouldery rapids in many of the smaller rivers, north of the great lakes, may be due to the action of frazil or anchor ice in buoying up the boulders, so that they might be rolled or partially floated down the rapids by degrees, from year to year, until the existing channels were formed. We managed to float our canoes down some of the numerous rapids of this river by removing boulders. This process was resorted to whenever it could be done in less time than would be consumed in cutting out a portage-trail, unloading the canoes, carrying over everything and reloading. But in addition to clearing a considerable number of such channels, we made upwards of thirty complete portages, which required the trails to be cut through the woods in every instance. All these operations entailed a great amount of labor, occupying from the 5th to the 18th of August. Soon after crossing the height-of-land, I left most of my party to bring on our larger canoes and supplies, and pushed on in a light canoe to the junction of Boulder river with the Attawapishkat, in order to ascertain whether it was possible to reach the latter at all by this route.

At seven miles before joining the Attawapishkat, Boulder river falls into a lake three miles long, which the Indians call Sturgeon lake, from the abundance of this fish to be found in it. While in the act of setting our gill-net, the evening we camped on its shores, a sturgeon, measuring upwards of five feet in length, was caught in it. Below Sturgeon lake, the river is not so difficult as above; and after having advanced nearly to this lake with a sufficient supply of provisions for the remainder of the season, I sent back Messrs. MacMillan and Murray with two canoemen, as already stated, and continued the exploration with the aid of the remaining four voyageurs.

While the labour of cutting out portages and transporting our supplies was going on, numerous observations for latitude were taken, and I also explored the country for some distance on either side of Boulder river through a considerable part of its course. The surface consists of a series of rounded bouldery ridges of no great height, irregularly disposed, but running generally in a north-easterly and south-westerly direction, with swampy spaces, covered with a deep hummocky growth of sphagnum moss between them. In some sections, the timber had been burnt off the ridges and dry parts, exposing the naked surface, which was then seen to consist of boulders of all sizes and of a variety of kinds, mixed with some gravel and sand, and presenting a sterile and forbidding appearance.

On the dry ground, the timber consisted of black spruce, tamarac, balsam, aspen and white birch, but on the wet level tracts, it was principally black spruce. All the rapids in Boulder river were overhung by thick groves of good-sized white cedar, and the same tree was met with in groups in some of the swamps at a distance from the river. The rough-barked poplar occurs near the stream, but was seldom seen inland. Common varieties of gneiss were noted in a number of places in the bed of the Boulder river. There was no regularity in the general strike. Locally, the gneiss ran in various directions, from north-west to south-west.

Boulder River, near its source, showing the general character of the streams on the height of land S.W. of Hudson Bay.

Attawapishkat River

Having reached the Attawapishkat river, I left my supplies in charge of one man on an island, half a mile long, which I called Nolin's island in his honour, and taking the other three men, proceeded to explore the upward course of the stream. Its general direction was found to be about W. by N. At three miles we came to a very steep rapid, with a rise of fifty to sixty feet in about a mile and a quarter, which, for convenience, I called the Long rapid. Notwithstanding the strength of the current, my men poled our canoe all the way up. No rock *in situ* is seen, but nearly all the boulders which form the bed and shores of Long rapid are more or less angular, and consist of an indistinctly and coarsely stratified grey syenitic gneiss, consisting of grey felspar, bluish-white quartz and black hornblende. The weathered surfaces are rough and pitted. My barometers showed the head of Long rapid to be eighty feet above the level of the river at Nolin's island. A mile farther on, a lagoon occurs on either side of the river. I afterwards learned from the Indians of the country that there is a portage from the lagoon on the north side to another channel of the Attawapishkat, nearly as large as the one we were ascending, and which falls into it only thirteen miles, in a straight line, below this portage.

At the next rapid, which is only a short distance above the lagoons, the ascent is fifteen feet. Here the river rushes over and among large angular masses of pinkish-grey granite, consisting of an even mixture of quartz, felspar and mica, with a medium or fine texture. The appearances indicate that this rock exists in place just beneath.

The finer materials of the drift along this section of the river contain a large proportion of soft, yellowish limestone, but there is besides, a hard, bluish limestone, containing chert, which frequently occurs also as good sized boulders. In addition to these, among the more noticeable constituents of the drift of this region, may be mentioned the dark grey, finely quartziferous felsite or greywacké, resembling dark sandstone or friable quartzite in appearance, and holding rounded spots of a lighter colour, weathering into pits of the same form, which is so generally and abundantly diffused in the drift all over the country, to the west and south-west of James' bay. Hard reddish and brownish sandstones, impure jaspery iron ores and red jaspers, having the peculiar oolitic structure of those of the Manitounuck and the Animikie series, may also be mentioned among the constituents of the drift along this part of the river.

Ascending the Attawapishkat from the last-mentioned rapid, we passed a dozen other rapids, alternating with small lake-like expanses, and at eleven miles, in a straight line from Nolin's island, entered a direct south-westward continuation of the south-west arm of Attawapishkat lake, but three or four feet below its level and separated from it by a short rapid, flowing out of the middle of the south side of the latter. The northern channel of the Attawapishkat river, above referred to, is said to discharge from the eastern extremity of this lake, but this portion was not completely explored. Attawapishkat lake is, however, apparently about nine miles long. Its inlet is near the west end.

Lake Lansdowne[22a]

Still following up the river, for three miles from the inlet of the last mentioned lake, in which the rise amounts to only a few feet, we entered the largest sheet of water on the Attawapishkat, but strangely enough the Indians had no definite name for it. I, therefore, proposed to call it Lake Lansdowne, in honour of the Governor-General of the Dominion. As explained in my summary report, it was found to have a length of about thirteen miles, from south-east to north-west, and an extreme breadth of about ten miles. Lake Lansdowne is diversified by many beautiful islands, two of which measure about four miles each in length. The bays and points have all a north-east and south-west direction. A large, rounded, but not high hill, covered with second growth deciduous timber was seen in the western part of the lake, near the inlet or mouth of the upward continuation of the Attawapishkat river. The points and islands in the northern part f the lake are higher than elsewhere and have steep, wooded slopes, but they appear to be all composed of drift, and no rock *in situ* was seen anywhere around the lake. Long narrow moraines or rows of boulders extend south-westward off the extremities of some of the points and islands along the north-east side. Except where forest fires have run, large spruce and tamarac trees, and some cedars were observed on the islands and on the mainland near the lake, and also along the river between it and Nolin's island. The mouth of the upper division of the Attawapishkat river, which the Indians described as a wide tranquil stream, is in the south-western bay of the lake. The Martin-drinking river, by which we should have travelled from the second highest of the Eabamet chain of lakes, enters a bay on the south side between the inlet and outlet. On the opposite side of the lake, a brook is reported by the local Indians to enter the first bay northward of the outlet; and by way of this stream, there is said to be a canoe-route to a lake on the Weenisk river,[23] described as being as large as Lake Lansdowne, and called Wa-pi-quai-o lake. Another canoe-route to the same lake was stated to begin in one of the northern bays of Lake Lansdowne, and a third route, which, however, strikes the Weenisk river above the lake referred to, was described as beginning in a bay a short distance south-west of the one last mentioned. Wa-pi-quai-o lake would appear to correspond with "Weenisk" lake of Arrowsmith's map, as the Indians stated that it receives a large stream from the west and discharges the Weenisk river to the north.

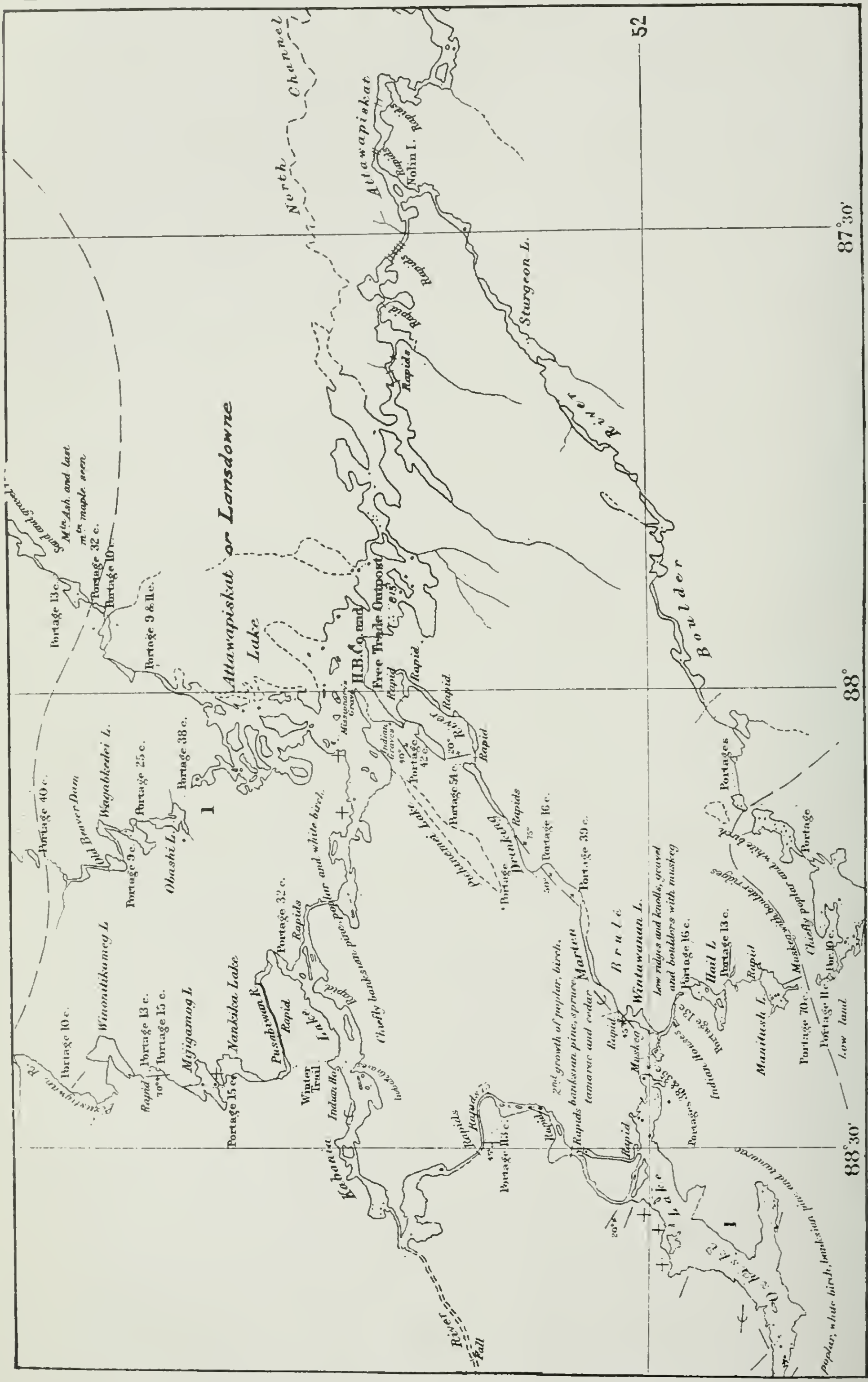
A triangular island, measuring about a mile and a half on each side, is formed at the outlet of Lake Lansdowne by a small channel north of the main discharge, by which we entered. In the bed of the southern channel, at a mile below the outlet, there is an exposure, at low water, of a grey, friable, "pepper and salt" gneiss, with a few redish grains. The strike is S. 75° W., but the stratification is not conspicuous.

Attawapiskat River below Lake Lansdowne

Below Nolin's island, at the junction of the Boulder river, the Attawapishkat flows eastward and is interrupted by three rapids in the first four miles. Its course then forms a semi-circle to the southward, four miles in diameter, and has marshy lagoons on

[22a] Lake Lansdowne is now called Lake Attawapiskat.—W.G.M.

[23] The river referred to as the Weenisk, following the spelling on the published maps, is called the Wainusk by the Indians, which means the Woodchuck or Ground-hog (*Arctomys empetra*, L.)



Attawapiskat or Lansdowne Lak

either side. From the most south-easterly of these, a trail leads directly to Martin's falls on the Albany. An intelligent Indian, who had just come from that trading post, informed me that the trail keeps the same bearing all the way, and on plotting it upon the map of my surveys of the two rivers, the position of the post is found to be directly in the line of this trail. The distance is about sixty miles, and the Indians report the country as level and covered with sphagnum. The trail is said to be crossed by five streams flowing into the Attawapishkat and only one into the Albany.

At the termination of the above semi-circle, the channel we have been following joins the north branch from Attawapishkat lake, the two branches here flowing towards each other from exactly opposite directions and meeting in the same line which bears about N.N.E. and S.S.W. The distance from the southern outlet of the lake to this junction is about twenty miles in a straight line.

For thirty miles below this junction, the general course of the river is about east, and in this distance, it maintains a pretty uniform character, being alternately swift and rapid with long bends. The banks are of boulder-clay, ice-swept and sloping gently down from the brink to the summer level of the water, the whole height being about thirty feet. The surface of the country on both sides is low and level, as indeed it has been all the way from Lake Lansdowne. Except where the timber has been destroyed by fire, there is a good growth of spruce, tamarac, balsam, poplars and white birch along the banks of the river, but it does not extend far back, the country generally being open sphagnum swamps with small scattered tamarac and black spruce trees.

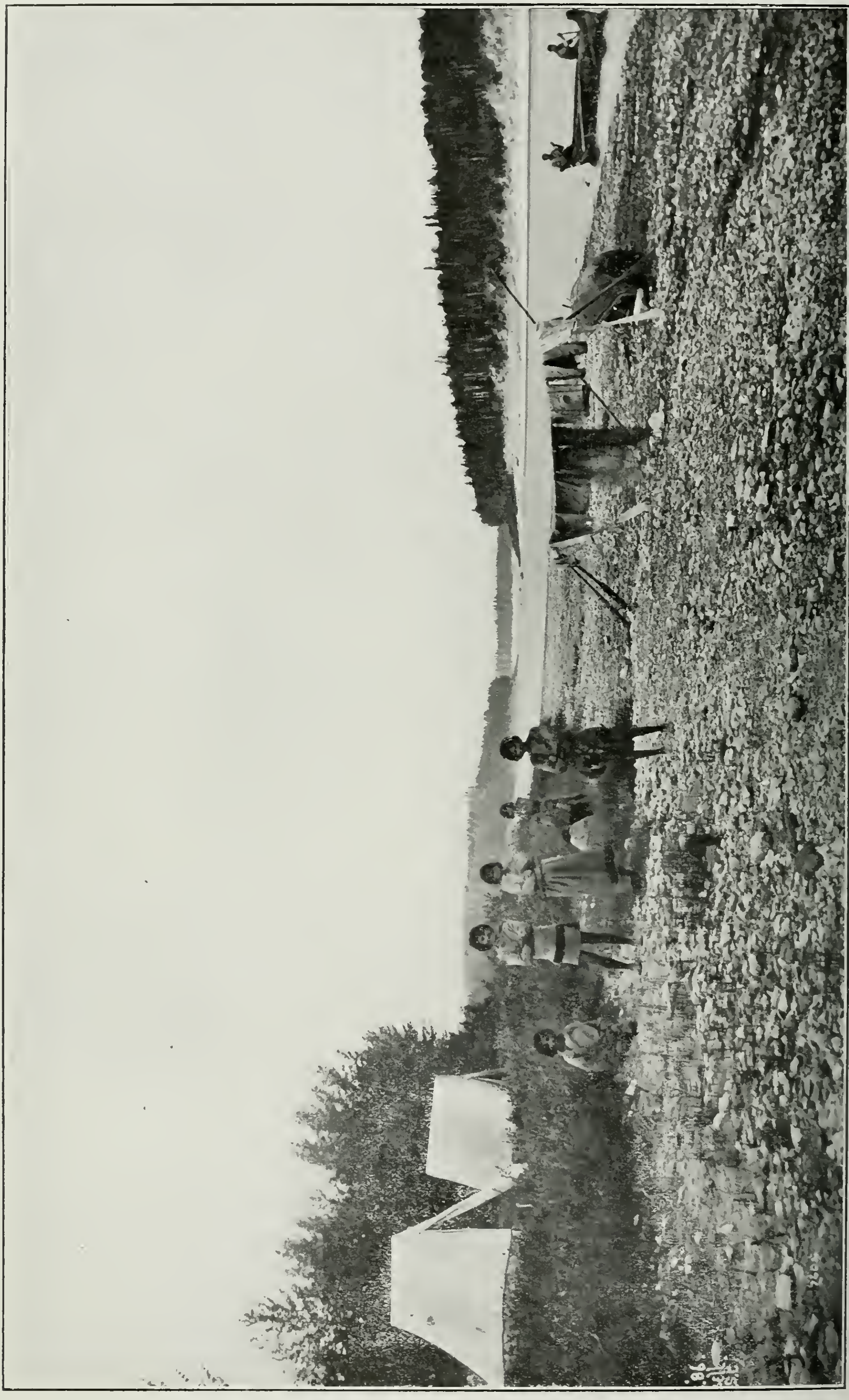
Three miles below the junction of the two channels, dark grey hornblende gneiss is exposed on the south side. It is distinctly bedded and strikes N. 50° W., angle 90°. Half a mile farther down, grey, strongly banded or ribboned gneiss strikes with regularity, N. 60° W. At a strong rapid, thirteen miles below the junction, a considerable area of fine-grained light reddish-grey contorted gneiss is exposed, the general strike of which is east and west. At nineteen miles below the junction, the river makes an "elbow" to the south-west and receives, at the angle, a large brook from that direction. On the south side, just below this brook, coarse grey gneiss is met with, striking from S. 40° to S. 60° W., but mostly in the latter direction, and dipping to the south-eastward at an angle of 40°. Two and a-half miles farther down, similar gneiss has an average strike of S. 50° W., with a dip to the south-eastward. Knobs and hummocks of this rock continue in the channel and on the right bank for more than a mile farther. In the last eight miles of the above thirty miles stretch, the river divides itself among numerous alluvial islands, one group of which (ten or twelve in number) is about two miles in breadth. Another Indian trail to Martin's falls leaves the river at the termination of this stretch. The distance is about fifty miles and the country traversed is described as a sphagnum swamp similar to that crossed by the trail to the same post which has been mentioned as leaving the Attawapishkat higher up. The old timber is still standing along the banks in some parts of the above section of the river, but as a rule, the forest consists of a second growth of poplars, white birch, spruce, tamarac and a little balsam. Here, as elsewhere, along this river, much of the timber has been killed by fires within the last few years, and only bushes and young trees have yet replaced it. Small black ash trees have been noticed here and there, all the way from Lake Lansdowne to beyond the termination of the present stretch, and white cedars have been of frequent occurrence, except where the ground is unfavourable for their growth.

At the termination of this thirty miles-stretch, the general course of the Attawapishkat changes to N.N.E., for about sixty miles, or to latitude 53° 0′ 0″, where a brook falls in from the left or west side In the first nine miles of this distance, the river divides into two main channels, with several smaller ones, all flowing sluggishly through a level country between low alluvial banks. The place where they come together again is called Mattawa by the Indians and is a favourite burying-place for their dead. From Mattawa, the stream again becomes swift and rapid, as it was above these islands, and the banks resume their ice-swept bouldery and clayey character.

Last Exposure of Archaean

At eight miles below Mattawa we passed the last exposure of Archæan rock on the river. At low water it forms a conspicuous island in the middle of the stream and consists of a strongly banded mottled grey gneissoid rock, but is composed of light-coloured felspar and black hornblende. The strike is straight and regular, N.5° E., and the dip is eastward at an angle of 45°. It is cut by a dyke of the same composition, ten feet wide, bearing due north, with smaller dykes running in other directions. A dislocation was noted running S. 60° W., towards which the stratification bends in approaching it from either side. Several boulders of a reddish grey syenite were observed at this locality, which exactly resemble the syenite in the Huronian rocks of Shebandowan lake.

Three miles below this rocky island, the river cuts through ridges of bouldery clay, capped with gravel, about 200 feet high, which here appear to run north and south. From where the river enters these earthy ridges, its course is eastward for about four miles,



Devonian limestone in banks of Attawapiskat river, about 200 miles from the mouth. (Photo by R. Bell) after which it resumes the general north-north-east trend and flows with a smooth swift current, unbroken by rapids, such as are of frequent occurrence in the upper reaches, for twelve miles, between banks from twenty to forty feet high, composed of sandy and pebbly yellowish clay, with some boulders.

Horizontal Limestones

At the foot of an eastern "jog" in the river, about eleven miles farther on, or sixteen miles in a straight line from the above mentioned island of gneissoid rock, unaltered limestone is seen in the right bank for the first time *in situ*. The strata are horizontal and consist partly of compact yellowish drab, rather thin beds, together with a larger proportion of porous and rusty looking layers, associated with iron-stained yellowish marl. The only fossils observed consist of large fucoids which cover the surfaces of some of the beds. Below this locality, yellowish limestones are exposed almost continuously in the banks or bed of the river for the next thirty-four miles. They often form cliffs from fifteen to thirty feet high, which are sometimes a mile or two long. Thick layers were observed in a few places, but, as a rule, the beds are thin. The strata appear to the eye to be quite horizontal, except in two localities, where very local, gentle undulations were observed. The river in this section is wide, shallow and swift.

In the above N.N.E. stretch of about sixty miles, the Attawapishkat receives no tributaries from the west that we could detect, except two or three small brooks, and the larger one at its termination, which has been already referred to. But it is joined by a considerable number of branches from the east in the same interval, the largest of which falls in at about forty miles down or eight miles below the first appearance of the horizontal limestone. The latitude of the mouth of this river, from the mean of two very closely agreeing observations, is 52° 41′ 11″ A party of Indians of the country whom we met here had no name for this stream, and I propose to call it Streatfield river, after the Governor-General's secretary. The accompanying illustration is from a photograph looking down-stream, which was taken opposite the mouth of this branch. It is a good representation of the character of the Attawapishkat where it flows over the horizontal limestones.

Timber Conditions

Along the upper part of this stretch (of sixty miles) the timber is mostly green, and some of it is of fair size, but throughout the greater part of the distance the woods have been burnt at different periods many years ago, and, whether original forest or second growth, the trees are generally of small size. In some parts, spruce and tamarac are mixed with the poplars and white birch, but in others the coniferous and deciduous trees occupy separate areas. The sections of old timber and second-growth alternate at intervals of varying length with others more or less recently burnt and not yet reforested. The white cedar is scarce, but an occasional tree is found in favorable situations much farther down the river. The last black ash observed on the Attawapishkat was passed in this section. An Indian from the Wai-nusk river, who was ascending this stretch, and who had never before been so far south, informed us that he had here seen the cedar for the first time in his life. He had not yet noticed the black ash, and had never even heard the Indian name of the tree.

Black Fence River

The next stretch of the river from the junction of the above mentioned brook, in latitude 53° 0′ 0″, bears E.N.E., and is about thirty miles long, terminating where the stream is joined by a very large branch from the west, called the Muckitai-michigan or Black Fence river, which, as far as could be seen, has the same general course as the united waters for some distance below. The horizontal limestone is exposed on both sides nearly all along the upper six miles of the stretch under description, but in the remainder of it the banks and bed of the river consist of drift, which is largely made up of the limestone debris. The country on both sides is level throughout this portion of the river. A large brook falls in from the south at six miles above the termination of this section.

The timber along both banks in the upper twelve miles of this reach consists of old green spruce of fair size, but in the remaining eighteen miles the green and recently burnt timber alternate in short sections. In some parts the fire was actually burning as we passed by.

The general course of the Attawapishkat, from the junction of the Black Fence river to its mouth, is about S. 70° E., and the distance in a straight line about 135 miles. The river has now become much larger, and it flows for many miles with a swift current between rather low banks of drift, the country on both sides being level. This latter character continues all the way to the sea. From this large branch to the mouth, the Attawapishkat is characterized by great numbers of islands. In the upper half of this long reach, only half-a-dozen tributaries were observed, and scarcely any at all in the lower half, which may be due to the even nature of the surface of the country and its general and uniform slope to the eastward, thus causing the drainage to pass off in parallel lines direct to James' bay.

Big Lake River

Nineteen miles below the Black Fence river, the Missi-sagaigan, or Big Lake river, a good-sized stream, falls in from the south, opposite the upper part of an island three miles long. In the sandy banks, about the lower end of this island, marine shells were observed for the first time. The species collected are *Saxicava rugosa, Tellina Grœnlandica, Cardium Islandicum* and *Mya truncata.* The barometric readings would give this locality an elevation of about 500 feet above the sea. Horizontal beds of limestone occur in the bottom of the river, five miles above this point, and again three miles below it, at the head of an island, which is over six miles long, and may be called Big island. From the foot of Big island, the river forms a semi-circle to the south, four miles in diameter, and then it divides into channels, which form four islands, with a total length of six miles. The water is shallow, and the descent rapid in these channels, each of which is flanked by cliffs, about twenty feet high, of yellowish, crumbling, earthy limestone. This rock, and indeed all the limestones met with so far on this river, resemble those of the Churchill and the Kenogami rivers, which are of Silurian age.

Devonian Fossils

For the next twenty-three miles, the river flows south-east, and has upwards of twenty islands in this part of its course. On one of these, about a mile in length, occurring about the middle of this stretch, and which we called Rainy island, the following fossils, as determined by Mr. Whiteaves, were collected in thinly-bedded limestone:

Favosites.—Species undeterminable. One fragment. Corallites about two inches in diameter; tabulæ complete.

Strophomena.—Species undeterminable. One valve.

Euomphalus (or *Pleurotomaria*), nov. sp. Four casts of the interior of the shell.

Straparollus. allied to *S. Nevadensis*. One cast of the interior of the shell.

Fragments of two other species of gasteropoda.

Orthoceras, nov. sp. Four or five specimens of the siphuncle only.

Mr. Whiteaves considers these fossils to be of Devonian age.

Throughout the above twenty-three miles, the river is generally wide and smooth, with low banks, composed of drift, while flat-bedded limestone is occasionally seen in the bottom. At the end of this distance, however, a sudden change takes place, and for thirty-three miles, or to the head of Lowasky island (the general course being east) the river flows with a rapid current, between cliffs, and among almost innumerable islands of yellowish limestones, all having an everage height of about forty feet. These limestones have a singular structure. They consist of great, spongey and cavernous masses, often occupying the full height of the cliffs, which may be described as gigantic concretions, alternating with thinly-bedded portions, the lamination of which appears bent at all angles, to accommodate itself to the spaces between the concretionary portions. Close to the latter, the lamination often follows the contours of their outlines, but farther away it dips at more moderate angles. The islets, which are thickly scattered among the larger islands in this part of the river, often appear to consist of single masses of this kind. Their surfaces generally present a massive and very uneven, or rugged, appearance, but they sometimes show numerous patches of more or less concentric lines, marking a subordinate or internal, indistinct concretionary arrangement, or the edges of the thin beds, which have remained in basin-like forms, in the depressions on their exteriors. Both the massive and laminated varieties have a yellow or yellowish-grey colour on fresh fracture, but the old surfaces have weathered to a blue or ash-grey.

The porous or cavernous masses are largely made up of fossils, although the number of species do not appear to be great, while the thinly-bedded inter-spaces contain but few. Mr. Whiteaves has determined the following from the specimens brought home, and he considers them to indicate the Devonian system:—

Favosites, species undeterminable. One fragment. Corallites polygonal; their maximum diameter five mm.; tabulæ complete, arched and crowded.

Meristella (*Whitefieldia*), nov. sp. allied to *Whitefieldia tumida*. Dalman (sp.) and *W. nasuta*, Conrad.

Strophodonta, species uncertain, but allied to *S. concava* or *S. ampla*.

Long cylindrical corals, like *Amplexus* or *Zaphrentis*, and a large trilobite, apparently allied to *Bronteus*, but resembling *Proetus* in the broad outer margin of the pygidium, were also observed, but owing to the friable nature of the rock, specimens for identification could not be obtained. The numerous caverns, often of fantastic shape, but seldom of very large size, in the cliffs and islets of this part of the river, give the scenery a very singular and picturesque character. The Indians from the Equan river (the next large stream north of the Attawapishkat) report similar light-coloured, cavernous rocks along the lower portion of its course.

Lowasky River

At forty-four miles before coming to its mouth, the Attawapishkat divides into two channels. We followed the southern or smaller of them, which is called Lowasky river on Arrowsmith's map, and the island between it and the northern or larger channel, which has the above length (44 miles) may be called Lowasky island. The limestones above described extend for a few miles down the southern branch, and there may be small channels in this neighbourhood between the two branches, but in the rest of its course the Lowasky river presented little requiring description. The banks, which are generally low, consist of bouldery clay, with stratified gravel or loam occasionally at the top. Numerous shallow rapids occur. The tide extends to the foot of three such rapids, close together, about eleven miles from the mouth. A channel, which appeared to be a feeder, but which may be a discharge, occurs at four miles from James' bay. In the marshes on either side of the mouth of the river, we observed great numbers of geese and ducks as we passed out to sea, on the 7th of September.

General Notes

Throughout the long stretch from Black Fence river to the sea, the country on both sides maintains the same level and swampy character which has been described as prevailing higher up. The timber on the borders of the river, where still green, is smaller along this section than along the upper parts. Some portions, consisting principally of spruce and tamarac, appear to belong to the original forest, but much of it is no doubt second-growth, and these two species are then usually mixed with poplars and some small white birch. The growing timber, whether original or second-growth, is not often continuous for any great distance, being interrupted nearly the whole way by frequent sections of burnt ground.

From the barometric readings obtained on Lake Lansdowne, this sheet of water would appear to be about 960 feet above the sea, which shows that the general fall in the surface of the country between it and James' bay must be very gradual indeed. It is a remarkable fact that we did not require to make a single portage in the whole distance from this lake to the sea, and I could hear of no portages in the continuation of the river above the lake. The Indians describe the latter as a wide and tranquil stream, expanding into several lakes along its course.

Sturgeon are abundant in the lakes of the Attawapishkat, and they appear to constitute the principal food of the few Indians who inhabit the country. Whitefish are also caught, both in the lakes and along the river itself. Pike and suckers are abundant in all the waters. The Canada goose breeds in considerable numbers in the open swamps behind the wooded borders of the lower section of the river, and the young birds, ready to fly, were congregating in flocks, all along the lower stretch, in the end of August and the beginning of September. The dusky and other species of ducks were also numerous, and the yellow-legged plover was very abundant. We saw a few cariboo and several black bears while descending the lower part of the river.

The Indians of the Attawapishkat and Weenisk districts appear to have diminished greatly in numbers since the last sixty or seventy years. At that time several trading posts were maintained in this territory, where none now exist. We met with only a few families, but a good many Indian graves were noticed along the banks of the river. Those living far up the stream never go to the sea. One old man with whom we talked had never been at any trading post. Few of them had ever seen a white man before. One young man whom we fell in with on Attawapishkat lake accompanied us up to Lake Lansdowne, and after a few days' acquaintance, I had no difficulty in engaging him to go with us to James' bay, and thence up the Albany, from which he was to cross by one of the Martin's falls trails to his own river again.

After leaving the southern mouth of the Attawapishkat, we reached the Kapushkow river in our canoes in three hours and a half, the distance being only about ten miles. Starting from this river early next morning (8th September), we ran the whole distance to Fort Albany the same day, by sailing and paddling, arriving there late in the evening. The shore of James' bay between the two rivers is extremely low. The beach along high-water mark is sandy and marshy, but when the tide is out, reefs of boulders and stones, which look interminable, stretch out to sea as far as the eye can reach. The tide had fallen some time before we reached the Albany river, and in order to get past these reefs in our canoes we were obliged to go so far out to sea that the tops of the trees on the nearest part of the shore were barely visible at a few points. Even at high water, it requires an experienced pilot to take a sail-boat over these extensive bouldery reefs. We were told that the water is so shallow that no large vessel could pass between the west shore of James' bay and "Agoomska" island. This large island lies nearer the west shore of the bay than is represented on the maps, and it is called by the Indians of the region Agimiski or Akimiski.

Albany River

Where the Albany river flows into James' bay, the coast is as low as possible, the water in front very shallow, and the country inland level and swampy. As the water of the bay is receding rapidly (in a geological sense), it becomes difficult to draw the line between the sea and what may be considered land. Fort Albany, one of the oldest and largest trading posts of the Hudson's Bay Company, is built on the south side of an island of the same name, six miles long and two and a-half wide, lying just inside the present mouth of the river. The channels on either side are of about equal size. Below it are two islands of sand and mud, covered with grass, sedges and bushes, but Albany

R. Bell, Photo., 1886. Albany River, Five Miles Below the Forks; Showing Ice-Swept Shores: "Pavements."

island is the first one which is timbered. As the mouth of the river and the adjacent shores are so difficult to define, all measurements of distances in the following description of the river will be taken from the Fort itself, which is situated about seven miles in, from the general line of the present mean high tide mark. Tide-water extends for only about three miles above the Fort.

As stated in a previous part of this report, in 1871 I made a micrometer and compass survey, with numerous latitudes, of the Albany from Abazotikitchewan lake down to The Forks, or junction of the Kenogami or Long Lake river, and thence up this river and via Long lake and Pic river to Lake Superior. A track-survey having been made the present season of the upper part of the Albany, from Lake St. Joseph to Abazotikitchewan lake, the lower section of the river, extending from the mouth to The Forks, was all that remained to complete the survey of the whole stream. It was only possible with the time and means at my disposal to make a track-survey of this part, on our return journey last autumn, but this was done with great care, and having ascertained the latitude and the variation of the compass in numerous places, I think the resulting map will prove very nearly correct.

Two Hundred and Fifty Miles of Steamer Navigation

In size, the Albany is comparable with the Ottawa, and at high water it might be navigated by powerful river steamers from the mouth to Martin's falls, where the first portage occurs, a distance of about 250 miles, following the general trend of the river. Its upward course, from Fort Albany to The Forks, bears about S. 45° W. (true), and the distance, in a straight line, is about 131 miles. For sixteen miles above the Fort, the river is wide, between the main shores, and full of islands of various sizes, and although the descent in the above distance is rapid, this portion may be called its delta. The channels spread widely over the flat-lying Devonian limestones, and the Lower and Upper Big "Falls," the strongest rapids below Martin's falls, occur in this part. Big island, which is the largest of this group, is six miles long. At thirteen miles from the Fort, a channel leaves the main river on the north side, and flows directly to the sea, falling into it several miles northward of Albany island.

For nearly twenty miles above the head of the delta, the river flows in a single channel free from islands, but from thence upward to The Forks, a considerable number are met with. The largest of them are Fishing Creek (five miles long), Black Bear (seven miles), Norran's and Chee-pye islands.

Some rivers and numerous brooks fall into the Albany below The Forks, from the swampy country on either side. The larger tributaries are Low Fishing creek from the south, almost opposite Fort Albany, Upper Fishing creek, from the north, at about one-third the distance to The Forks, and two other large brooks from the same side a few miles below it; Chemahogan river, from the south, at two-thirds of this distance, and the Chee-pye river, eight miles farther down. The latter is the largest branch below the Kenogami. The Henley river falls in from the north, ten miles below The Forks. Henley House, a former Hudson's Bay Company's post, was built on a gravelly island, which is now being swept away, at the mouth of this stream. Several lakes, abounding in fish, are said to occur on the course of this river.

From The Forks all the way down to the delta, the Albany flows in long sweeping curves, with a pretty uniform current, broken by occasional rapids. The elevation of The Forks, from barometric observations, is about 300 feet over the sea, which would give an average fall of about two feet in the mile, following the course of the stream. In two of the stretches, known as the "Long Openings," the river is so straight that, sitting in a canoe and looking from one end of them, the sky and water appear to meet on the horizon.

The country on either side is quite flat, and behind the strips of forest, which extend to a varying breadth from the banks of the river, it is covered with sphagnum, with only stunted tamaracs and black spruces at wide intervals. In some parts it is so open as to be called "plains," and on these the cariboo are found occasionally in considerable numbers, especially during the winter.

Bluffs of stoney clay, fifty feet or more in height, occur along some sections, but, as a rule, the banks are lower. Both sides are completely ice-swept throughout the entire length of this stretch. There is often a cut-bank a few feet high at the top, but from the foot of this the wide shore slopes gradually down to the low-water level. The upper portion of this slope, comprising the greater part of its breadth, is paved with boulders and worn stones, all crowded closely together and forced down to an even surface by the repeated moving pressure of the river ice as it is carried rapidly along during the spring freshets. The rise and fall of the river between high and low-water marks would appear to average nearly thirty feet, but where temporary ice-jams have occurred, it sometimes exceeds this. The Indians say that it rarely overflows any of the country beyond the banks.

Flat-lying Beds of Limestone

Thin horizontal beds of light yellowish-grey limestone, of Devonian age, begin at the first rapid, about three miles from Fort Albany, and are exposed almost continuously in the bed of the river for several miles above. The descent in the stream is so rapid that the thickness of the level strata over which it falls, must amount to, at least, twenty or thirty feet in this part of the river. Flat beds of similar limestone were seen here and there, sometimes covering considerable areas in the bed of the river, but rarely in the banks, to within about fifteen miles below The Forks. From this circumstance and owing to the level and undisturbed nature of the country, as well as from the abundance of angular fragments of Devonian limestone in the drift all along, there is no doubt that the Albany flows over flat-lying strata of this system, from the point above named to its mouth. The following is Mr. Whiteaves' list of the fossils collected in the above section of the Albany:

Syringopora Hisingeri, Billings. One small fragment.

Heliophyllum Canadense, Billings. One small but nearly perfect specimen and two fragments.

Favosites hemisphcrica. Yandell and Shumard. One fragment. Corallites one mm. in diameter: tabulæ complete.

Favosites. species indeterminable. Fragments. Epitheca thick and strongly developed: corallites two mm. broad: tabulæ complete.

Dictyonema, species indeterminable. One specimen.

Ptilodictya Gilberti, Meek, var. One specimen which resembles Meek's species in its microscopical characters, but in which the frond is apparently undivided.

Strophomena rhomboidalis, Wilckens. One well-preserved and nearly perfect specimen of each valve.

Strophodonta demissa, Conrad. Four ventral valves.

S. Patersoni ? Hall. One fragment.

S. concava ? Hall. An exfoliated cast of a ventral valve.

Orthis, species indeterminable. One specimen.

Spirifera, two or three species. Fragments only.

Meristella, nov. sp., allied to *M. unisulcata*, Conrad.

Atrypa reticularis, L. Two specimens.

Centronella glans-fagea, Hall. One perfect specimen.

Conocardium trigonale, Conrad. Two specimens.

Proetus crassimarginatus, Hall. One pygidium.

Mr. Whiteaves remarks that the above fossils "are clearly of Devonian and probably of Lower Devonian age."

Beginning at about fifteen miles below The Forks and extending thence for some miles up-stream, yellowish limestones, some of the beds being of a very spongy or finely vesicular character, are exposed at a few places along the north-west shore of the river. These limestones may belong to the Upper Silurian system, like those higher up the Albany and also on the Kenogami. (See Geol. Survey Report for 1871.)

Marine shells of Post Pliocene age, washed from the river banks, were observed in many places all the way from the sea to The Forks. They were abundant in a modified grey clay in the north-west bank, from Cap island, thirty miles below The Forks, for a number of miles upward. The following species were collected in this section: *Tellina Grœnlandica*, *T. proxima*, *Saxicava rugosa* (valves closed), *Cardium Grœnlandicum*, *Mya truncata* (with the epidermis), *Astarte Laurentiana*.

Forest fires have destroyed much of the timber along the banks of the part of the Albany now under description. Old spruces and tamaracs of good size are still green in some sections, but second-growth timber, much of it well grown up, prevails for the greater part of its length. A good deal of both kinds have been only recently burnt. In addition to the spruce and tamarac, balsam, aspen, rough-barked poplar and white birch occur all along. Banksian pine and ground maple were observed in the upper part. White cedar was first seen about twenty miles below The Forks. Grey elm and black ash were noted on the Kenogami just after we left the Albany or some distance farther north than they were observed when surveying this river in 1871. Groves of both these kinds of trees are found on the alluvial flats at the mouths of all the branches of the Kenogami. Cedar of good size is common all along the banks of this stream. It may be remarked that the occurrence, or otherwise, of certain trees along a river like the Albany may be due to the nature of the ground as much as to latitude.

The Kenogami river and Long lake were surveyed and reported upon in 1870 and 1871, and nothing requiring special description in this place was observed on our homeward journey, with the exception of some facts as to the drift, which will be mentioned further on. The rocks along the Black river, by which we travelled from Long lake to the Canadian Pacific Railway line, as stated in my summary report, were found to consist of crystalline schists and diorite, granite, syenite and gneiss, but further exploration will be required in this region before anything definite can be said as to their distribution.

Courses of Glacial Striae

The glacial striæ were carefully looked for wherever the solid rock was exposed, and their course was recorded in all cases where it could be distinctly seen. Exceptional instances, such as those on nearly vertical walls of rock, or on very uneven surfaces, are omitted from the following list. The bearings refer to the magnetic meridian, but the differences between them and the true bearings are not great, as the line of no variation passes through the central part of the region which they cover.

1.	Minnietakie lake, 8 miles from S. W. extremity	S. 45° W.
2.	do. 3 miles S. of Abram's Chute, at the outlet	S. 40° W.
3.	Abram's Chute	S. 10° W.
4.	Islands in the middle of Abram's lake (below Chute)	S. 40° W.
5.	Island in Lonely lake, 10 miles due east of H. B. Co.'s post	S. 60° W.

6. Point in Lonely lake, 13 miles eastward of H. B. Co.'s post .... S. 25° W.
7. Point on N. shore of Lonely lake, 16 miles eastward of H. B. Co.'s post.... S. 55° W.
8. Rapid at mouth of Root river, E. extremity of Lonely lake .... S. 45° W.
9. Root river, 5 miles in a straight line from its mouth .... S. 50° W.
10. Root river, 10 miles in a straight line from its mouth .... S. 45° W.
11. N. side of L. St. Joseph, 4½ miles from W. extremity .... S. 30° W.
12. Western mouth of Cat river, 9 miles from W. extremity .... S. 45° W.
13. Island in Lake St. Joseph, 18 miles from W. extremity .... S. 60° W.
14. Islet in Lake St. Joseph, 4 miles E. of east mouth of Cat river .... S. 15° W.
15. Islet in Lake St. Joseph, 7 miles E. by S. of mouth of Cat river .... S. 45° W.
16. Fall Fishery on N. shore of L. St. Joseph, 44 miles from W. end .... S. 30° W.
17. Extremity of N. arm of Lake St. Joseph, 50 miles from W. end .... S. 30° W.
18. Northern outlet of Deer Lodge lake, on the Albany river, 13 miles below Lake St. Joseph .... S. 20° W.
19. First Kagami portage, Albany R., 22 miles below Lake St. Joseph...... S. 40° W.
20. Albany river, 2½ miles below Etow-i-ma-mi Branch .... S. 25° W.
21. Narrows about middle of Maminiska lake .... S. 65° W.
22. Middle of Patawonga lake .... S. 75° W.
23. Outlet of Eabamet lake .... S. 80° W.
24. North shore and also head of Eabamet lake .... S. 75° W.
25. Inlet of Sturgeon lake, Boulder river .... S. 70° W.
26. Attawapishkat river, 3 miles below junction of the two channels from lake of the same name .... S. 60° W.
27. Attawapishkat river, 13 miles below the above junction .... S. 42° W.
28. do. 22 miles below the above junction .... S. 22° W.
29. do. 23 miles below the above junction .... S. 15° W.
30. do. Last exposure of Archæan rocks, or 8 miles below Mattawa ....S. to S. 10° E.
31. Attawapishkat river (on limestone), about 75 miles from southern mouth of river .... S. 18° W.
32. Attawapishkat river (on limestone), about 66 miles from southern mouth of river ....S. 8° to 12° W. (Old set.) S. 60° to 70° E. (New set.)
33. Attawapishkat river (on limestone), at head of Lowasky island, about 44 miles from southern mouth of river .... S. 20° W.
34. Attawapishkat river, southern channel or Lowasky river, about 40 miles from southern mouth of river .... S. 35° W. Older, all round to S. 80° W., newer.
(At this locality the striæ are newer in proportion as they become more westerly)
35. Kenogami river, 8th Portage (in going up), about 20 miles below Pine lake S. 40° W.

From the foregoing list it will be observed that the general direction of the glacial striæ is to the south-westward, as it is elsewhere throughout the great Laurentian region between James' Bay, Lake Winnipeg and Lake Superior. In descending from the Laurentian plateau along the Attawapishkat river the course of the striation becomes more and more southerly, but on the horizontal limestones farther down the stream it runs in various directions between west and south at the same localities.

Character of the Drift

The drift (principally boulder-clay) which overspreads the Palæozoic basin westward of James' Bay appears to be a continuous sheet varying probably between thirty and ninety feet, as far as can be judged by the sections along the rivers. Over the generally level surfaces of the Laurentian rocks farther west, the thickness is more variable, but it seldom appears to exceed 100 feet, and it becomes thinner and more irregular as we rise higher and get farther inland, and in these regions the fundamental rocks protrude themselves more frequently through it. It is of a looser and less clayey nature on the higher grounds than elsewhere, and consists largely of washed gravel and shingle.

Along the Attawapishkat, Albany and Kenogami rivers, as well as on the west coast of James' Bay, the most remarkable feature in the composition of the drift is the abundance of pebbles and boulders of dark grey granular siliceous felsite or grey-wacké. It constitutes the greater number of the boulders and pebbles of the extensive reefs which have been referred to, between Akimiski island and the west shore, and is abundant among the boulders of the coast between Rupert's house and Moose factory.

Well-rounded fragments of this rock are also found along the Moose and Missinaibi rivers, and as far west as Lonely lake, and southward to Lake Superior. It is characterized by round spots, from the size of a pea to that of a cricket ball or larger, of a lighter colour than the rest of the rock, which weather out into pits of the same form. Microscopic sections show that it is composed principally of small angular grains of felspar with others, somewhat rounded, of quartz, the interspaces being filled in with a dark green amorphous mineral. This rock occurs *in situ* on Long Island, off Cape Jones, on the east main coast, where it strikes south-westward or with the greater length of the island. The same rock, no doubt, continues under the sea for some distance in the direction of its strike. The abundance also of rounded pieces of hard, banded, siliceous hæmatite in the drift of both the Attawapishkat and Albany rivers is another striking feature which was alluded to in reference to the latter in 1871. (Geol. Survey Report for 1871, page 112.)

After careful observations as to the nature of the drift along the rivers mentioned, the followiug appears to be about the relative abundance of its boulders and pebbles: the unaltered limestones which occur *in situ* immediately beneath; the dark grey siliceous greywacké above described; compact hard blue limestone; gneiss, syenite and granite; crystalline dark, grey and mottled and porphyritic diorites; slaty and jaspery banded hæmatites, compact siliceous magnetites, sometimes consisting of pure ore and fine-grained quartzite in thin alternate layers; quartzites of different shades; hard red sandstones and conglomerates; chloritic and hornblendic schists; dull red jaspers with oolitic structure like those of the Manitounuck or the Animikie series, or mixed with streaks and small disseminated spots of the peroxides of iron; compact amygdaloids; brecciated hard blue limestone; drab-coloured clay ironstone.

Extent of Polaeozoic Rocks

From our present knowledge of the distribution of the flat-lying Palæozoic rocks west and south-west of James' Bay, it is pretty certain that they occupy an area as extensive as the whole region between the Ottawa river and Lakes Ontario, Erie and Huron. The contours of the outer margins of their basin, as well as those of the different horizons within it, as far as they have yet been determined, indicate that its geological centre or highest point is under James' bay, off the mouth of the Albany river. In such an extensive and undisturbed basin, the occurrence of Carboniferous rocks might appear possible, and if they existed at all it would probably be near this centre. But the total absence of any trace of them in the drift which has come from that direction, and spread itself over the extensive region alluded to, leaves very little hope of finding such rocks in this part of the Dominion. The Devonian rocks no doubt underlie a great part of James' Bay, and they probably occupy a still greater area of the extraordinary level bottom of the main body of Hudson's Bay itself, and here there would be a greater probability of the occurrence of Carboniferous rocks than in James' Bay. Yet no evidence of their existence has so far been afforded by the drift of the shores of the larger bay, or in any part of the surrounding country which has been examined.

Judging from the approximate distribution of the rocks in Hudson's and James' Bays, and the courses which were probably followed by the drift, as indicated by the glacial striation all around these bays and in the great interior regions to the south-west of them, the drift of the country to the west and south-west of James' Bay would be derived from the bottom and east side of this bay, or it may have partly come originally from the site of Hudson's Bay, and thence been transported over the floor of James' Bay to the country referred to.

On the Kenogami, at six miles by the stream above the mouth of the large southern branch called the Bagutchewan, the river makes a sudden bend to the north, and about a mile farther another similar bend. These unusually sharp curves, which are unlike any others in the course of the stream, appear to be caused by the river traversing pre-glacial excavations in the Silurian strata, which here consist of dull-red, coarse, somewhat indurated arenaceous marl, with green blotches and layers. These excavations had become filled up with loose materials before the formation of the present river channel. At the lower bend, gravel fifty feet deep is exposed in the south bank. At the upper bend, the excavation of the Silurian marls is plainly seen. Starting from the level of the river, the lower ten feet of the filling of this hollow consists of boulder-clay. Upon this rests a bed, six to eight feet thick, of soft lignite, containing many flattened stems of small trees, which are partially carbonized, but are somewhat elastic when newly excavated and still wet. The lignite bed is overlain by thirty or forty feet of rudely stratified red and grey drift, holding rounded boulders and many pebbles. Marine shells were observed in the drift along the Kenogami almost up to this point, which, according to my barometric readings, would have an elevation of about 500 feet above the sea.

Before concluding this report, I wish to acknowledge our usual indebtedness to the officers of the Hudson's Bay Company for personal courtesies or assistance in promoting the objects of our survey. I would mention the following gentlemen who aided us during the past season:—Messrs. Chief Commissioner Wrigley, Newton Flannigan, Alexander Matheson, John Hourston, R. C. Wilson, William Mackay and Isaac Hunter.

APPENDIX

List of Lepidoptera collected in the Southern Part of Keewatin District.

By Dr. R. Bell.

The following Lepidoptera were collected in 1883, while exploring the country from Wabigoon lake to Red lake, by way of Lonely lake, which adjoins on the west that explored in 1886. The species were determined by Major H. H. Lyman of Montreal, with the exception of the last two, which were named by the Rev. George D. Hulst of Brooklyn, at Major Lyman's request:—

1. *Pieris napi*, Esper., var. *oleracea-æstiva*, Harris.
2. *Argynnis polaris*, Boisd.
3. *Grapta Progne*, Cram.
4. *Limenitis Arthemis*, Drury.
5. *Pamphila metacomet*, Harris.
6. *Callimorpha Lecontei*, Boisd.
7. *Euprepia Americana*, Harris.
8. *Apamea nictitans*, Bkh.
9. *Heliophila pallens*, Linn.
10. *Chærodes transversata*, Drury.
11. *Metrocampa margaritata*, Linn., var. *perlata*, Guen.
12. *Sicya macularia*, Harris.

ALBANY RIVER

LAKE ABAZOTIKITCHEWAN TO MOUTH OF KENOGAMI RIVER[23a]

By Robert Bell

Gneiss, striking from west to north-west, is found all around the southern part of Lake Abazotikitchewan, but in going northward, dark crystalline trap, like that of Lake Nipigon, (see my Report of 1869), is met with on the shores in approaching the inlet of the Albany, which is from the north-west. On a small island, near the inlet, a dark coloured granite and a green hornblende rock are cut by a trap dike five feet thick, running north-west and having a basaltic structure, the columns being at right angles to the walls. From the inlet of Lake Abazotikitchewan, the course of the Albany river is south-east for eight miles, when it enters Makokebatan lake. In this section seven rapids, but no portages, occur and the width of the river varies from ten to twelve chains at the rapids to more than half a mile in the smooth places between them. Gneiss running N. 70 deg. W. was observed in one place in this section of the river.

Makokebatan Lake

From the head of Makokebatan lake to Martin's Falls, a distance of fifty-six miles, the general course of the river is N. 70° E. Makokebatan lake is nearly straight, and measures sixteen miles in length by one and a half in breadth. No rock *in situ* was seen upon its shores, which are strewn with small, rounded boulders, interrupted in some parts by sand beaches; and the country all round is so low and level, that, looking from one end of the lake, the land cannot be seen at the other. At the eastern extremity of the lake the Albany flows out by two channels, which only come together again at Moosewaké lake, nearly twenty miles farther down. Ten miles below Makokebatan lake, the northern channel enters the lower part of Washi-sagaigan or the lake of the Narrows. This part of the lake is four miles long, but the Indians informed me that the upper division approached close to a bay on the north side of Makokebatan lake, and that a portage leads from one to the other. This would give a length of twelve miles more, or sixteen in all, which is equal to that of Makokebatan, and the Indians also consider these two lakes to be of the same length. Washi-sagaigan was also formerly called Gloucester lake from a Hudson Bay Company's post of that name, which existed many years ago at the Narrows.

The distance from the Lake of the Narrows to Moosewaké lake is about five miles. Fine micaceous and dioritic schists (like those already described) running S. 65 deg. W. occur at the east end of the former, and again running S. 30 deg. W., at the west end of the latter; while on the river, between these two localities, is exposed a massive, reddish-grey, micaceous gneiss, much of which is thickly studded with crystals of light red feldspar, giving the rock a coarse porphyritic appearance.

Moosewake Lake to Martin's Falls

From Moosewaké lake to Martin's Falls, (a distance of about twenty miles), the river is full of islands and rapids, and the rocks appear to consist entirely of fine-grained, green, micaceous, dioritic and hornblendic schists, with which are associated small veins, strings and patches of quartz, and large veins and masses of coarse granite. Specks of copper pyrites were observed at one place in the dioritic schist. The average strike is west, varying to ten and sometimes to fifteen degrees both to the south and north of that course. The rapids mostly occur where great veins of the granite cross the bed of the river. Towards the end of the above twenty miles, bands of gneiss become interstratified with the schists, and just at Martin's Falls the latter have become entirely replaced by red and grey gneiss, apparently shewing a conformable passage from the Huronian into the Laurentian rocks. What appeared to be a similar blending of these formations was noticed last year in the neighbourhood of White lake.

Martin's Falls

At Martin's Falls there is only a rapid with a descent of about twelve or fifteen feet, down which light canoes are easily run. Fifteen portages occur between Makokebatan lake and Martin's Falls. The greatest single descent is at Ka-gé-ami, where the river descends forty-five feet at one chute. The surface of the country on either side of this

23a. From Report of the Geological Survey of Canada, 1871-2, pages 109-112.

section of the river appears to be only slightly undulating, and the soil in many places seems to be good. The general direction of the glacial striæ is about W.E.W., corresponding with that of the upward course of the river. Between Abazotikitchewan lake and Martin's Falls, twelve rivers and large brooks enter the Albany.

When at Martin's Falls, Mr. McKay, the gentleman in charge of the Hudson Bay Company's post there, kindly afforded me an opportunity of looking over the journals of the last forty years, which had been kept by his predecessors. From these I ascertained that the river between this point and James' Bay is open, on an average. six months of the year. Hay, turnips and potatoes have been successfully cultivated for a long time at this post, and cattle kept here thrive well.

Below the Falls

Below Martin's Falls the river changes its character entirely, becoming more uniform in breadth, depth and velocity of current. In the 120 miles which we surveyed to "The Forks" or junction of the Kenogami river, the width is from twenty to thirty chains, the depth in the middle from five to twenty feet (averaging about eleven), and the mean velocity about three miles an hour. Below the Forks, the river is described as maintaining similar characters all the way to the sea. A rapid occurs near the mouth, but it is said to be easily passed by boats going up and down. Except in very low water, the river would appear to be navigable by powerful steamers, with shallow draft of water, all the way from its mouth to Martin's Falls, a distance of about 250 miles. As shewing its freedom from obstructions, I may mention that the Hudson Bay Company's boats, in descending, are allowed to drift all night with the stream, in any part of this distance, the submerged top of a fir tree being sufficient to keep them in the channel.

From Martin's Falls to the junction of the Ogoké river, the Albany makes a curve to the north, equal to a semi-circle, measuring over thirty-seven miles. The Ogoké is nearly twenty chains in width where it joins the Albany. From this point the latter runs due east for twenty-one miles, and then turns south-east, and maintains that course for upwards of sixty-one miles, to the Kenogami, which it joins at right angles; the Albany, at this point, turns abruptly to the north-east, while the upward course of the lowest stretch of the Kenogami is south-west.

Character of River Banks

All the way from Martin's Falls to The Forks, the Albany is flanked by steep banks, either immediately overlooking the water, or rising at a short distance back from it. In descending the river their general height increases gradually from forty to about ninety feet, and they also become more regular and continuous in approaching The Forks. They are at first composed entirely of drab-coloured boulder-clay, capped with sand; but, after reaching the Palæozoic rocks, these deposits are by degrees replaced, in the lower part of the banks, by drab and chocolate coloured marls and shales, the upper part being usually composed of the boulder-clay overlaid by sand. The bed and shores of the river consist of either smooth, flat-lying rock, or small rounded boulders, packed closely together, and all brought by the drifting ice to a uniform surface, so that they bear a strong resemblance to a well laid pavement.

Gneiss, with the usual east and west strike, was the only rock seen *in situ* from Martin's Falls to the most northern point of the great bend; but, immediately on passing this, yellowish limestone strata made their appearance in the bed of the river. Similar limestones, and others of a grey colour, are seen in the bed and banks of the river, here and there, to within about twenty miles of The Forks, where they become replaced by the overlying drab and chocolate-coloured marls and shales. The inclination of the strata towards the sea is greater than that of the bed of the river, so that the line of division between the chocolate-coloured and the underlying drab marls and shales becomes gradually lower and lower in the banks, and at length sinks beneath the river bed. Layers of the two colours are interstratified with each other for a certain thickness at the junction, so that for some miles the banks have a banded appearance. In this interval a small quantity of soft, thin-bedded, grey sandstone occurs. The few fossils found in these rocks appear to indicate an equivalent of the Niagara formation; but in one place, just below the mouth of the Goose river, or three miles below the point where the river turns south-east, bright red marl occurs on the north bank, and on a small island, a mile farther down, some loose fragments of a bright bituminous coal were found. The Hudson's Bay Company's officers informed me that coal had never been brought into the country; and, considering that the conveyance of even light and valuable goods is so expensive in this region, this is only what might have been expected, so that I cannot suppose this coal to have been brought here by human agency.

The large proportion of boulders of a very dark-coloured granular quartzite, and the abundance of rounded fragments of a hard, banded, silicious hematite, containing usually about 50 per cent. of iron, which occur in the drift along the Albany, are worth nothing. These erratics have probably come from a long distance to the north-eastward, as indicated by their worn character and the direction of the glacial striæ.

The country on either side of the Albany below Martin's Falls is quite level. The steep banks drain a narrow strip of land on either side of the river, but beyond this great swamps appear to extend on all sides. Water is constantly oozing from the foot of the banks, rendering it very difficult to walk along the sides of the river, on account of the deep mud, except upon the boulder pavements already described. The Albany received nineteen rivers and large brooks between Martin's Falls and The Forks.

COUNTRY AROUND HEADWATERS OF SEVERN RIVER[24]

By Charles Camsell

* * * * * * * * * * *

A letter of instruction reached me there, directing me to proceed to Dinorwic, and from there to make a survey of a route to Cat lake, defining and mapping the eastern boundary of an area of so called Huronian rocks, whose western edge was examined by Mr. Dowling in 1893. On completing this work I was to go north from Cat lake across the height-of-land dividing the Albany from Severn river waters, and make a survey and examination of the rocks of the hitherto unexplored branch of the Severn river, called the Lake or Cedar river, descending this as far as Severn lake to connect with a survey of the western branch made by Mr. A. P. Low in 1886.

* * * * * * * * * * *

Outfit, provisions and two canoes were obtained from the Hudson's Bay Company at Dinorwic. The party left here on June 17th, and travelled as far as Lac Seul in company with Mr. McInnes, who there turned north-east to the Albany river. At Lac Seul I hired an Indian guide to take us as far as Cat lake by the Wenasaga river route, a river which enters Lac Seul about two miles east of its western extremity. This route has been explored by Mr. Fawcett, D. L. S., some years ago, and in 1902 Dr. Wilson and Mr. Johnston of this department also made a micrometer and compass survey as far as Cat lake, from which point they returned following the Cat river to lake St. Joseph, and thence out to Dinorwic by the Hudson's Bay Company's usual route.

At Cat Lake

We reached Cat lake on July 15, only to find the place deserted by all except two Indians. It was necessary that the services of another guide should be obtained here, to take us across the height-of-land and down the Lake or Cedar river, as our Lac Seul Indian had never been beyond Cat lake. A party of Crane Indians was expected from the north in a few days, so in the intervening time, I made a micrometer survey of the shores of Cat lake, not knowing at the time that I was duplicating the work of Dr. Wilson and Mr. Johnston. (See map, page 50.)

This work, on account of the stormy and unsettled state of the weather, occupied us until the 28th, and on our return to the Hudson's Bay post I found Mr. Williams of Osnaburgh house. He had come straight across to Cat lake by a route hitherto travelled only by Indians. I obtained a copy of Mr. Williams' notes and some sketches of the largest lakes; but he had no means of estimating his distances. The journey took him five days, and he reckoned the distance to be somewhat over 100 miles. Shortly after leaving Lake St. Joseph he got on to the waters of the Attawapiskat system, and on these he travelled by river and lake to within a few miles of Cat lake. A rough sketch of the route has been prepared and incorporated in the accompanying map of the Cat lake district. Williams lake, which is drained by the Sand river, and whose waters pass through Vermilion lake and river to the Attawapiskat, is the largest lake on the route, and is said by Indian report to be two days' travel from one end to the other, or almost as large as Lake St. Joseph. Mr. Williams describes the geology to comprise the usual Archæan granites and gneisses with only one band of a darker basic rock, crossing the Vermilion river above Vermilion lake.

Down the Lake or Cedar River

On July 29th, the party left Cat lake, after, with much difficulty, obtaining the services of a young Crane Indian, who was to act as guide down the Lake or Cedar river to Severn lake. Through a difficulty of interpreting my wishes correctly a misunderstanding arose, and he got the impression that we only wished to go as far as Pakhoan or Little Cedar lake, which is only about half way down the river to Severn lake. From Pakhoan or Little Cedar lake he refused to accompany us farther, and left for his own camp, while we had to find our way down the river alone.

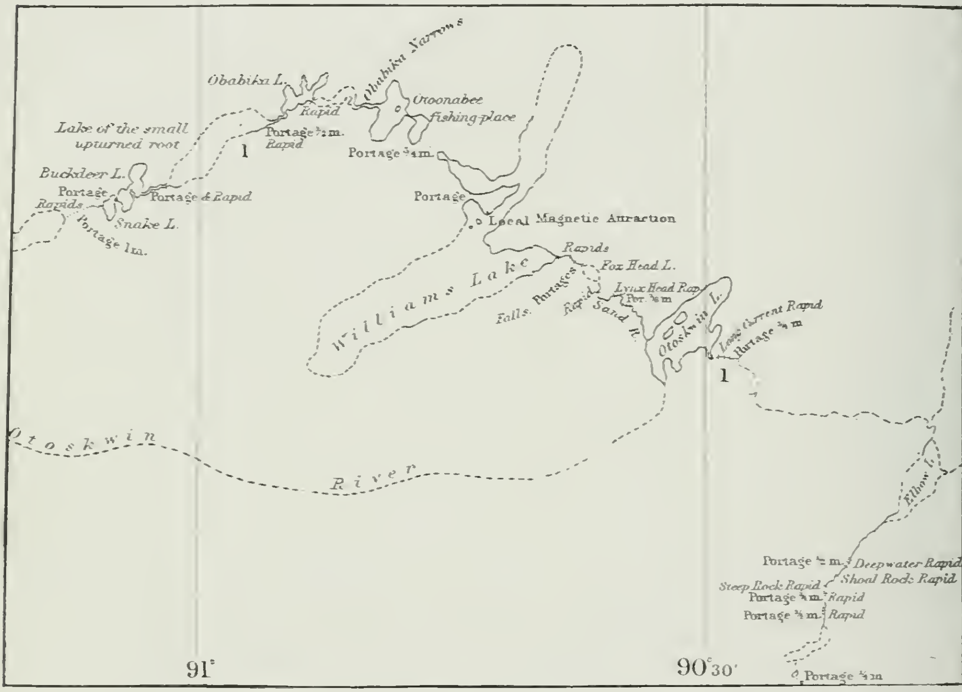
On August 14th, we reached our farthest north, a point fourteen miles below the junction of the Lake or Cedar river with the middle branch of the Severn, which the Indians call the Jackfish river. From here we were unfortunately compelled to return

[24] From Part A, Vol. XVI., pages 143-150, Geological Survey of Canada 1904.

owing to a scarcity of provisions, and our ignorance as to how far we were from Severn lake. I afterwards learned that another day's travel would have brought us to the lake and completed the survey. (See map, page 102.)

In returning, short side trips were made up the middle and other branches of the Severn river, and Cat lake was reached on August 30th. The following week was spent in making a trip forty miles to the north-westward to a lake (Wigwasikak lake), which is said to be the head waters of the central branch of the Severn river. Southward from Cat lake, the route followed took us west from Wapikik, or what Mr. Fawcett calls Pine Channel lake, through a series of lakes and portages to the Shabumeni lake, defining the north-eastern boundary of the large Huronian area before mentioned; and from Shabumeni lake I followed Mr. Dowling's route of 1893, down through Woman lake and Trout lake river to Lac Seul, which we reached on September 24th.

On arriving at Dinorwic, I found it necessary to go to Winnipeg to pay off my men and settle accounts, after which I proceeded to Ottawa, reaching here on October 10th.



Williams Lake.

Topography

The area covered by the summer's exploratory work is roughly enclosed by a parallelogram, the east and west angles of which are placed at Cat lake and Wigwasikak lake, the head waters of the central branch of the Severn; and the north and south angles at Severn lake, and the western end of Lac Seul. It occupies a part of the great uplifted peneplain of the Archæan protaxis, and is similar in character to that so frequently described by other geologists in its more thoroughly explored sections.

The general relief is even lower than is usually found in other parts of the Archæan, and the maximum relief seldom exceeds 100 feet above the level of the water. There are a few exceptions, the most notable of which occur on the Severn River watershed, where some isolated hills attain a height of 130 feet. These are usually granitic eruptive masses, which sometimes have very precipitous slopes, and are very noticeable features in the topography. Residual monadnocks of this description occur at Cat lake, Cedar (Kishikas) lake and at the mouth of the middle branch of the Severn river: while a range of hills, probably of similar origin, borders the western shore of Windigo lake, about twelve miles to the east of Cedar river. The highest hill in the whole area is situated about three miles west of Greenshields lake. It rises 300 feet above the level of the water, and is composed seemingly entirely of boulders and drift material. Similar hills and ridges of moranic material occur in the neigbhourhood of the large one, also on the height-of-land between the Severn and Albany rivers, and in the country a few miles north of Cat lake. These hills form excellent landmarks and can be seen from a distance of several miles rising above the surrounding country. From the top of any one of them a good view is obtained, and everywhere we see the same gently undulating surface, and even skyline, typical of the Archæan area.

Lakes are more numerous on, and south of the Severn river divide, than on the area north of it. These all occupy more or less shallow rock basins eroded out by the action of the continental ice-sheet, their long axes usually lying parallel to the direction of the glacial striæ. Their shores are deeply indented, and beaches are rare, a few sand beaches occurring only on Cat lake and Whitestone lake.

The streams occupy only shallow valleys, and rapids and falls are common. In the distance between Greenshields lake and the mouth of the middle branch (Jackfish river), the slope of the land is much more pronounced, and here the river has cut itself a fairly well defined valley twenty-five or thirty feet in depth. A corresponding slope was noticed by Mr. A. P. Low on the western branch of the Severn river, which he descended in 1886. There is no very decided fall in any one place, except a long steep slope marked by a series of shallow rapids, the majority of which can be run.

Archean Geology

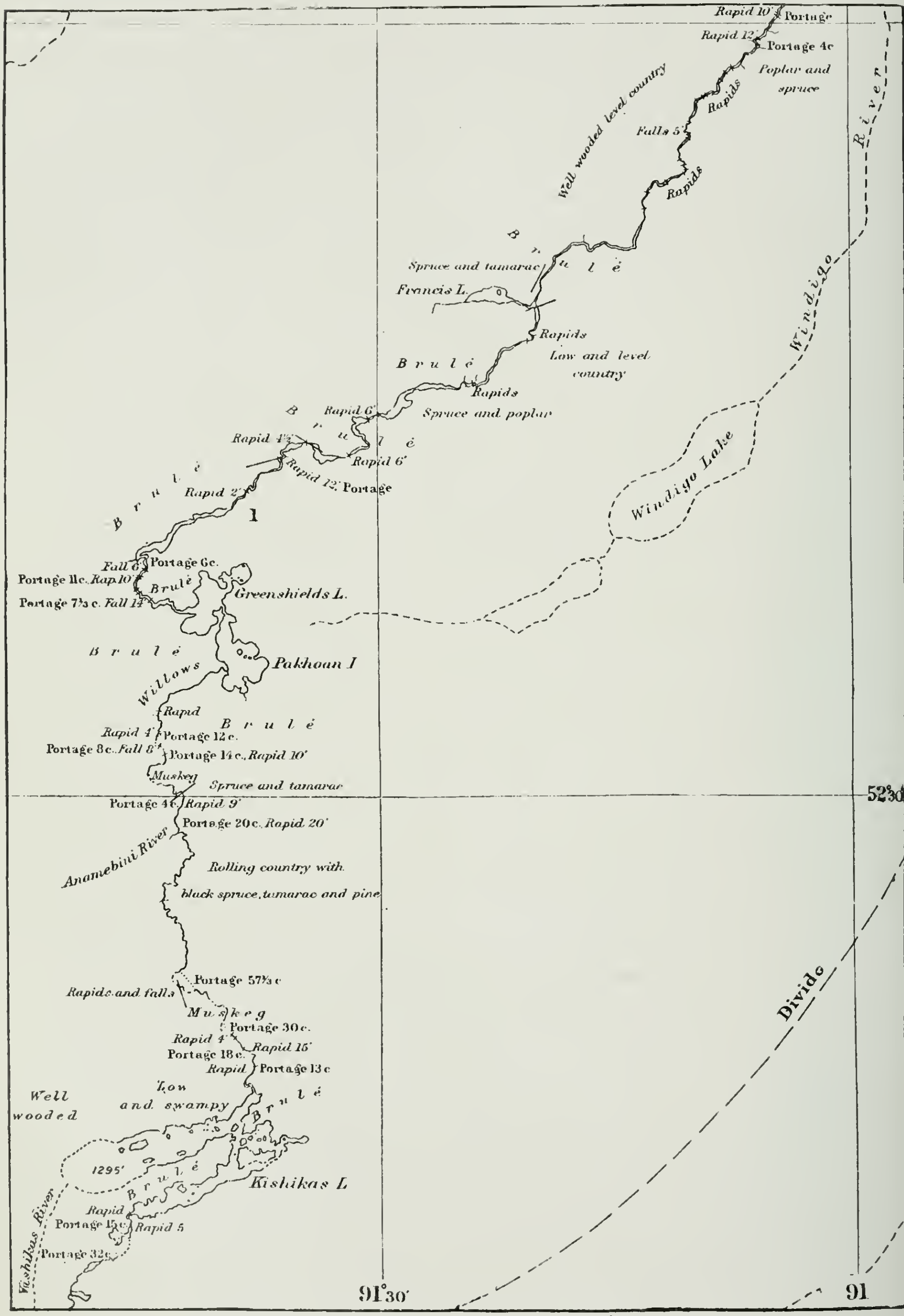
As has been already stated, the whole area is occupied by rocks of Archæan age, principally granites and gneisses, with a few bands of the darker basic rocks. The largest area of the so-called Huronian rocks lies to the south and west of Cat lake, and has been examined in different parts of its south and west borders by other members of this department. Mr. Dowling defined its western boundary, and Dr. Wilson crossed it by the Wenasaga river route. It was crossed this year in two directions, one by the same course as Dr. Wilson, and the other by a route from Wapikik lake to Shabumeni lake. By the latter route, the north-western extension of the area was traced to a distance of twenty-five miles east of Shaubumeni lake. The northern boundary of the area crosses Shabumeni lake about three miles north of its outlet, striking in a general direction north-easterly. The contact with the granitic rocks was not seen anywhere except at a point just east of Kay-gat lake, so that the boundary is only sketched in approximately, by following the strike of the rocks. On Shabumeni lake the strike is about 50 degrees, on Birch lake from 105 degrees to 120 degrees, on Kay-gat lake 75 degrees, and on the contact a couple of miles east of Kay-gat lake 145 degrees. The eastern boundary of this area appears to be very irregular, running out into several long, narrow tongues.

As reported by Dr. Wilson, the Wenasaga river flows through the area, south-westerly for about twenty miles, and going up the river beyond this, the Huronian belt is replaced by very coarsely crystalline granites and some gneisses. Two narrow tongues, however, of basic rocks intervene before reaching Gull lake. One of these occurs on the Sesikinaga river, and is perhaps a quarter of a mile wide. The other is crossed on the height-of-land between Cat river and the Wenasaga. The latter tongue is undoubtedly a continuation of the main body, for it was traced westward for a distance of five miles from the height-of-land portage. The other band may or may not be an altogether isolated area, but nothing resembling it in composition was noticed on the main area. The south-eastern corner of the main area extends very much farther eastward than any other part, and it is probable that a much larger and longer tongue projects out from here. The valley of Slate lake, which has been formed by the erosion of the soft calc schists, which make up this portion of the belt, can be traced eastward for six or seven miles beyond the lake, at which point it bends slightly to the southward, running approximately in the direction of Goose lake. Dr. Wilson also examined an area of Huronian rocks, north of the east end of Lac Seul; but it remains to be proved whether this area is continuous with the one on Slate lake. This I intended doing on my way back from Cat lake, but was unfortunately prevented by the impossibility of getting any guide to take us through that country.

North of Cat lake and on Cedar river there is an almost unbroken continuation of the granites and gneisses, with a predominance of the red granite variety. In a few places basic inclusions in the gneisses might indicate that larger bodies of the same rock would be found in the near neighbourhood; and the following places might be mentioned, where such conditions occur:—On the lake at the head of Cedar river; on the lower end of Cedar (Kishikas lake); on Cedar river, at the mouth of the Francis river.

Bands of Huronian (Keewatin)

A very narrow band of hornblendic rock crosses Cedar river, a few miles above the junction of the Windigo river; while a much wider band is met with just below the



Cedar or Kishikas River and Pakhoan Lake.

mouth of this river. Here, Cedar river takes a sharp bend to the west and flows in this direction for ten or twelve miles. The cause of the deflection is its entrance into this band of softer rocks, which it follows until it strikes against a steep bluff of eruptive rocks at the south-west angle, and it again deflected into its original course. The southern boundary of this belt follows closely the course of the river in its western trend; but its northern contact with the granite is covered by a layer of drift, and could not be accurately placed. Its width is perhaps two miles, and the strike slightly north of east. The central branch of the Severn river joins Cedar river in this belt of Huronian, and occupies a shallow valley in the wide depression caused by the excavation of these soft hornblendic rocks. Few outcrops of this belt occur, for the drift covering becomes much thicker in the lower parts of Cedar river. Dawes falls, just below the junction of the two streams, where the river has a drop of twelve feet, is caused by a band of hard siliceous hornblende-schist, striking diagonally across the river and dipping down stream at an angle of 45 degrees.

The large area of these basic rocks, south of the height-of-land has been referred by Mr. Dowling to the Keewatin series, and the two narrow bands, which are seen on Cedar river through their lithological similarity to the large area, may also be referred to the Keewatin.

Samples of the different varieties of rocks occurring in the several Huronian belts were taken, and thin sections are being made of those whose mineralogical composition could not be readily determined in the hand specimen. The Severn river specimens are all hornblendic rocks, varying from a massive amphibolite to a siliceous hornblende-schist. The latter is closely associated with a coarsely crystalline rock, composed essentially of hornblende and quartz, and no doubt the one is simply a phase of the other.

[Under the nomenclature now in use, the hornblendic and chloritic rocks classed as Huronian in this report should probably be called Keewatin.—*W. G. M.*]

The rocks on the Wenesaga river have been referred to by Dr. Wilson in the Summary of 1902; but one occurrence, which appears on the Sesikinaga river, and which he consequently did not visit, shows an interesting contact. A narrow band of pyroxenite, showing considerable metamorphism, and alteration on the surface to serpentine, is separated by a band of granite from a hornblende-schist, having alternate layers of quartz and hornblende in very thin laminæ. Closely associated with these exposures, and at no great distance from them to the east, is an outcrop of what Dr. Barlow has identified as a quartz-mica diorite. All of these strike about N. 60° E. and are separated from each other by narrow bands of later intrusive granite.

Conglomerate and Slate

The greatest variety of specimens was taken from Birch lake and the Shabumeni river, along the northern boundary of the large belt. Near the contact with the granitic gneisses the rock is a mica-schist, which changes shortly to spotted chloritic and hornblendic schist. West of these along the route, the following rocks are found: slate, conglomerate, quartzite and an altered quartz porphyry, massive fine-grained diorites, amphibolite and hornblende schist. Certain portions of the quartzite are highly impregnated with iron sulphide. The diorites are cut by numerous veins of quartz ranging in width from a few inches up to eight feet, and highly mineralized.

Glacial Geology

The whole area exposed shows a predominance of the action of erosion over that of deposition. In the central portion about the height-of-land, drift material covers a very small proportion of the surface, while bare rock exposures are common. These are always smooth, and frequently still retain the glacial markings. The general outline of the lakes conforms to the direction of the striæ, which at Cat lake is about N. 70° E., and they usually occupy shallow rock basins. A few of the lakes on and about the height-of-land occupy basins formed by an unequal distribution of morainic material. Cat lake itself is an example of the erosive force exerted by the moving ice. Its long axis lies N. 70° E., while several long, narrow bays cutting into the western shore have the same general trend. Many of the islands are composed of drift material, and conform to the direction of the striæ. They are long and narrow with rounded tops and gently sloping sides composed largely of boulders and having the appearance of drumlins or sowbacks. Whatever drift there is is made of material carried presumably but a short distance, boulders of granite and gneiss; but I also noticed some erratics of a hard bluish limestone which could only have been brought from the Palæozoic area bordering Hudson Bay. A large number of bearings of the glacial striæ on Cat lake were taken. The average gives a reading of N. 70° E. On Birch lake, two sets occur on the same exposure, one giving 55 degrees and the other 65 degrees. The latter, however, is the more constant. On Cedar river few striæ occur; those near the head water conform in a general way to those on Cat lake. One reading near the mouth of Windigo river shows a great divergence from all the others, being N. 12° E., and the indications are that the movement was apparently towards the north instead of away from it. This is an isolated case, and no other striæ occur anywhere near it to check it. All the evidence, however, of the movement of the ice north of the height-of-land agrees with the results obtained by other explorers in this region, that the ice movement was southward instead of northward.

Lower down Cedar river the covering of drift becomes thicker. Sedimentary clays form cut banks fifteen feet high on the river just above the south-west angle.

Moraines and sand plains are numerous on the height-of-land, also in the neighborhood of Pakhoan or Little Cedar lake. Some of the former have been mentioned before as forming some of the principal topographic features. Two long parallel north-east and south-west ridges, rising to a height of 120 feet, are crossed in making the portages over the height-of-land. But the most important glacial hill occurs near Greenshields lake, and is 300 feet above the level of the water. It lies east and west with prominent peaks at either end, each higher than the centre of the ridge. From peak to peak is about half a mile, and beyond this the ridge slopes gently away to the level of the plain. The east and west sides are exceedingly steep, the slope being determined entirely by the angle at which the material of which it is composed will rest. It is composed entirely of boulders and gravel. A number of lower ridges and hills of the same material are irregularly scattered around the larger one.

Several moraines have been laid across the valley of Cedar river, and some of these deflect the course of the river, while others are cut through and form shallow rapids. About ten miles below the junction of the middle branch of the Severn a moraine, lying at right angles to the course of the stream, had dammed up the waters and formed a lake nearly three miles long and a mile wide, which, on the cutting down of the dam, has been transformed only recently into a huge meadow.

Timber, Soil, Etc.

Spruce, poplar, banksian pine, and birch are found everywhere over the whole district. White and red pine were only noted in the southern part of Lac Seul. One solitary white pine tree occurs on Slate lake, and this appears to be the northern limit of the tree in this district. Ash trees were observed here also for the last time on our way north. The white cedar is a rare tree, but it occurs on this east end of Slate lake, on Sesikinaga lake, on Cedar (Kishikas) lake, and also on Greenshields lake. On the shores of the last a few rusty looking trees are growing, and this is their northern limit. Mr. Williams, in his traverse across from Osnaburgh to Cat lake, reports seeing ash trees for the last time on the east shore of Elbow lake.

Large areas have been burnt along the route of the Wenasaga river, notably at Wenasaga lake, ten or twelve years ago, and at Big Portage lake, about five years ago; also on Gull lake. North of Cat lake, we enter, at the lower end of Cedar (Kishikas) lake, an area that has been burnt probably eight or nine years ago, and this extends to a few miles below the mouth of the Francis river, or a distance of over thirty-five miles. Eastward it extends at least to Windigo lake, ten or twelve miles to the right of the river, and westward as far as could be seen from the tops of the highest hills. This is generally being reforested with a second growth of banksian pine and poplar.

In very few places, either on the north or the south sides of the height-of-land, do the spruce and tamarack attain such a size as to make them economically important to the lumbering industry. On the shores and islands of Birch lake the best timber occurs; that on the branches of the Severn river is generally small.

Beyond the Hudson's Bay post at Lac Seul no farming of any kind is done. At Cat lake, some years ago, potatoes and other hardy vegetables were grown with indifferent success, but this has now been discontinued. Being so near the height-of-land they are liable to frosts at any time during the summer. When we were there a sharp frost occurred on the night of July 31st and also on August the 6th. The Crane Indian chief, who has built himself a house at Windigo lake, evey year raises a small crop of potatoes, which he first obtained from Trout lake posts. A great part of the country is either too rocky or swampy for agricultural purposes, and nothing will ever be grown on it, but there are portions particularly in the large belt of Huronian rocks, and in some parts of the valley of Cedar river, where the land is dry and the rocks are covered with a clayey soil that is good enough to raise some of the hardier vegetables. The region around the mouth of the Anamabine river is such a country, as also the clay belt below the mouth of the Windigo river. As a rule, however, the dry land only occupies a fringe along the water courses, while the country back of this is largely muskeg or rocky.

Moose and caribou are fairly plentiful in the Shabumeni and Birch lake section; and bears were frequently seen on the lower parts of Cedar river. White fish, pike and pickerel were caught with a net in all the larger lakes; but no trout were got anywhere. Sturgeon ascend Cedar river as far up at least as the mouth of the Windigo river, and in several places the natives have gone to a great deal of trouble in building weirs across the river to catch them.

Much delay was caused in our work by the inclemency of the weather, and the disadvantage of travelling through parts of the country without a guide. The season was very wet and cold, frosts occurring in every month. Snow fell first on September 10th and again on the 19th.

The discharges of all the larger streams were taken, and the fact established that what was considered to be the main branch of the Severn river is really not so large as the Cedar river branch. The discharge of these two streams was taken near the end of August, when the water was at its lowest stage. Cedar river was found to give 735 cubic feet per second, and the middle branch 503 cubic feet. At the junction, the middle branch is wider and deeper than the eastern branch, and it would appear to carry much more water; but there is a great difference in the relative velocities.

PRELIMINARY REPORT

on

AN EXPLORATION OF COUNTRY

between

LAKE WINNIPEG AND HUDSON BAY (Via BERENS AND SEVERN RIVERS)[25]

By A. P. Low

. . . .

The height of land portage, six hundred and seventy-five yards long, passes through a gulley between hills from fifty to seventy-five feet high, and ends on the north side at a small lake on the headwaters of the middle branch of the Severn river. This lake lies about fifty feet below that at the other end of the portage, and shows that the land on the north side falls abruptly. The dividing ridge stretches away in a south-easterly direction, rising from fifty to one hundred and fifty feet above the water surface.

The first lake or pond, one-quarter of a mile long, empties into a second by a brook too small and shallow to float canoes, so that a portage of thirty-five yards has to be made between the lakes. The second lake, three-quarters of a mile in length, empties into Black Birch lake by a brook, having six feet fall; passed by making a portage one hundred and ten yards long.

Black Birch and Deer Lakes

We reached Black Birch lake about its middle, and then coasted its shores in an easterly direction for three miles to its outlet. The shores rise from thirty to fifty feet almost perpendicularly above the lake; the trees are larger than those last described, but nearly seven-eighths of the timber has been burnt. Turning north down the outlet, the stream, varying in width from ten yards at the falls and rapids to half a mile, was followed ten miles to Deer lake through a rough, barren and rocky country, almost wholly burnt; chutes of twelve, eight and six feet were passed in this distance, and the entrance of Deer lake was reached on the 18th of June. Here, on a small island, we found the provisions forwarded from Family lake, safely stored.

Having transferred them to our canoes, we continued the survey along the north side of the lake, for nine miles, to the supposed outlet, which, however, proved to be an inflowing stream. As we were without a guide, we were obliged to coast carefully along the shore and around each small bay. Thus the north shore of the lake was surveyed to its extreme end, where, at a distance of forty miles from the supposed outlet, another large stream was found flowing in. Knowing that the chances were greatly in favour of the outlet being on the north side, and thinking that it might have been passed, we carefully retraced the coast for twelve miles, and succeeded in finding the outlet in a small bay. It passed through a narrow cleft in a high rock and was not visible, even when close to its entrance. Deer lake is a long, narrow body of water, surrounded by rocky hills, rising from fifty to two hundred feet above the lake. These hills are rounded, and appear to run parallel to the range forming the height-of-land. The lake runs in a general course of N. 7° E. Its greatest length is about forty-five miles, with a breadth varying from one to four miles. Three deep bays indent its eastern end, the entrances into which are narrow and easily overlooked, unless the shore is very closely followed. The outlet is in the north bay, four miles from its entrance. Besides the bays above mentioned, several large and many smaller lateral bays deeply indent the shores, which are generally steep and rocky, and the lake itself is full of rocky islands rising from its clear waters. The surrounding hills have been almost wholly burnt by fires of various dates, and present all the different appearances of a burnt country, from the standing blackened trunks left by recent burning, to the small second growth of poplar and banksian pine of earlier fires. The soil is very thin, and the timber correspondingly poor, except on a few low points, where some white spruce, balsam and poplar exceed fifteen inches in diameter.

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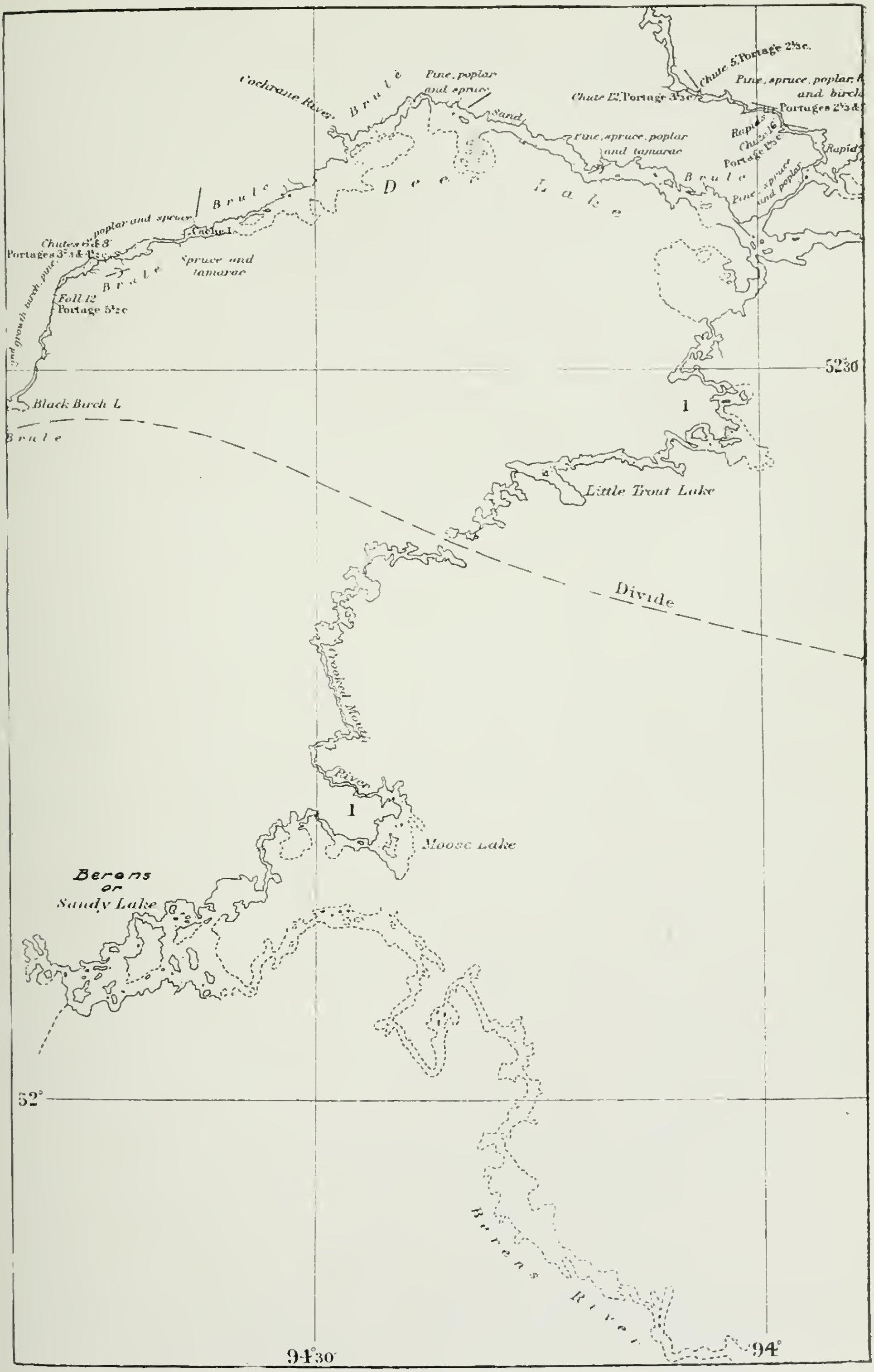
[25] The exploration on which this report is based was made in 1886. The report forms Part F of Vol. II. of the Geological Survey of Canada.



Black Birch and Deer Lakes

The river runs in a northerly direction, with a swift current for one mile, and then expands into a small lake, one mile beyond which it turns sharply to the west and contracts, flowing with a rapid current for five miles between high, rocky banks covered only with dry moss and a few stunted black spruce, birch and banksian pine, all less than four inches in diameter. In this distance there are five chutes, which together give forty-nine feet fall; or sixteen, ten, six, five and twelve feet. Here the river again turns north and spreading out flows with a steady current for eighteen miles to Favourable lake, but interrupted by chutes of three, twenty, and twelve feet and a few small rapids. As the river descends, the surrounding country gradually becomes smoother and the timber larger until within three miles of the lake, when the stream passes through low, swampy land, covered with thick, wet moss and a small growth of black spruce and tamarac.

Favourable Lake

We entered the lake at its south-west corner, and followed the north shore for nine and a half miles to the end of a point; here the lake took a short turn to the northward, and again stretched out east and west. Supposing the outlet to be to the eastward, we surveyed to the end of the lake in that direction seven and a quarter miles, and found two small streams flowing in. Returning to the point, we proceeded westward six miles to a small channel from the north, and discovered that the point was the end of a peninsula about seven miles long, joined to the main shore by a narrow neck of sand, over which a small portage might have been made and fifteen miles of paddling avoided. After passing through this channel one mile, the lake again expanded, and we then followed the west shore nine miles, and found the outlet in the north-west angle, where two bays were seen stretching away to the eastward.

Favourable Lake is very irregular in shape, the two portions forming a T, the stem of which lies north and south, with a crooked head stretching irregularly east and west. The width varies from two to five miles. Hills from fifty to one hundred and fifty feet high surround the lake, more than half the timber on which has been burnt. Along the shores there are considerable areas of good land, the best being on the peninsula and along the southern part of the lake, where the underlying rocks are hornblendic and chloritic schists; the northern portion is more barren, the soil resting on gneiss.

The soil is a fine, rich, sandy, loam, quite suitable for growing good crops, and summer frosts seem to be the only drawback to successful agriculture. These are said not to occur at Trout lake, though situated farther to the north-eastward. The trees around Favourable lake consist of white and black spruce, aspen and balsam poplar, white birch, balsam and tamarac, many of which exceed eighteen inches in diameter.

Sturgeon are plentiful in the lake; it is remarkably free from islands; the water is a dirty light yellow colour and not deep. At the end of the peninsula the foundations of several old houses were discovered, out of which trees twelve inches in diameter were growing. These ruins evidently mark the site of some old Hudson Bay Company, or more probably Northwest Company, trading post. Nothing was known about it at the Hudson Bay Company's post we visited.

Favourable lake was left on the 29th of June, and at two miles due north a fall of eight feet was reached; this fall is formed by a horizontal ledge of gneiss, which closely resembles a mill-dam. Three-quarters of a mile farther on, a portage of seventy-five yards was made to pass a chute of twenty-five feet. Beyond this, the river flows in the same northerly course seven miles, when another chute of fifteen feet was reached.

From here the stream bends gradually westward for ten miles, then turns sharply north for five miles, and again bends slightly north of east for ten and a half miles. Here the river apparently forked; thinking that the north branch, which looked the larger, the correct road, we passed up it and entered a lake, only to find, after making a survey of its shore, that we were once more at the place we entered by, that no other outlet existed, and that we had gone ten miles out of our way. Continuing down the river seven miles due east, a sharp turn to the south was made, and passing four and a half miles along this course, Musk-rat Dam lake was entered.

For the entire distance between Favourable lake and this lake, the river, with the exception of the three falls mentioned, flows with an imperceptible current between low, muddy banks, covered along the edges with grass and weeds, and has an average breadth of two hundred feet. The water is of a whitish-yellow colour, and is highly charged with suspended matter.

Musk=Rat Dam Lake

The surrounding country is a vast, level swamp, broken only by a few knobs of gneiss, that rise from ten to fifty feet above the general surface. The swamp is covered with moss, and supports a small growth of black spruce and tamarac; better timber growing on and around the hills. Musk-Rat Dam lake was entered July 3rd on its north side, some distance from the west end. Owing to the smoky state of the atmosphere, and the numerous islands which obstruct the view, neither the west end nor the south shore were seen, and so the exact size of the lake is unknown. We coasted along the north shore to the south-eastern angle, a distance of nineteen and a half miles, passing many islands of various sizes. Where the river enters the lake, it has deposited much of the matter it carries, and formed a long point of low marsh, now covered with grasses and small willows, and surrounding several small, rocky islands; the name of the lake is probably due to this feature. Elsewhere, the shore rises from thirty to seventy-five feet above the water, the greater part consisting of clay and loam soil with several rocky points and outlying islands. The timber, with the exception of that growing on the points and islands, corresponds in size and variety to that described around Favourable lake. The islands, many of which are quite large, are rocky, and covered chiefly with a dense growth of black spruce. Several extensive fires were burning round the lake while we were on it, and the smoke was so thick that it caused considerable delay in the work of surveying.

Sandy Lake

We left Musk-Rat Dam lake at its south-east angle, and followed the river in a S. 30° E. course for four miles to Sandy lake. This lake was also entered on its north side at some distance from the western end, and the shore followed to the eastern extremity, a distance of forty-three and a half miles. This is probably the largest body of water passed through on the route, its extreme length and breadth being unknown, as the surface is covered by innumerable islands, so close together that a view of the opposite shore could not be had.

The water is turbid and white in colour. The shore is higher and more rocky than that of Musk-Rat Dam lake, but much good land, and many trees of white spruce, poplar, birch and balsam were seen, exceeding eighteen inches in diameter. Indeed, the greater part of the land around these lakes would make good farms.

Severn lake lies north-east of Sandy lake, and distant from it one hundred and fourteen miles by the river. Sandy lake was left on the 8th of July. The river passes with a sluggish current between low hills, mostly burnt; and at six and three-quarter miles, a chute of eighteen feet was passed by a portage one hundred and fifty yards long. Beyond this, the river becomes narrow and crooked, with a swift current, passing low, rounded and rather rocky hills, with good soil between, supporting a growth of black and white spruce, tamarac, poplar and birch, slightly smaller than those seen around the lakes.

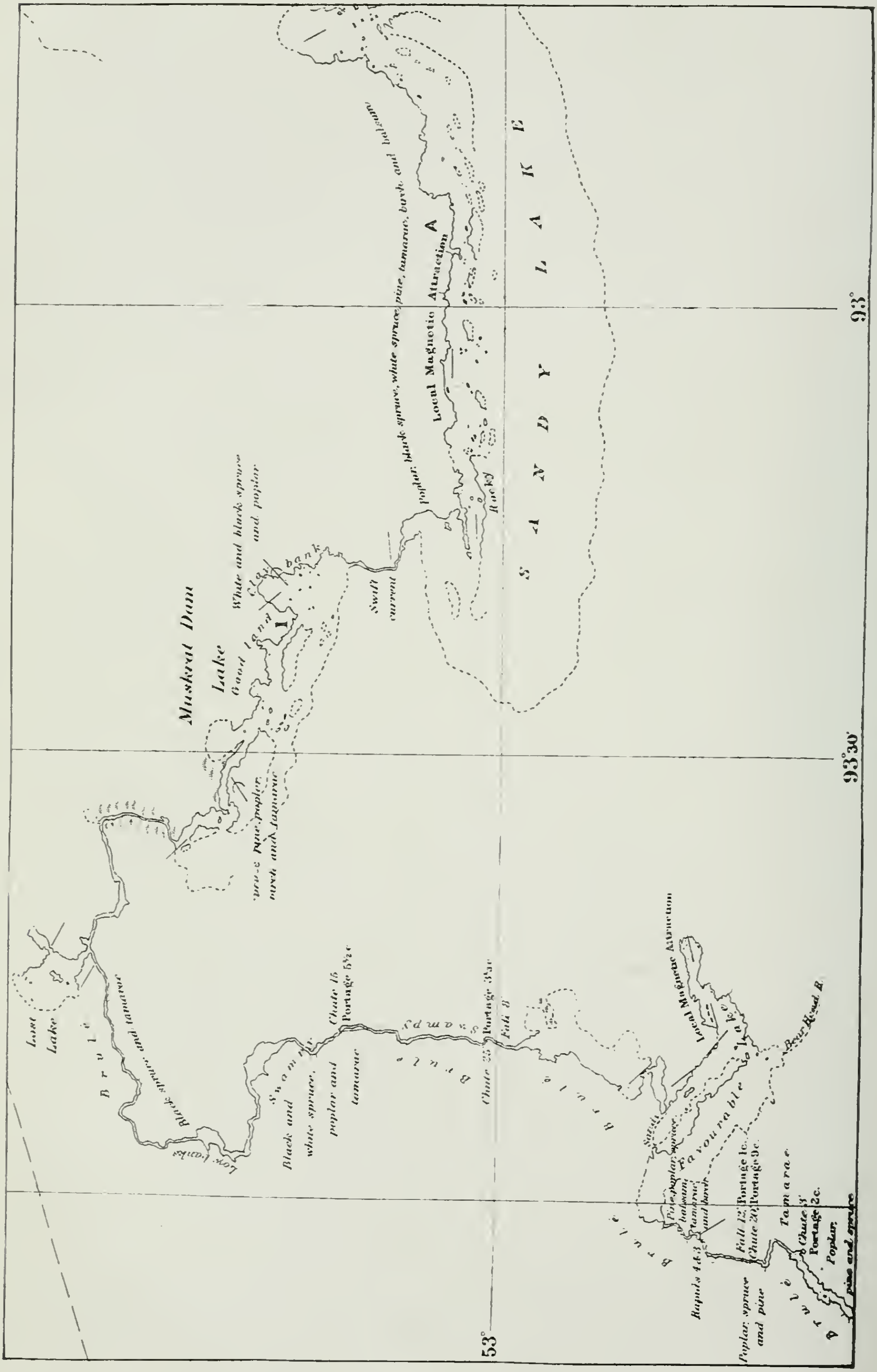
Forty-two miles from the portage, the river widens out into two lakes, which, together, are sixteen miles long and not above two miles broad, both being dotted with many small islands. The surrounding country is almost flat, with good timber and soil. Beyond this, as far as Severn lake, over 114 miles north-east from Sandy lake, the river flows with a swift current, broken by several rapids and falls, entailing six portages.

Cut banks, from five to ten feet high, composed chiefly of a boulder-clay, are now seen. The soil and timber become poorer, and good trees grow only on the islands, the shore having a thick growth of black spruce, poplar, and tamarac of small size.

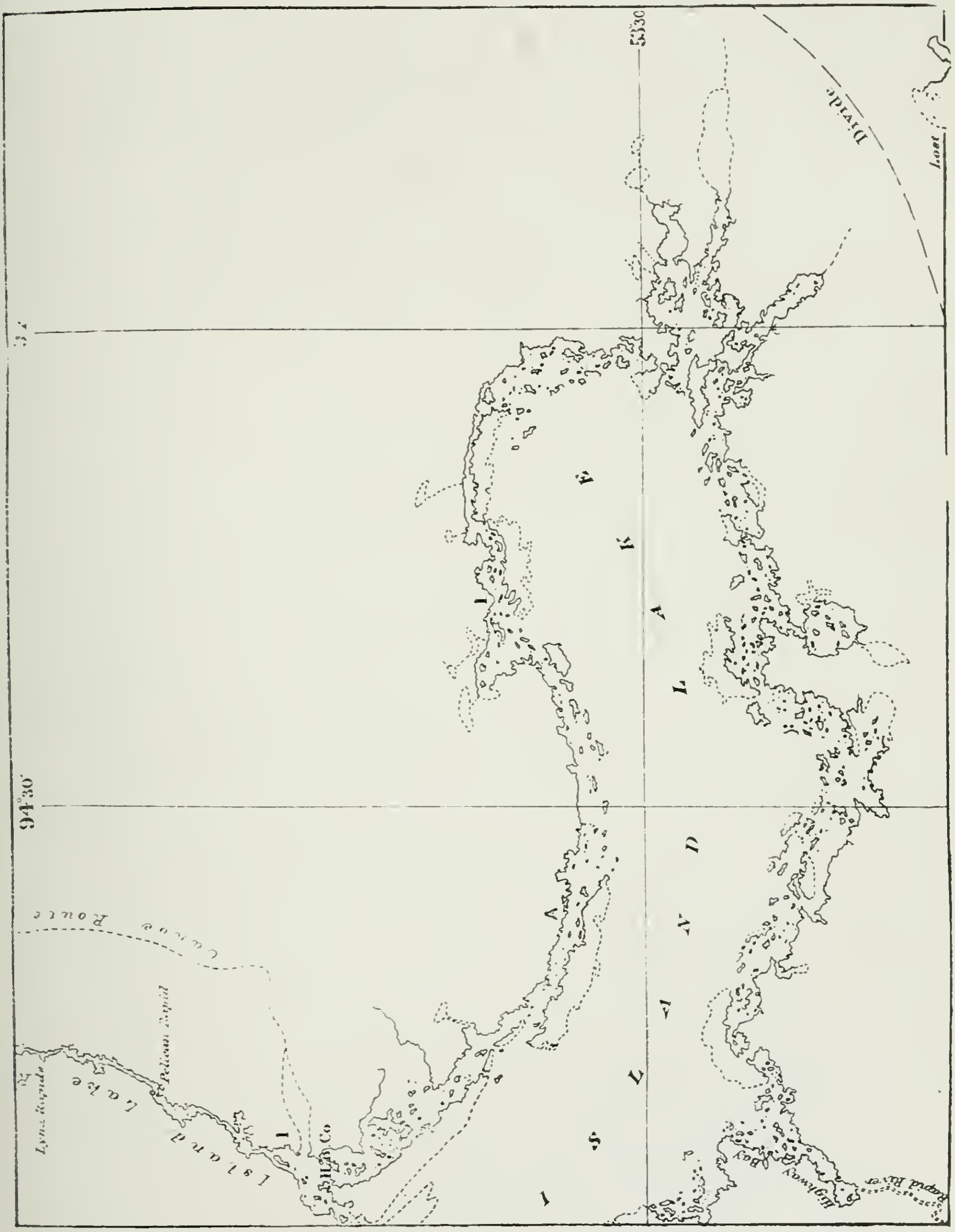
Severn and Trout Lakes

While camped on the last portage above Severn lake, an old Indian with his wife passed in a canoe, the first persons seen since leaving Family lake. As we had but an imperfect idea of our exact position we hurried after and overtook them on an island in the lake, and learnt that we were on Severn lake, and that, by a portage route, the Hudson Bay Company's post on Trout lake was distant about three days' journey. As our provisions were running short, not enough remaining to carry the survey to the mouth of the river, we decided to make for Trout lake. Accordingly, we crossed the lake in a south-east direction, and in nine miles reached the portage.

The shores and the numerous islands of Severn lake are all low and swampy, covered chiefly with black spruce and tamarac. The portage by which the height-of-land between the Main and Fawn branches of the Severn river is passed, is one and a quarter miles long, through low, swampy ground, with a rocky ridge at the east end. Here a small lake and another portage of 400 yards brought us to three small lakes, connected by a small stream; leaving the stream at the third lake, three portages of 350, 760 and 375 yards, are passed with two intervening small lakes, the stream being again reached at the end of the third portage. Descending it two and a half miles Little Trout lake, four miles long by one broad, was entered and passed through to its east end. Following its outlet four miles, Trout lake was reached July 19th. The general course of the route was due east, through low, swampy country, out of which rise a few low, rocky hills almost destitute of soil, the whole covered with small trees of black spruce, banksian pine and tamarac, few exceeding six inches in diameter two feet from the



Favourable, Musk rat Dam and Sandy Lakes



Island Lake on Manitoba boundary, about twenty miles northwest of Musk-rat Dam Lake.
A—Keewatin (and Huronian?). 1—Laurentian.

ground. Trout lake is irregularly oval in shape, forty miles long from east to west, and nowhere more than twenty miles wide. Its shores are generally low and swampy, with some rocky points, the highest land being towards the west and south. Along the north side, are several large islands and numerous smaller, rocky ones. The prevailing trees are black spruce, with tamarac, aspen poplar, white spruce and birch, a few being eighteen inches in diameter.

[Since two of the largest lakes in the district of Patricia are known under the name of Trout, the alternative name of Fawn has been used for the lake on the Fawn branch of the Severn river on the map which accompanies this volume.—*W. G. M.*]

The water of the lake is remarkably clear, cold and deep, and is abundantly stocked with large white fish and lake trout, which form the principal food of the Indians and Hudson's Bay Company's people living around the lake.

The Hudson's Bay Company's post is situated on one of the larger islands, twelve miles from the east end. Here also is a church, supported by the Church Missionary Society of England, and the services are conducted by a native missionary.

Nearly 500 Indians trade at this post, but they do not all belong to the post, part being a roaming population, some of which belong to Martin's Falls and Cat lake posts, on the Albany river, while others come from York, Severn and Island lakes. These Indians speak a language made up chiefly of Cree words, with a mixture of Sautaux dialects; they are all supposed to be Christians, although many of them still believe in the power and charms of the medicine men.

Crops at Trout Lake

Mr. Tait, the officer in charge of the post, says that good crops of peas, potatoes and other roots are raised here yearly, and are very rarely injured by summer frosts. This being the case, the country to the westward, between Severn and Sandy lakes, which is more favorably situated, having all the appearance of a better climate and a richer soil, must undoubtedly be well suited for agriculture, and will at some future time prove valuable land for settlement. At the Hudson Bay post both our canoes were repaired; and on the 22nd July, after securing the necessary provisions for the trip to the mouth of the river, and having determined the latitude of the place, we proceeded along the north shore to the north-east corner of the lake, where the Fawn branch of the Severn river flows out.

Fawn Branch of Severn River

This river, which varies from thirty to six hundred yards in width, was followed for eleven miles due north, where a small lake, three miles wide, was crossed. From here, for fifty miles, the river, with an average breadth of thirty yards, flows N.N.E., with a rapid current between low banks. Twenty-four rapids and chutes, caused by ledges of gneiss crossing the stream, occur in the distance, the greater number of which have to be passed by portages in ascending the stream, although only eight were made in descending.

At the rapids the river usually spreads out, and flows in several shallow channels, between a number of small islands. This greatly increases the danger of damaging the canoes from striking against rocks on the bottom while running down stream. In its upper part the channel is greatly obstructed by large boulders strewn over the bottom, often rising to within a few inches of the surface, a good look-out being necessary to keep clear of them where the current is slow, as there is then no sign to show their position.

Throughout this distance the surrounding country slopes towards the north and east with the river, which flows but a few feet below the general surface. Except the few small ridges of gneiss, the whole is swamp, covered with thick, wet moss, and supporting a growth of small black spruce and tamarac with a few poplar clumps.

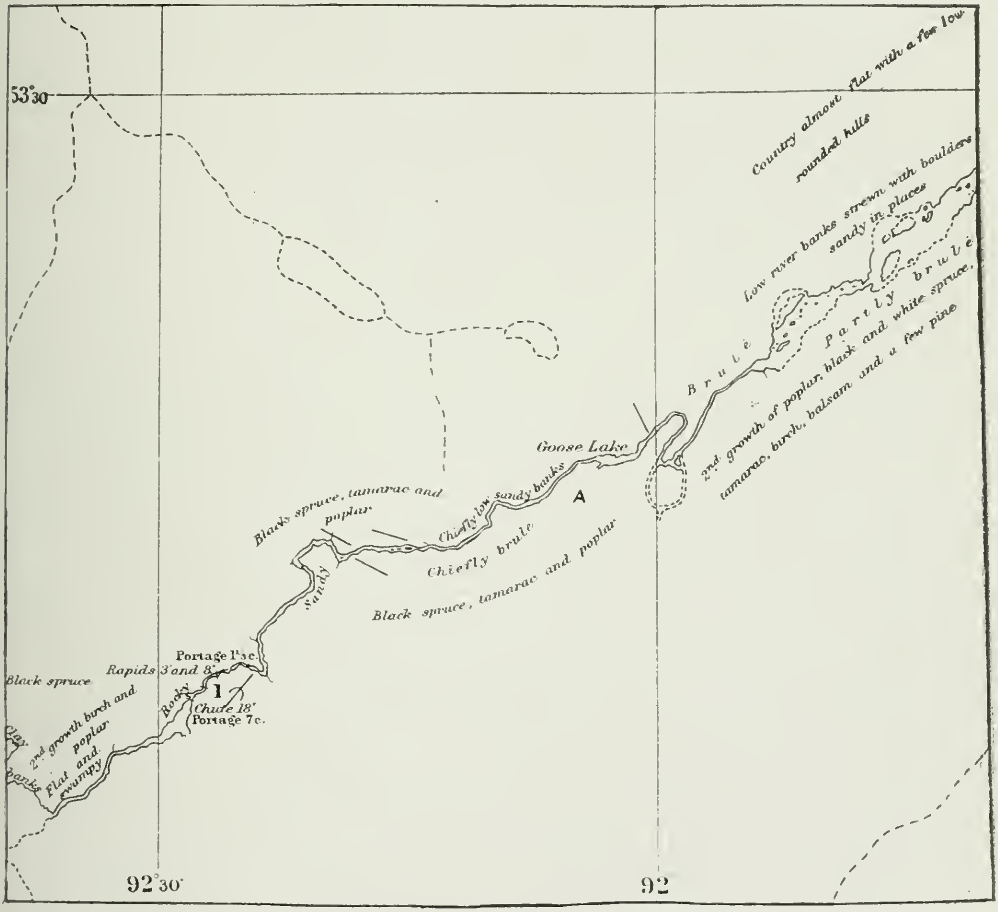
On the islands is a better growth of white and black spruce, poplar and tamarac; the last white birch was seen near the end of this course. This region has a bleak, barren look, with soil totally unfit for cultivation, being wet without the possibility of drainage. Below the last chute the character of the river changes; it now flows with a swift current between banks cut in the drift sands and clays, but no rapids necessitating portages occur until within a few miles of the Forks.

The country above the river valley is comparatively flat and swampy, with clay subsoil overlaid by sand; the trees are chiefly black spruce and tamarac of small size, the greater part of which have been burnt. These characteristics prevail all the way to the mouth of the river, the whole country being practically useless.

The only timber large enough for small buildings grows on the islands and in the bottom of the river valley, where the soil is better and the high banks form a protection from the cold winds. Below the last chute the river first runs N. 50° E. for seventeen miles, then in a general course a few degrees south of east, twelve miles, to the Otter river, a large branch flowing from the southeast. For this distance the sloping banks of the river vary from ten to fifty feet high, and are covered to the water's edge with a thick growth of small willows.

Below the Otter branch the river suddenly expands, being almost fifty yards wide, and gradually increasing with the descent; the channel is very shallow and interrupted by a great number of bars. The water, which on leaving Trout lake was remarkably clear, gradually becomes discoloured by the washing down of the clay banks of the river and the dirty waters of small brooks that flow in.

The valley now becomes deeper, the banks rising from fifty to one hundred feet, the upper part being cut almost perpendicular, with the lower part sloping gradually to the water's edge.

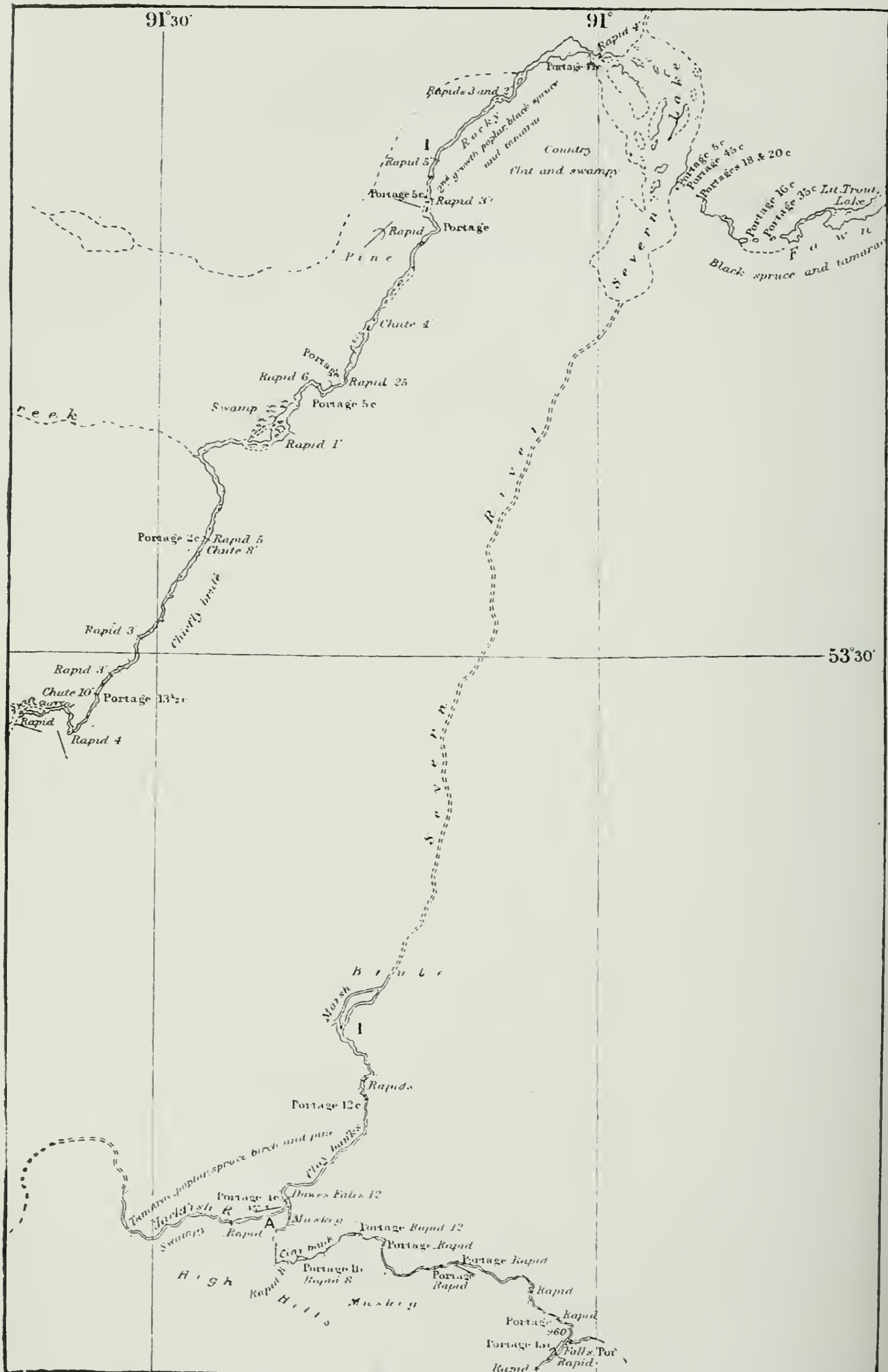


Part of Severn River between Sandy and Severn Lakes.

A—Keewatin (and Huronian?). 1—Laurentian.

The willows do not grow so thick along the banks, which afford good tracking paths, used by the Indians in towing the boats up stream. Marks on the trees along the banks show that in spring the ice passes along fully fifteen feet above the summer water level.

From the Otter river the general course is about northeast for thirty-eight miles, then N. 30° E. twenty-one miles to the Picticiow river, flowing in from the eastward. Here a turn is taken westward, and the stream passes from bank to bank in a valley about half a mile wide, with a general course of N. 35° W. for fifty-six miles to the forks of the Severn. Six miles above this point beds of limestone rise from under the clay banks, and in crossing the stream cause several heavy rapids.



Part of two branches of Severn River, and Severn Lake.
(See Appendix II, page 200, for Geological Legend and Symbols.)

Junction of Fawn River and Severn

The Severn river, below the junction of the Fawn, is about half a mile wide. Beyond this, as far as its mouth, it varies from one-quarter to one mile in width, the average being one-third of a mile. The cut banks are from thirty to two hundred feet high, gradually falling as the sea is approached. The channel is very shallow, and in places greatly obstructed by low gravel beds and sand bars. From the forks the general course is N.E. for 16 miles, then 10° E. for twenty-three, where a fall of thirty feet, called the Limestone rapid, occurs in one mile. This is caused by beds of limestone crossing the stream, forming a number of small islands, between which the river pours in heavy rapids.

The portage by which this obstruction is passed is on the west bank and over the bare limestone rock.

Besides this rapid there are several smaller ones, due to the same cause, but none are heavy enough to necessitate portages.

Below the Limestone rapid the river again flows north-east to the sea, a distance of twenty-eight miles. Many large islands divide the stream into different channels for several miles from its mouth.

We arrived at Fort Severn, situated on the west bank about four miles from the sea, on the 6th of August, thus finishing the micrometer survey from Lake Winnipeg to Hudson bay.

Fort Severn

Fort Severn is a small trading post of the Hudson Bay Company, resorted to by a few Indian families, the majority of whom live along the coast, making their hunts on the small rivers flowing into the bay, and living chiefly on geese, which are killed in great numbers in the spring and fall while on their way to and from the breeding grounds of the north. The soil around the post is a heavy clay and very swampy. The climate is so cold and the season so short that nothing but a few small turnips is grown here. On August 8th we picked strawberries on the clearings around the post; at that time they were only beginning to ripen.

It was the intention to return up the river to Severn lake, from there to go by Trout lake across the height of land to Cat lake, and thence to Rat Portage; but on reaching Fort Severn the canoes were found to be so worn out as to make it impossible to return in them, and being unable to procure anything suitable for the trip at Fort Severn, we were obliged to coast along shore to York Factory.

This we attempted to do in our canoes, and, leaving Fost Severn August 10th, in two days we reached Goose river, forty miles on the way. Here we were delayed by a heavy gale from the north-west, which continued for three days. On the second day a violent gust lifted the larger canoe over the stakes driven in the ground to secure it, and, rolling it over the ground, threw it against one of the tents, breaking it beyond repair. I immediately sent Mr. Macoun, with one man on foot, back to the post, with a request to send a boat and men enough to take us to York. They returned on the third day with a small whale boat and two Indians as guides.

Embarking, we coasted along shore, being greatly delayed by head winds, and reached York Factory on the 23rd August, without other accident than the loss of our other canoe, which broke adrift from the boat while anchored off one night in a gale.

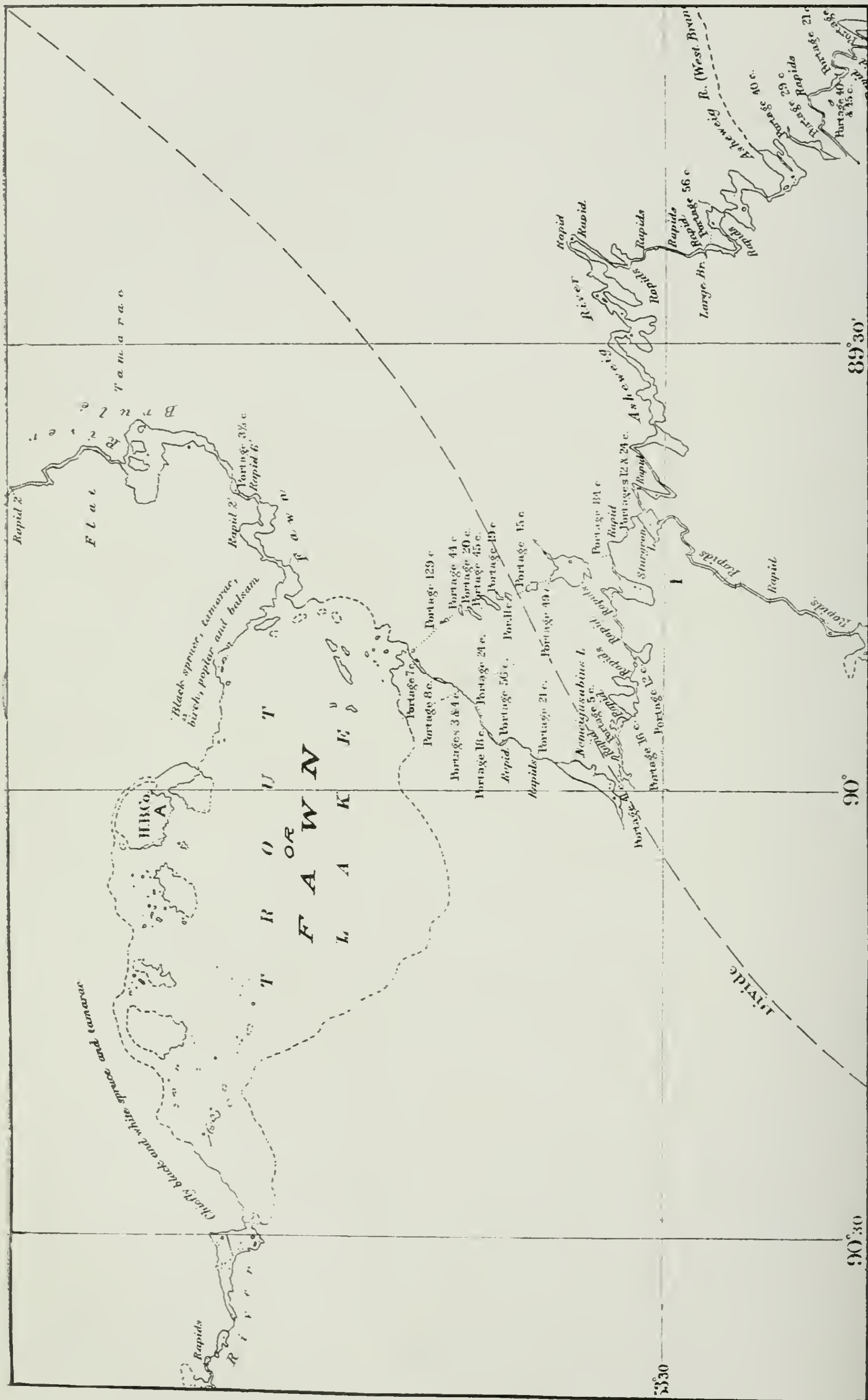
Fort Severn to York

The distance between York and Severn is about 200 miles. The coast is quite flat and low, and is formed, for a considerable distance back from high-water mark, of parallel ridges of gravel, from one to four hundred yards apart, the space between being filled up with sand and mud, and dotted with innumerable small lakes or ponds, the water of which is brackish behind the outer ridges, but quite fresh, clear and cold farther inland.

These ridges are each a few inches higher than the next nearer the sea, and drift wood is seen on each, showing more signs of decay on the inner than on the outer banks.

This would tend to show that in this part of Hudson bay the shores are slowly rising, as has been noted by other observers on other portions of the northern coasts.

The ebb and flow of the tide is between four and six feet. At low tide the water retreats a long way, exposing great sand and mud flats, with gravel ridges, mostly parallel to the shore, and in many places thickly strewn with large boulders. From the mouth of the Severn to near Cape Tatnam no trees are seen from the shore; beyond this small black spruce come to within a mile or so of the water. The distance of the trees from the shore is due to the unfavorable soil rather than climatic influences. Between high water and the tree line the sand and gravel are almost bare, while the mud between the ridges is covered with a rich growth of grasses, affording fine feeding grounds.



Trout or Fawn Lake on Severn River.
A—Keewatin (and Huronian?). 1—Laurentian.

Being unable to obtain canoes at York, we were obliged to travel in a heavy, flat-bottomed boat. Leaving York August 26th, Norway House, the head of Lake Winnipeg, was not reached until September 20th, great delay being experienced owing to the low state of the water in the Hayes river and its branches. At Norway House our boat was exchanged for a lighter one, in which we coasted down the east shore of Lake Winnipeg, but were so delayed by rough weather that Selkirk was not reached until October 13th and Ottawa four days later.

GEOLOGICAL NOTES

Archaean

(A) Laurentian

With the exception of some small bands of Huronian, the Laurentian rocks occupy the whole area of country between Lake Winnipeg and Trout lake, and probably extend much farther to the eastward.

Their northern limit on the Fawn river was not exactly located, the rocks being covered with drift, but it lies somewhere between the last chute on its upper portion and the limestone exposures near the forks; from the physical features of the valley it is supposed to be near the former point. The rocks consist chiefly of the characteristic red micaceous gneiss, along with grey varieties, and also hornblendic gneisses. No limestones were noted.

(B) Huronian

The Huronian rocks were first observed on Favourable lake, where they consist of chloritic and altered hornblende rocks, with talc and hydro-mica schists. The same band, presumably, was seen on Sandy lake, and below it on the Severn river. The rocks in several places are highly magnetic, and probably contain large quantities of iron ore, both disseminated in small crystals through the rock and in large masses. Another band was met with at Trout lake, in connection with a large mass of eruptive rocks.

[Under the nomenclature now in use the rocks classed as Huronian in this report should be called Keewatin.—*W. G. M.*]

Owing to the extent of the country covered in one short season, no strict investigation of these rocks could be undertaken, and it remains for another season to examine them carefully, both as regards their mineral characters and lithological relations.

Palaeozoic

Cambro-Silurian and Silurian

The limestones of the Severn and Fawn rivers, as roughly determined from the fossils collected, are not older than the Galena, and may be as new as the Niagara; more investigation, however, is required to fix their precise horizon.

The rock is a coarse, yellowish-white dolomitic limestone, closely resembling that of Lake Winnipeg. It lies almost flat, being broken only by long, low anticlines and synclines. At the Limestone rapids of the Severn, where it is more contorted than usual, it rises in a number of low domes, closely resembling a sheet of letter paper when dampened. The total thickness of the beds exposed does not exceed one hundred feet.

Post Tertiary

Drift

From Lake Winnipeg to Hudson bay almost all exposed rock surfaces exhibit distinct evidence of ice action, being strongly marked with glacial striæ, which vary in direction but a few degrees on either side of north-east, showing that the drift was from that quarter. Scattered all over the surface of the country are rounded boulders, many of great size and evidently far-travelled.

The Severn and Fawn rivers for over two hundred miles from their mouths have cut valleys into the Post Tertiary deposits. As seen in the banks of these streams, where sections of two hundred feet are obtained, the top beds are composed of a light, sandy clay, containing many boulders of limestone, gneiss, red jasper and green chloritic and epidotic rocks. Below these are thin sandy beds, holding a large number of small boulders; while the lowest and thickest beds are made up of a heavy blue clay, comparatively free from boulders.

The following fossils were collected on the Fawn river, a short distance from the forks:—

Rhychonella psittacea, Chemnitz.
Cardium Islandicum, Chemnitz. (= *C. ciliatum*, Fabr.)
Macoma calcarea, Chemnitz.
Mya truncata, L.
Saxicava pholadis, L. (= *S. rugosa*, Low.)
Buccinum tenue, Gray.
Trophon clatheatus, L.
And a small *Balanus*.

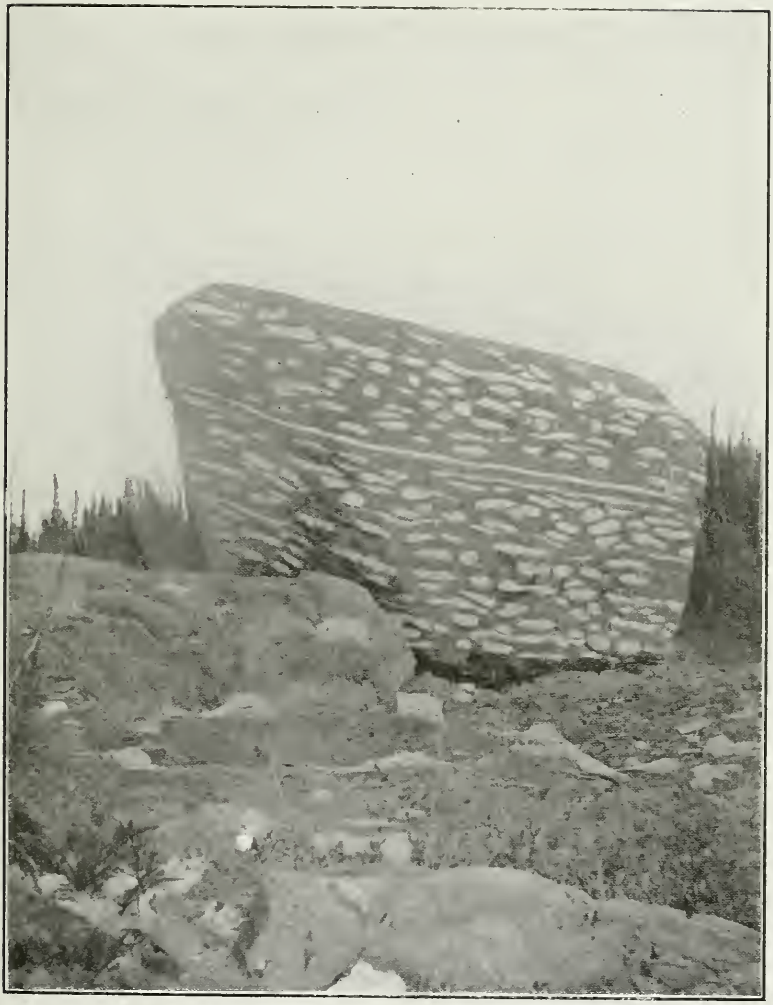
Botanical Notes

It has been deemed inadvisable to publish with this report a list of the plants collected, as many species will probably be added during the next season, and after the country has been thoroughly explored a complete list will be published. A number of species was collected that were new to this portion of Canada, and a few that are extremely rare. Among the most interesting may be mentioned *Aquilegia brevistyla*, Hook, in two localities on the Severn river; *Nymphoea odorata* Ait. *Var. minor*, Sims, growing in profusion between Severn and Trout lakes. *Sisymbrium humile*, C. A. Meyer, was found a short distance from the junction of the Fawn and Severn rivers, growing in gravelly soil; and along the coast, between Fort Severn and York Factory, specimens were collected of a species supposed by Watson to be *Sisymbrium humifusum*, Hook, and has been so named provisionally by him. This species has not been found before on this continent, although reported from Greenland.

A peculiar form of *Linum perenne*, L., with white flowers and of procumbent habit, was noted in one locality along the coast. Although supposed to be rare, *Saxifraga Hirculus* L., grew in great abundance between Severn and York. Three specimens of *Cnicus Drummondii*, Gr. *var. acaulescens* Gr., were collected along the Lower Severn, not before noticed east of the Saskatchewan.

Chrysanthemum arcticum, L., and *Matricaria inodora* L. var., *nana*, grow as far south as the mouth of the Severn. A form of *Primula*, that appears to be intermediate between *P. farinosa*, L., and *P. Mistassinica*, Mx, but placed by Watson with the latter species, was found growing along the coast below high-water mark. *Scheuchzeria palustris. L.*, is of frequent occurrence throughout the country. *Arctophila Laestadii*, Rupt., a rare and beautiful species of grass, recorded but once before, is quite common along the coast.[26]

[26] The appendix to the report from which the foregoing paragraphs are taken gives five pages of meteorological observations made by Mr. Low and his assistants during the trip from Lake Winnipeg to Hudson Bay.—W. G. M.



Boulder of green and reddish purple Slate, Winisk river. Photo by W. McInnes.

REPORT ON

A PART OF THE NORTH-WEST TERRITORIES OF CANADA DRAINED BY

THE WINISK AND ATTAWAPISKAT RIVERS[27]

By William McInnes

The present report deals with a tract of country lying within the unorganized North West Territories of Canada, between N. lat. 51° 10′ and N. lat. 55° 10′, and between W. long. 86° and W. long. 90°.[27a]

This district forms part of what was known for a time, prior to the inauguration of the Provinces of Alberta and Saskatchewan, as the District of Keewatin, and lies between the northern boundary of Ontario and the south-western shore of Hudson bay.

It is drained by rivers running from the west into James bay and into Hudson bay respectively, and the report is, in the main, a description of one of the latter—the Winisk—throughout almost its entire length, and of the upper branches of one of the former, the Attawapiskat.

Earlier Exploration in the District

As far as I have been able to learn there are no references in the journals of the early explorers to the Winisk river. All concerned in the search for a north-west passage to the Orient, they were naturally led to give most of their attention to the passages between the Arctic islands lying at the extreme north end of the bay. The mouth of the Severn river was, however, visited by a number of them, and Henry Hudson and Thomas James explored the bay now known as James bay, then called Hudson's bay.

Captain Thomas James and Captain Luke Foxe (who styles himself in his journal the "north-west fox"), seem to have been the only navigators who sailed along the coast between the Severn river and Cape Henrietta Maria, for the purpose of examining it. They describe a generally low shore, with shallow water, and make no allusion to having noticed the mouth of the Winisk river. It must have been, however, as Mr. Miller Christy points out, in the vicinity of the bay at the mouth of the Winisk river that the two vessels approached one another in August, 1631, when the two captains, both bearing letters from His Majesty King Charles I to the Emperor of Japan, were able to compare notes as to their discoveries, and when Captain Foxe, ridiculing James' action in keeping his flag continually flying at the masthead, said to him, to use the quaint language of his journal, "Keepe it up then," quoth I, "but you are out of the way to Japan, for this is not it."

Mr. G. Taylor, of the Hudson's Bay Company's service, seems to have visited the river in 1808, and to have supplied the topographical details that appear on the Arrowsmith map.

Dr. Robert Bell, in 1886, descended the Attawapiskat river from the lake, which he named Lansdowne, to the sea, and published an account of the exploration in the Annual Report of the Geological Survey for that year.[28] The Fawn branch of the Severn river was explored by Dr. A. P. Low in 1886[29], and the Ekwan and Trout rivers by Mr. D. B. Dowling and Mr. W. H. Boyd in 1901.[30] No description of the Winisk has been published, though, without doubt, employees of the Hudson's Bay Company have traversed it, as, in the early part of the last century, posts of the Company were established at three points near the head of the river. The missionary priests from Albany, too, have descended the river, holding missions at the more important Indian centres.

Surveys

In order to secure data for the compilation of a map of the region, the following surveys were carried out during the seasons of 1903-4-5:—

Surveys by micrometer telescope and compass, checked by astronomical observations for latitude, were made of the Winisk river, from the mouth to a point 190 miles from the coast, following the course of the stream; from the foot of Wunnummin lake up to

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[27] This report, No. 1080, is based on surveys made for the Geological Survey of Canada in the seasons of 1903, 1904, and 1905. Preliminary or summary reports accompany Vol. XV., part AA, pages 100-108, and Vol. XVI., part A, pages 153-160, of the Geological Survey.

[27a] As will be seen from the map, scale 35 miles to 1 inch, accompanying this volume, the part of the territory described by Mr. McInnes' report now lies wholly within the District of Patricia. W.G.M.

[28] Annual Report Geological Survey of Canada (New Series), Vol. II., 1866, Part G.

[29] Ibid. Part E.

[30] Summary Report Geological Survey of Canada, 1902.

the outflow of the west branch at Misamikwash lake, a distance of 60 miles; down the west branch for 55 miles, and across by a portage route 24 miles in length to Trout lake at the head of the Fawn branch of the Severn river; of a route from the foot of Lake St. Joseph by way of the south branch of the Attawapiskat river to Fort Hope, a distance of 189 miles; and of 27 miles of the Albany river below Fort Hope.

In addition to the above a number of track surveys, checked by latitudes, were made. These covered portions of the Winisk river; part of the Attawapiskat river; three routes connecting the Attawapiskat and Winisk rivers; a route from the Albany river at Eabemet lake to Lansdowne lake; and a route from Trout lake down the west branch of the Winisk river and across to the main river near Nibinamik lake.

Routes into the Region

While the number of possible routes to the Albany river from the Canadian Pacific railway is very great, there are but three that have been used to any great extent, one leaving the railway at Dinorwic station and reaching the Albany river by way of Lac Seul and its tributary the Root river, another one strating from Ignace and reaching the Albany by way of Sturgeon and Musibimega lakes, and another leading from Nipigon station by Nipigon river and lake and crossing to the Albany by way of the Ombabika and Opichuan rivers. The first of these is the best route in, particularly where a load is to be carried, as, though somewhat longer than either of the others, it is down stream or through large lakes for the greater part of the distance.

For light canoes and a quick passage the route by way of Nipigon is preferable, on account of the shorter distance to be traversed.

The greater part of the supplies used for the fur trade in the district are brought up the Albany river from James bay, a route including 300 miles of swift water, where tracking is the only means of progression, and about 50 miles of alternating quiet water and rapids, where portages are frequent. This is considered an easier route to Fort Hope, the headquarters of the trade, than any of the roads from the Canadian Pacific railway.

The completion of the Grand Trunk Pacific railway will shorten very considerably the distance from this side, and render the whole region comparatively easy of access.

From Fort Hope the heads of the Winisk and Attawapiskat rivers can be reached by several routes, none particularly difficult, but all made tedious by reason of the number of portages necessary.

General Description of the Region

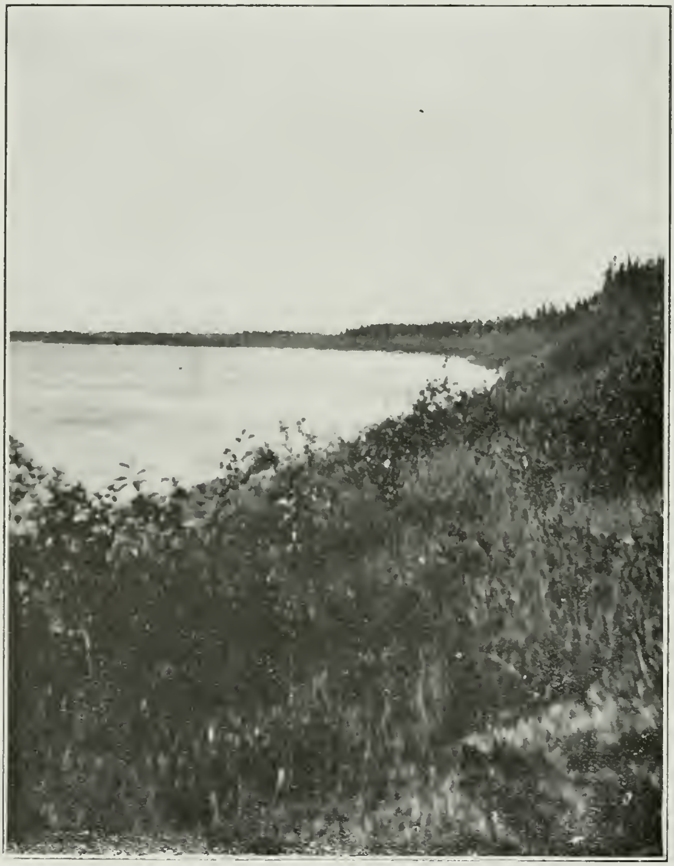
The region may be roughly divided into three great areas, each with characteristic features: the Archæan area of the high interior plateau; the boulder clay area; and the limestone area of the Hudson bay basin. The Archæan, of the three, comprises by far the largest extent of country.[30a] It consists of an elevated, undulating plain, with an average height of from 700 to 1,000 feet above sea-level. The effects of long-continued subaerial decay and denudation, supplemented by the later cleaning up and smoothing action of a great glacier, are everywhere noticeable in the gently rounded outlines of the very moderate elevations. On it all the larger rivers of the Hudson bay watershed, and many of those flowing south and west, have their sources, the great muskeg areas acting as storage reservoirs, from which, even in the dryest season, the volume of drainage is large. It is along the parts of their courses lying within this area that the quickest descent occurs, falls and rapids that would afford water-powers being thus largely confined to the upper stretches of the streams. This condtion is in contrast with that obtaining everywhere throughout eastern Canada, where the streams flow for the greater part of their length over the Archæan, and only come tumbling down from the elevations when low down in their courses, after they have attained almost their maximum volume, thus making the eastern portion of Canada probably unequalled in the world in the matter of water-powers. It must not be thought, however, that throughout the area now under consideration there is any scarcity of good water-powers. They occur in great number, but owing to the distribution of the Archæan highland referred to, they are situated mainly far inland rather than near the coast.

Though, considered as a whole, the central, elevated region cannot be spoken of as generally adapted for agriculture, there occur basins covered by heavy deposits of stratified sand and clay that seem to have been laid down in lakes held in between barriers formed by the walls of the retreating glacier and ridges of drift. An examination of some of these clays by Dr. Hoffmann shows them to be highly calcareous and somewhat siliceous, a composition that, with the admixture of the surface vegetable mould, should produce an excellent soil for general agriculture. The question of climate, which is, of course, of the utmost importance when considering the agricultural

[30a] See map page 5

possibilties of a district, will be referred to more particularly in another place. It may be said here, however, that the climatic conditions are, if somewhat adverse, not by any means prohibitory to the general cultivation of suitably situated tracts.

Muskeg, alternating with low ridges of gravel and boulders, covers wide tracts, though, owing to the fact that the only practicable mode of travel through the country is by canoes, there is a tendency, perhaps, to overestimate the extent of such areas, as the natural canoe routes must follow the watercourses, and these in turn keep to the lowest elevations, and, therefore, show a proportion of swamp that is greater than the average of the district. It was noticed that the surface drainage became more perfect in that part of the region extending westerly towards Trout lake. Ascending the Winisk river from Weibikwei lake towards its headquarters this was very noticeable, the muskeg areas becoming infrequent and of smaller extent.



Lower Winisk river Photo by W. McInnes

The larger lakes throughout the district are confined to the Archæan area. They are all comparatively shallow, and so studded with islands, and broken by long, projecting points, that they seldom show any large expanses of open water. They occupy depressions in the superficial deposits, generally with a boulder clay bottom, and in no case was one found occupying a regular rock basin.

The areas of the principal lakes are approximately as follows:—

Wunnummin lake	60	square miles.
Weibikwei lake	40	"
Lansdowne lake	38	"
Ozhiski lake	25	"
Wapikopa lake	24	"
Eabemet lake	20	"
Nibinamik lake	10	"

The highest land lies about the headwaters of the south branch of the Attawapiskat river, east of Cat lake, where an elevation of probably 1,500 feet above the sea-level is reached.

The approximate heights of the principal lakes determined by barometric measurement is given below:—

Eabemet lake, Albany river	900	feet above sea-level.
Ozhiski lake, Attawapiskat river	910	" "
Lansdowne lake, Attawapiskat river	815	" "
Wimbobika lake, Attawapiskat river	1 300	" "
Weibikwei lake, Winisk river	670	" "
Wapikopa lake, Winisk river	750	" "
Nibinamik lake, Winisk river	785	" "
Wunnummin lake, Winisk river	830	" "
Misamikwash lake, Winisk river	865	" "

Boulder Clay Area

The tract referred to as the boulder clay area consists of a broad belt of country, about 159 miles in width, lying between the Archæan highlands and the edge of the limestones of the basin of Hudson bay, overlapping the latter, however, so that the surface features of the two are generally quite similar.

Gently undulating, and with a slight slope northerly and easterly, its general surface aspect is that of a great swamp, sparsely covered with stunted and deformed trees, that reach a growth approaching their normal only along the immediate banks of the rivers, where drainage is afforded by frequent short gullies into the trenches that constitute the river valleys. The interior, to within a chain or two of the river-banks, owing to the impervious character of the till, is quite undrained, and consequently covered by a thick deposit of sphagnum moss from two feet to ten feet deep, the surface layer still growing, and even the bottom only bleached a little, but not at all oxidized. The short cool summer season, and consequent low temperature of the water that saturates the moss, is probably the principal reason for the absence of any of the visible effects of decay.

The rivers flowing through this region have no real valleys, that is to say, they occupy trenches but little wider than the immediate channels in which they flow, cut down through the stiff, tough till, which stands up in nearly vertical walls that rise from the freshet mark on either side. At low stages of the water a slanting beach, often paved with boulders, slopes gradually from the foot of the bank to the edge of the diminished channel. A more or less continuous layer of marine clay, rich in fossil shells, overlies the boulder clay, ensuring, wherever it is present, a soil of good quality. The absence of other than swamp vegetation must be ascribed, then, to the almost total absence of drainage, and to the generally unfavourable climatic conditions.

Silurian Limestone Area

The third area, underlain by Silurian limestones and dolomites, presents essentially the same surface features as the till area. The folding of the limestones, however, though generally amounting to broad undulations only, gives to it somewhat more of relief, and the troughs in which the rivers lie have been excavated entirely through the mantle of till, and have cut down into the limestones to depths of from twenty to thirty feet.

There is the same absence of any vegetation other than that having a muskeg habitat, excepting on the islands in the rivers and along their banks.

The northern rim of this area consists of a treeless plain, bordering the shores of the bay, and varying in width from a mile and a half to three miles. It has an elevation of only a few feet above the level of high, spring tides, and is probably submerged on occasions, when these tides happen to coincide with north-east storms on the bay. The sandy and gravelly surface is sparsely covered with bunchy grasses, and, early in August, was bright with the flowers of many sub-Arctic plants, among which the Arctic daisy, *Chrysanthemum arcticum*, the yellow ragwort, *Senescia pallistris*, the painted cup, *Castelegia pallida*, a live-for-ever with small, bell-like blue flowers, purple vetches, and the large rose-coloured *Epilobium* were prominent.

Geological Summary

The geological divisions recognized in the region under consideration consist of the following, in ascending order:—

Laurentian,
Keewatin,
Lower Huronian (?),
Silurian (Niagara),
Pleistocene (Till, etc.),
Post-Pleistocene (Marine clays, etc.)

Laurentian

Biotite granite gneisses, varying in the proportion of their various constituents, in their attitude, and in the degree to which the gneissic structure has been developed in them, are widespread over the whole extent of country explored. Over great areas they have a stratiform appearance, the foliation showing an almost horizontal structure, with only very low, broad undulations. As at present constituted they, without doubt, include areas that differ widely in age, the comparatively new granites, however, occurring in quantity quite insignificant in comparison with the volume of the older gneisses. Pegmatites, in veins and irregular masses, cut the gneisses practically everywhere, and are, probably, though newer than the gneisses, almost contemporaneous with them in their present form.

Keewatin

The Keewatin bands, made up of areas of basic rocks, in the main diorites, diabases, and chloritic and hornblende schists, but including a considerable volume of coarse conglomerates, though occurring as belts of considerable length and four to six miles in width, are of exceedingly small volume when compared with the whole extent of gneisses in which they are enfolded. Probably not more than a tenth of the whole Archæan area is occupied by them.

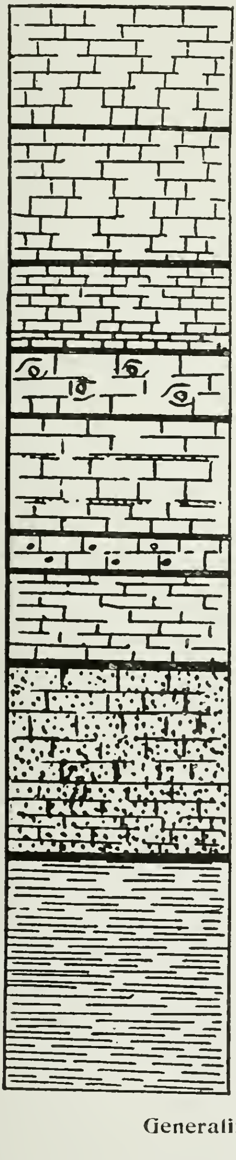
Silurian Limestone on the Lower Winisk river. Photo by W. McInnes.

In the region explored, between the Albany river and the overlap of the mantle of till, six apparently separate belts of these rocks were noted. They have all, in a general way, about the same trend, N. 70° E.

The belt of these rocks crossing the Albany river at Petawanga lake, and seen again on the route between the Albany and Fort Hope, just north of Eabemet lake, is the most southerly. It is made up for the most part of chloritic, feldspathic and hornblendic schists, and diorites in different stages of deformation, and has a width of about six miles. The gneisses bordering the belt on the south are finely foliated, hold a large proportion of black biotite, and are, in certain layers, thickly spotted with garnet crystals. Masses of coarse pegmatite, cutting these gneisses, hold crystals of mica up to 2″ in diameter.

The next belt going northerly is situated about twenty miles north of the Albany river and is well exposed along the banks of the Kawinogans river, which has cut its channel in these rocks for about seventeen miles. This band is from one to four miles in width, and is made up of feldspathic and chloritic schists, diorites and other basic rocks. It is flanked by biotite gneisses, with, at points close to the contact, occasional outcrops of hornblende granite-gneiss.

Another belt, quite similar to the two above referred to, lies just north of Lansdowne lake. Further reference is made to it in the descriptions of the routes leading north from the Attawapiskat to the Winisk. The most interesting belts are the next two; the first, lying just south of Nibinamik lake, by reasou of the occurrence in it of a large mass of hypersthene gabbro, similar to the nickel-bearing intrusives of Sudbury; and the next, the Wunnummin lake band, on account of the extensive development in it of heavy beds of coarse conglomerate, holding pebbles, chiefly of various forms of granite. The most northerly band is apparently quite narrow, and was noted only where a few isolated outcrops are seen near Kingfisher lake, north of the Winisk river.



Generalized Section along the Winisk River

Silurian

The Silurian section along the Winisk river seems to comprise, in ascending order, twenty feet of close-grained, hard, brittle, green and black ribboned slates, with bands and nodules of more highly calcareous material; six feet of a hard, dark-grey, rusty weathering, calcareous quartzite; ten feet of a much more calcareous form of the last-named beds, so calcareous as to constitute an impure limestone rather than a quartzite. All of these lower beds, which are exposed at but one place on the river, where they are brought up by a compound anticlinal fold, are hard and baked-looking, with many small veins of quartz and calcite cutting them in all directions. Lithologically they are quite dissimilar to any of the strata composing the rest of the section. Further effects of pressure are seen in the hardened condition of all the rocks, and in their cracked and fissured condition, the cracks filled with secondary quartz and calcite. The more massive beds described as calcareous quartzites are seamed in all directions by these white, reticulating veins, which are brought into strong prominence by their contrast in colour with the dark, rusty-weathering surfaces of the parent rock.

There seems to be a gradual passage upwards from these beds, by the increase in their calcareous content, into impure limestones, and then into the next beds in the series, consisting of a series of slightly magnesian limestones, comprising eight feet of buff-coloured, slightly ferruginous, hard, close-grained, flaggy beds, with the texture of lithographic stone in certain layers; two and a half feet of more massive nodular limestone, the nodules of finer texture than the enclosing, slightly shaly matrix; and ten feet of rubbly, shaly limestone, with occasional sandy layers. Nodules of bluish opalescent quartz, with banded, agate-like structure, occur in the more compact beds throughout the series.

Above these beds is a very persistent band, six feet in thickness, of a tufaceous-looking, vesicular limestone, the very distinctive character of which makes it easily recognizable at many points along the river. Cavities in it are coated with crystals of calcite, and vesicles and cracks occurring in it are filled with a fibrous form of that mineral. The calcite occurs throughout the rock in irregular masses that weather out to form cavities of irregular sizes and shapes. Immediately above this bed there occurs a 6″ layer of a compact yellowish limestone, with but little magnesia; then six feet of very fine-grained, almost compact, very light buff-coloured dolomite, containing a small quantity of argillaceous matter and occurring in heavy flag-like beds, the plates hard and clinking under the hammer. These are overlaid by twelve feet of buff-coloured impure magnesian limestone, shaly in certain layers; and ten feet of flaggy and shaly buff-coloured, somewhat nodular, magnesian limestone, the whole becoming disintegrated easily so as to show only nodular, crubling surfaces.

Broadly speaking, the strata may be said to lie almost horizontally, with a slight dip towards the shores of the bay, amounting to about the same as the descent accomplished by the river. Low undulations cause the same beds to recur again and again in the sections exposed along the river. The exposures are not continuous, long intervals where the overlying boulder clay only is seen intervening between the exposed sections, so that the generalized section given above, and tabulated on the preceding page, is made up from an examination of separated exposures occurring along the river for a distance of eighty miles. Though the strata are uniformly buff-coloured and closely similar in general appearance, a few very distinctive beds—notably the tufa-like limestone bed, which seems to be very persistent and to keep its distinctive characteristics—serve to connect the various exposures satisfactorily. The lowest beds, comprising the thirty-five feet of strata brought up by the compound anticlinal fold, appear at only one place on the river. As no fossils were found in them their age can be inferred only from their apparently conformable position immediately underneath the fossiliferous Silurian strata.

The corrugated surface of the dome of the anticlinal itself dips about ten degrees north of west, at a low angle, varying from five to twenty degrees, and it is possible, though not probable, that the rocks noted by Mr. Dowling at Sutton Mill lake represent underlying beds brought up by a southeasterly extension of this fold.

The calcareous nodules, which probably represent bands broken by the stress of the folding, weather out readily, where exposed to atmospheric action, leaving a rock full of holes.

A small collection of fossils was made from the beds overlying the vesicular band, in which Dr. Whiteaves has identified the following forms:—

Favosites gothlandica, Lamarck.
Stropheodonta niagaraensis, W. and M.
Leptæna rhomboidalis, Wilckens (sp.).
[31]*Camarotœchia* (?) *winiskensis*, Whiteaves.
[31]*Camarotœchia* (?) *coalescens*, Whiteaves.
[31]*Glassia variabilis*, Whiteaves.
[31]*Actinoceras keewatinense*, Whiteaves.
Trimerella, sp. indet.
Orthis, "
Spirifer, "

[31] The two new species of Camarotœchia, the Glassia and the Actinoceras have been described by Dr. Whiteaves in Palæozoic Fossils, Vol. III., Part IV., 1906, where further notes concerning the collection will be found.

Streptelasma. sp. indet.
Trochonema, "
Euomphalus, "
Loxonema, "
Cyrtoceras, "
Bronteus, "
Encrinurus, "

Though not a very satisfactory collection in itself for purposes of age-determination, the above-named species correlate the beds holding them with those of the Severn river to the north, and the Ekwan river to the south, and collections from the three localities combined fix the age of the rocks very satisfactorily.

The southern limit of the Silurian limestones cannot be fixed with any degree of exactness, owing to the heavy overmantle of till that conceals from view the underlying rock for a distance of 130 miles along the river. It seems probable, however, that it extends to the vicinity of N. lat. 54° 20′. Mr. Low found on the Fawn branch of the Severn, the nearest river to the west, the same wide area of country completely covered by till intervening between the most northerly exposure of gneiss and the first exposure of limestone. He thought it probable that the limestones extend under the till for a distance that would correspond very closely to that given above for the Winisk. East of the Winisk river the inland boundary of the Silurian bends suddenly to a direction nearly due south, crossing the Attawapiskat river a little above N. lat. 52° 30′, and the Albany one degree lower.

Pleistocene

The boulder clays of the Winisk river may be easily divided into an upper and a lower till, the one lying upon the gently undulating surface of the other.

The upper bed is composed of a buff-coloured clay, drying slightly friable, with occasional large boulders, and many small pebbles and angular fragments of diorite, quartzite, gneiss, red and white sandstone, jasper, etc. Its greatest observed thickness is about forty feet, measured from the surface of the lower till to the bottom of the fossiliferous marine beds. No stratification is apparent in it, and the large boulders are so rare that, at a little distance, cut faces have the appearance of beds of pure clay.

The lower till, the thickness of which was not ascertained, is composed of an extremely tough blue clay, with very many large boulders, semi-rounded and mostly well striated. Limestones and dolomites quite similar to the Silurian beds of the lower river make up a large proportion of the boulders, but others of gneiss, quartzite, conglomerate, etc., are not uncommon. The sloping beaches extending between low and high water marks are often a mosaic of the washed out material from the clay, forming very good examples of boulder pavements, the natural tendency of the rocks to arrange themselves with their flatter sides parallel to the surface resulting in an almost smooth floor, over which the spring floods seem to pass with little or no denuding power. The whole bed of the river is, in the same way, protected by a layer of heavy boulders that offers great resistance to the wear of the current, and that has practically stopped the further excavation of the channel at levels far from the bottom of the lower till.

The accumulations of glacial drift are an important feature over this whole district. They form the highest elevations, and are the principal causes that define the shapes of the lakes and the directions of the rivers. The influence of morainic ridges of boulders and gravel on the course of a river is strikingly seen in the case of the upper part of the Winisk river. The direction of the ice movement was about S. 23° W., and the course of the river is found to conform to this direction to a remarkable extent, that is, it makes its way eastward in a series of zig-zags, the lake-like expansions conforming in a remarkable way to the course of the morainic ridges of drift.

The lakes occurring along the river are characterized by many long narrow bays with the same trend, due to the drift ridges that bound them.

The glaciation of the whole area shows most clearly that it is the result of the passage of a large glacier, continental almost in extent, moving in a general way a little south of west, but showing minor deflexions, that occurred probably at stages in the period of glaciation when the ice sheet was not at its greatest thickness and was more readily influenced by the surface contours.

The general S.S.W. direction of movement is indicated not only by striæ, chatter marks, and crag and tail sculpturing, but also by the character of the boulders enclosed in the till and scattered broadcast over the Archæan area. The occurrence of the fossil-bearing limestones along the west coast of Hudson bay and James bay, and the entire absence of any rocks at all similar to them over the whole region farther south, makes the character of the travelled boulders derived from these rocks a sure index to the direction followed by the moving ice-sheet. Additional evidence is afforded by the occurrence in the till of boulders and pebbles of jasper, hematite, quartzite of a very distinctive character that Dr. Bell has recognized in place on the east coast of Hudson bay, and jasper breccia or conglomerate. The wide tract of country lying between the Archæan gneiss and the first exposures of limestone, where the underlying rocks are completely concealed by the thick mantle of boulder clay, might be the source from which is derived many or all of these apparently foreign boulders, but their very close similarity to rocks that are known to occur on the east shore of Hudson bay makes it more probable that they have been derived from them.

A few south-westerly striæ that appeared to be possibly later than the prevailing ones might be interpreted to indicate a glacier travelling down a gathering ground such as has been assigned to the Keewatin glacier. The local variations of the striæ from the general direction are so many, however, that it seems quite possible that they are only the records of deflexions caused by local surface relief, and made perhaps by a very much reduced glacier. No evidence of a glacier moving down towards the bay was noticed. The following list of glacial striæ is arranged under three divisions—the height-of-land region, where the striæ may be considered to represent most truly the general course of the glacier; the Winisk river channel, where the direction of the striæ seems to have been somewhat affected by the river course; and the valleys of the Albany and Upper Attawapiskat rivers, where the direction has been quite governed by the trend of the valleys.

Direction of Glaciation

Height-of-Land Region—	
Kawinogans river	S. 50° W.
Hail lake	S. 40° W.
Wapitotem river	S. 38° W.
Winisk river, eight miles above Weibikwei lake	S. 38° W.
Winisk river, Wapikopa lake	S. 32° W.
Lower Winisk River Region—	
Winisk river below outflow of Winiskisis	S. 6° W.
" at outflow of Tabasokwia	S. 6° W.
" above Tashka rapid	S. 10° W.
" at Tashka rapid	S. 30° W.
" at Boskineig fall	S. 30° E.
" ¼ mile below Boskineig fall	S. 18° W.
" 1 " " "	S. 10° E.
" 2 miles " "	S. 12° E.
" 8 " " "	S. 10° E.
" 13 " " "	S. 24° E.
" 15 " " "	S. 26° E.
Albany River and Attawapiskat River Valleys—	
Eabemet lake, northwest shore	S. 83° W.
" " north shore	S. 78° W.
Albany river, 10 miles below Eabemet	S. 68° W.
" 12 " "	S. 67° W.
" 15 " "	S. 64° W.
Ozhiski lake	W.
Kabania lake	N. 79° W.

Post-Pleistocene

The marine clays, overlying the boulder clays along the Winisk river, were found to be generally fossiliferous, excepting near their most southerly extension where they are quite thin, and, as far as observed, do not hold fossils. From a collection made from these clays in 1903, Dr. J. F. Whiteaves has identified the following species:—

Pecten islandicus, Müller.
Mytilus edulis, L.
Cardium ciliatum, Fabricius.
Serripes Grœnlandicus, Gmelin
Macoma calcarea, Gmelin.
Mya truncata, L.
Mya arenaria, L.
Saxicava rugosa, L.
Buccinum tenue, Gray.
Buccinum ?

and, fresh water species:—

Sphœrium striatinum, Lamarck.
Limnœa palustris, L.

The Winisk River

The Winisk river, though without falls in its lower course, and with a volume that would lead one to suppose it easily navigable by vessels of considerable size, is so rapid and so wide for a long distance up from the bay that it would be difficult to find a channel for a steamer of even moderate draft. This is particularly true of the thirty miles of its course over the flat-lying limestone ledges that often form barriers quite across the river bed, on which there is a depth of only a few feet of water.

The river has cut down into the limestones to a depth of more than forty feet, the strata rising in vertical walls to that height above mean low water level.

There is evidence that the river followed its present channel in the limestones prior to the glacial period. It has since then not worn out for itself any valley beyond its immediate channel, which is a mere trench in the boulder clay in the upper stretches, and in the clay and underlying limestones farther down. The extreme toughness of the lower boulder clay, and the protection afforded by the great number of large boulders that wash out from it and coat the bottom and lower parts of the sides of the trench, have prevented any quick degradation of the banks, which stand up, raw and steep, like the sides of a newly excavated canal or railway cutting. The more gently sloping parts of the bank, between high water mark and the foot of the boulder clay wall, are covered with a growth of grasses and small bushes, and, beyond latitude 54° 30′, the nearly vertical boulder clay itself supports a growth of silver berry, *Eleagnus argentea*, and buffle berry, *Shepardia*, the almost snow-white foliage of the former standing out in strong contrast with the dark-green leaves and red berries of the latter.

The Winisk river, along its upper course easterly to Weibikwei lake, has a distinguishable valley. The lower part of the river, however, from the lake to the sea, has absolutely no valley outside of the steep-walled trough in which it runs. The upper Attawapiskat river, flowing in an easterly direction, has a fairly well-marked valley, comparable to that of the Albany, though of less extent. The upper parts of the river are roughly parallel to one another and to the Albany river, with which it is not at all improbable that the Attawapiskat was at one time connected, as the country now dividing them is characterized by high hills of glacial drift, filling up and concealing any former channels that may have existed. These are the very remarkable hills described elsewhere in this report in greater detail

Parallel Channels a Feature

In all the rivers on this slope is seen the tendency to split up into two or more channels, enclosing areas of land often many miles in extent. This feature is more marked in the case of the Winisk than in any of the others. Above Weibikwei lake one of these divisions of the channel occurs, enclosing an area of thirteen square miles; and below, the two branches known as the Winiskisis and the Tabasokwia flow around islands with areas of about 480 and 180 square miles, respectively. The former of these branches, flowing to the east at a point seven miles below the lake, joins the main river again sixty-five miles below. The Indians say that no important stream comes in to the branch, but a number of small streams makes it a river of considerable size at its confluence with the main channel, even at low water when no water is passing over the bar at its upper end.

The volume of water in the river during the period of spring freshet must be quite ten times as great as at low water in mid-summer. The height reached by the water is, in many places, plainly indicated on the banks.

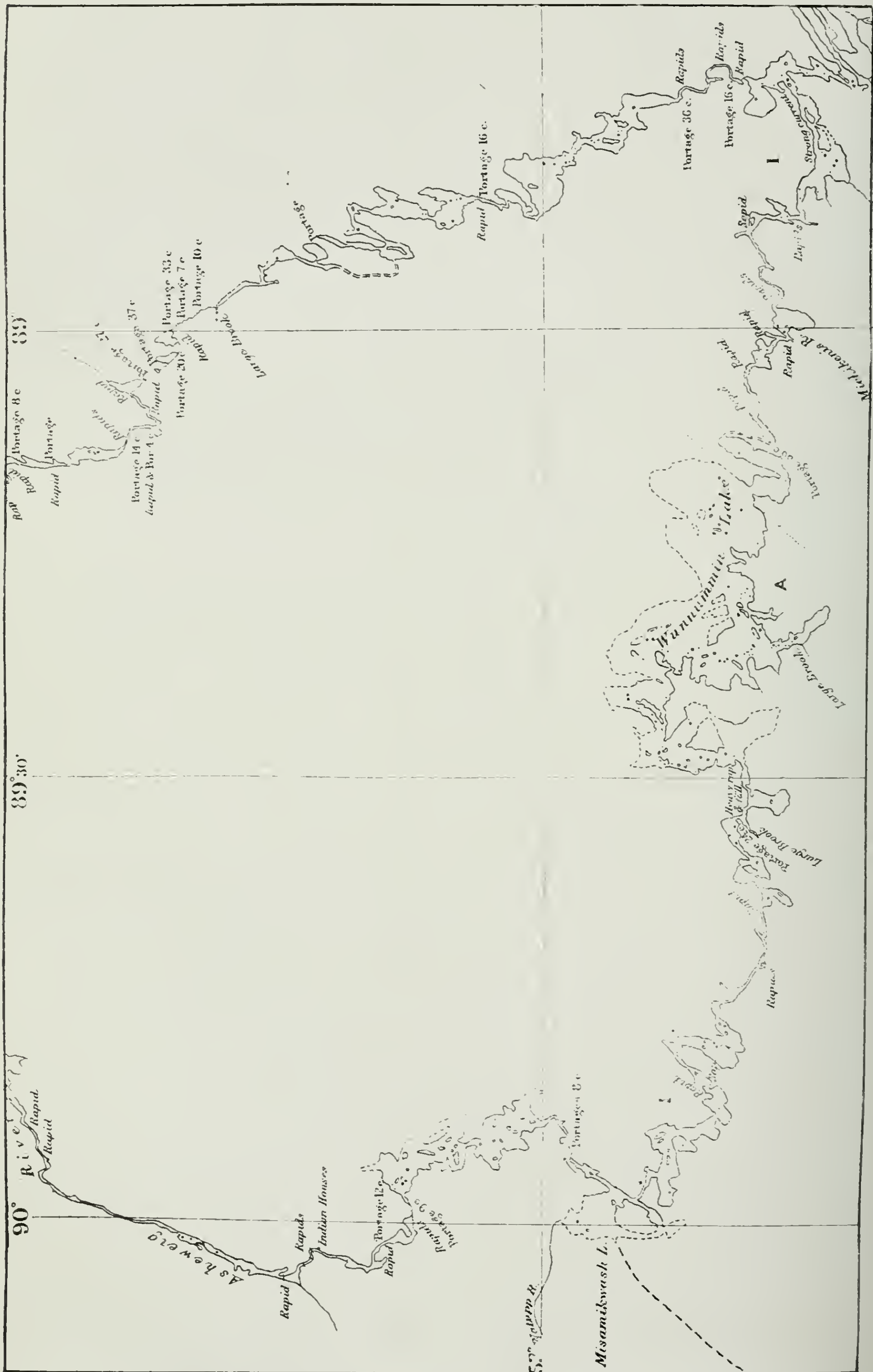
Evidences of the destructive force of the ice, when running out in the spring, are common. Trees on some of the islands are found broken and uprooted at heights of fifteen feet above the normal water level, and the boulder clay of the banks is ploughed and deeply scored at corresponding heights.

The flat surface of the limestone bordering the gorge is evidently swept annually by the river when at its height, though the water surface in the gorge at ordinary summer level is thirty feet below the top of the limestone.

No beds of lignite were observed, though a few highly carbonaceous, sandy layers were seen to occur at water level, apparently beneath the boulder clay on the upper Winisk river.

Owing to the frequent small landslides occurring along this part of the river it was impossible to fix the position of these beds with any degree of certainty.

Though for so great a part of its course the river is bordered by high and steep banks of clay, landslides seem to be exceedingly rare, excepting where the country has been swept by forest fires. Where fires have recently taken place along the banks, denuding them of their protecting vegetation, small landslides are almost continuous.



Wunnummin Lake and Asheweig River.

The Winisk is with little doubt the largest of the rivers discharging into the west side of Hudson bay or James bay between the Severn and Albany rivers. Rising in the highlands lying to the south of Trout lake, it drains the large expanse of country lying to the east of the upper waters of the Severn river, and to the north of the spreading branches of the Attawapiskat. The watercourses of this section of country have been most inadequately represented on the existing maps, owing to the lack of knowledge of their positions, and a reference to the map accompanying this report will be necessary in order to understand the apportionment of the watersheds among the various rivers. From Misamikwash lake, above which the Winisk is divided into two main and many smaller branches, the river flows out by two channels, one quite insignificant in volume flowing to the north, and the other, a river of considerable size, flowing to the east. The former of these forms the head of the Asheweig or west branch of the Winisk, and the latter the main river.

Diverging at a point situated in N. lat. 53° and W. long. 90°, these two streams unite 224 miles below, following the course of the main river in N. lat. 54° and W. long. 87° 30′.

From Misamikwash lake and for twenty-five miles the river keeps a general easterly course. In this distance the descent is about thirty-five feet, and occurs principally in a series of five rapids, at the lowest of which, just above Wunnummin lake, there is a very considerable fall. Between the rapids are stretches of swift water, varied by many lake-like expansions. The surrounding country is for the most part low, seldom rising to greater heights than fifty feet above the river. Few rock exposures are seen, what there are consisting of low, rounded knolls and ridges of well foliated biotite granite gneiss, generally with an almost horizontal foliation and often invaded by a coarser white granite or pegmatite. The banks are usually low, but in places the river is found impinging against a bank of unstratified sand and gravel twenty to thirty feet in height.

Wunnummin Lake

Below the rapid and fall just referred to a large stream comes in from the south, and the river widens out to form Wunnummin lake, a body of water of varying width, twenty-five miles in length. The trough in which the lake lies has been hollowed out mainly in a band of Keewatin rocks to whose trend it generally conforms. The most conspicuous rocks occurring in the belt are heavy beds of coarse conglomerate, very similar to that of Abram lake on the English river below Minnitakie lake.[32] With these are associated diorites and chloritic and hornblende schists, the whole striking about N. 70° E. and dipping at high angles. These rocks can, without doubt, be classed almost wholly with the Keewatin, though there are possibly small areas of lower Huronian, the basal beds of which would be represented by the conglomerate.

About the lake almost the only eminences in view are low hills of unassorted drift, rising generally not more than fifty feet above the water level, but in one case forming a very striking cone-shaped eminence, rising perhaps 300 feet above the surrounding level. Owing to its inaccessibility this hill was not visited, but from its general aspect, and from the accounts of it given by the Indians, it evidently is one of those remarkable, isolated masses of drift seen on the south branch of the Attawapiskat, and noted also by Mr. Camsell as occurring in the country north of Cat lake.[33]

From Wunnummin lake to Nibinamik lake, a distance of twenty-five miles, the descent is about forty-five feet, the fall occurring principally at three points, where series of heavy rapids break the course of the river. Between these are stretches of quiet flowing water, where the current, though generally strong, flows along placidly between banks of sand not generally high, but in places, where the current has worn into the side of a drift ridge, showing cut banks seventy-five feet in height. A stream known as Michikenis flows in from the south about six miles below Wunnummin lake, and a larger one, referred to again in describing the route from Trout lake, joins the river from the north five miles above Nibinamik lake.

Nibinamik and Wapikopa Lakes

Nibinamik lake is an irregular body of water whose shape has been largely defined by ridges of glacial drift. From inlet to outlet is but five miles, the lake, however, extending to the south for seven miles and to the north for four miles. A number of low ledges of fine, well-foliated biotite gneiss occur along its shores, cut by a coarse white gneiss that often is interbanded with the finer, giving the whole an appearance of stratification. The land rises gradually from the lake shores to heights of about sixty feet, a considerable thickness of sand and gravel concealing the underlying rocks, excepting at

[32] Annual Report Geological Survey, 1901, Vol. XIV., p. 90 A.
[33] Summary Report Geological Survey, 1904.

the immediate shores. A forest about one hundred years old, but never very large, covers the surrounding country. Spruce and tamarack are the principal trees, with aspen, poplar, and canoe birch on the ridges.

From the southern end of the lake, by a large brook entering the southeasterly bay, a route to be referred to again, leads to the Attawapiskat river.

For the next twelve miles, between Nibinamik and Wapikopa lakes, the river flows with a fairly stiff current, increasing to rapids at three places, and descends in all about thirty-five feet. No ledges are seen along the shores, the over-mantle of drift, rising in places to form ridges ninety feet in height, quite covering the underlying rocks.

Wapikopa lake has a length northeasterly of thirteen miles, with a long irregular bay running to the north for fourteen miles, where it receives the waters of the river of the same name, a quiet flowing stream thirty yards wide, two to six feet deep, and with a sluggish current of about one mile an hour.

Many exposures of biotite gneiss occur about the lake-shores, the foliation being well marked, and dipping at angles of from forty degrees to horizontal. A coarser grey gneiss cuts these stratiform beds, and encloses in places angular blocks of the finer black gneiss in such numbers as to constitute a breccia.

A newer reddish granite, with porphyritic crystals of red feldspar, occurs in heavy ledges near the west end.

Green forest, from thirty to one hundred years old, clothes the shores of the lake on every side.

Weibikwei Lake

From Wapikopa lake downwards to Weibikwei lake, a distance of thirty-eight miles, the river follows a most irregular course, and really constitutes a succession of lakes, with intervening rapids, the total descent being about eighty feet.

The lake-like expansions are remarkable for the way in which the long, narrow bays, running off from them, conform to the direction of glaciation. This is caused by the recurrence of parallel ridges of glacial drift, with a direction about N. 30° E., the valleys between them forming the basins of the lakes.

A number of small rapids occur where the river breaks through the drift ridges, and for ten miles immediately above the outflow of the channel coming in below Weibikwei lake the current is very swift, and heavy rapids occur, some of them over ledges of biotite gneiss.

These rocks, the only exposures seen, are fine, banded black and grey biotite gneisses, dipping at various angles, but preserving a general north-easterly trend. They are invaded by irregular masses of a coarser white gneiss, that sometimes occurs as bands conforming to their foliation, but often cuts them in the form of apophyses, and surrounds and encloses angular blocks and masses.

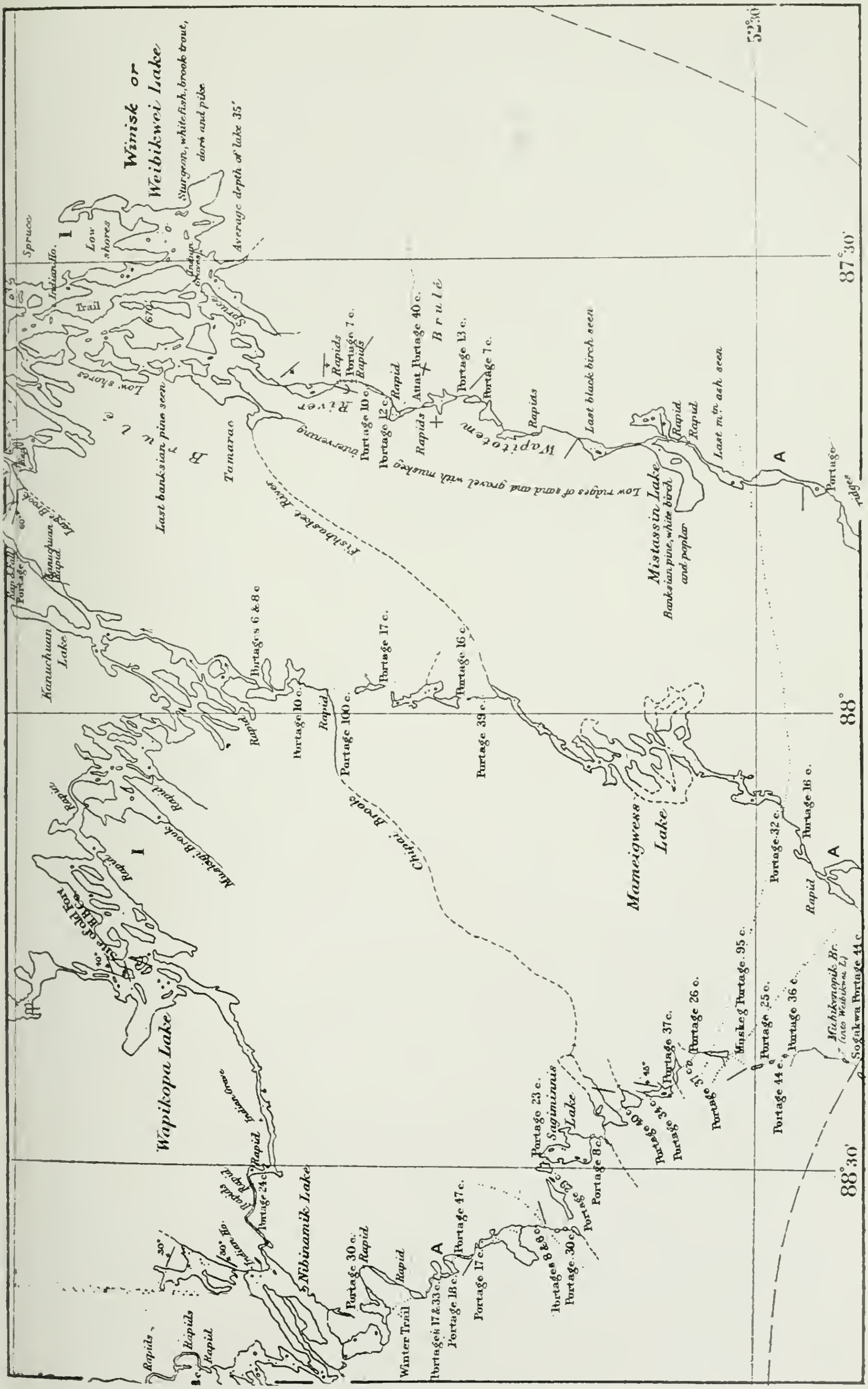
Midway, at a point above Kanuchuan lake, where the river divides into a number of channels, a small brook flowing in from the south is the starting point for a route across to Lansdowne lake, and nine miles above Weibikwei lake a channel leads off to the north, rejoining the main river just below that lake.

The southern channel of the river flows into the north-westerly bay of Weibikwei lake and discharges from its extreme northern end.

Weibikwei lake has an extreme length of seventeen miles, and is seven miles wide. Two rivers of considerable volume flow into its southern end, the Michikenopik (stone fish-trap)—known on the old maps as the Fishbasket river— and the Wapitotem, up which the principal canoe route to the south leads.

The lake, though of considerable area, nowhere shows any wide expanse of open water, consisting of a series of long, narrow channels, lying about north and south, between parallel low islands of sand, gravel and boulders, with a substratum of till reaching about the level of the top of the water. The passages are not generally more than half a mile in width and only thirty feet in depth. The land about the lake is low, and has been almost entirely denuded of trees by recurring fires, excepting in a few localities where Banksian pine, tamarack, and spruce of fair size remain to show the character of the original forest. Sturgeon, whitefish, pike and doré of good size are plentiful in the lake, and the Indians say that brook trout are not uncommon, but that lake trout do not occur. The only ledges about the shores are biotite gneisses that form low points near the southern end of the lake.

The river discharges from the extreme northern bay of the lake by a short rapid, with a fall of three or four feet. Just below the rapid, at the head of a long bay that extends for several miles to the west, the channel which leaves the river ten miles above rejoins. This is probably really the main channel of the river. Below the junction the river flows for the first eight miles of its course over horizontally foliated ledges of banded, biotite gneiss, that cause an almost continuous succession of rapids with swift water between, down to the point of outflow of the Winiskisis, a channel that flows off to the north-east, to become reunited to the main river seventy miles below. At



Winisk or Weibikwei, Nibinamik and Wapikopa Lakes.

low water, no water flows over the bar at the entrance to this channel, though there is, at all stages of the water, a river of considerable size coming in at the junction, due, the Indians say, not to any single large stream, but to a great number of smaller tributaries draining the country between this stream and the heads of the Ekwan and Black fence branch of the Attawapiskat rivers. Thirteen miles below the head of the island thus formed, another branch channel, called the Tabasokwia, splits off to the west and flows around an island about twenty-three miles long. For forty-five miles below the lake, or to the upper edge of the till-covered area, the river is an almost continuous rapid, the descent being probably as much as seven feet to the mile. At two points only do these rapids become cascades, both situated near the bottom of the very rapid section.

Boskineig or Smoky Fall

At the Tashka rapid the vertical fall is not great, but at the Boskineig or Smoky fall there is a vertical pitch of about fifteen feet. The portage past the first of these rapids mounts over a low ridge of boulder clay, but cut banks, showing a section through the till, are first seen just above the Boskinieg fall, where the river has cut down through twenty feet of an upper buff-coloured clay, and six feet of an underlying, exceedingly tough blue clay holding many well striated boulders.

Below the fall the cut banks of boulder clay become higher, and a few inches at the summit are seen to be stratified. Four miles below in the thin layer of stratified beds at the top, the first fossil shells, *Saxicava rugosa*, were noted, proving these beds to be of post-glacial, marine origin. The height above the sea is estimated to be about 350 feet. The banks along this part of the river's course are low, rising gradually from almost water level to heights of not more than fifty feet above it.

Frequent exposures of biotite gneiss generally nearly horizontal, but much disturbed by intrusions of a coarser white gneiss, and by veins and apophyses of pegmatite, occur all along the river. They are low, rounded, well-glaciated ledges, showing well-marked striation in a general direction varying from south to south-west, but showing occasional striæ, that are probably later, having a direction about south-east. Down to this point, and for a few miles beyond, the old forest has been destroyed by the same fire that swept the shores of Weibikwei lake, and its place taken by a second growth about thirty years old.

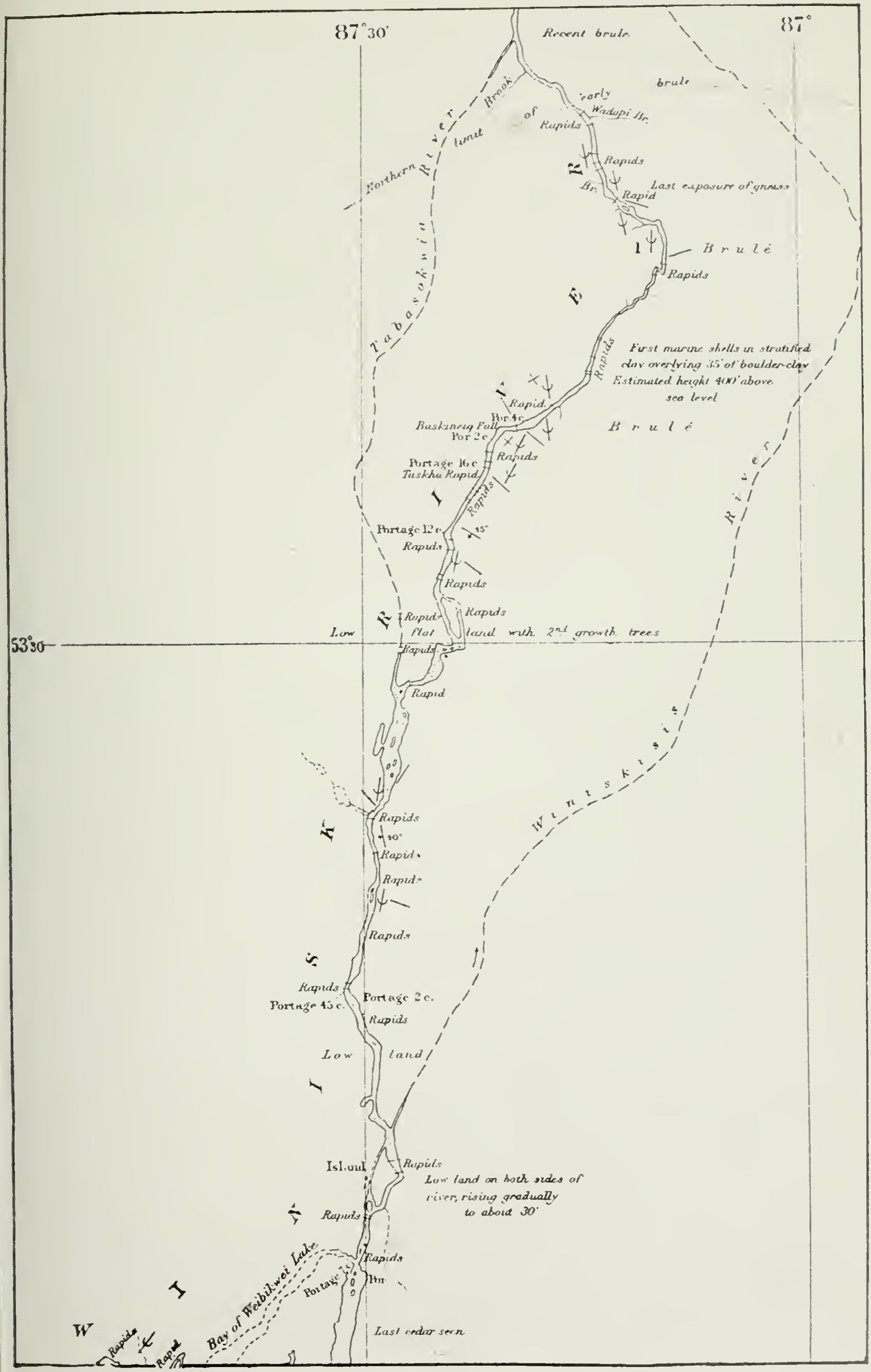
Occasional low bosses of biotite granite-gneiss are exposed along the shores for sixteen miles below Boskineig fall. A horizontal or gently undulating foliation is well developed, though the regular uniformity of their attitude is marred by frequent invading masses of coarse white gneiss and pegmatite. These exposures are the last that outcrop along the river until the outer rim of the limestones of the Hudson bay basin is reached, 140 miles below. Though the bottom of the trough gradually becomes lower in reference to the surface of the till as the river is descended, at no place in this distance has degradation been carried far enough to expose the underlying rocks, the great number of boulders derived from the wearing away of the till probably becoming an increasingly important factor in retarding the wearing action of the current.

Below the last exposure of gneiss the old forest still clothes the banks, the brulé above referred to extending only to that distance. The banks of the river preserve, all along the part of its course lying within the till-covered area, a very uniform character. The shores between low and high water mark gradually slope up from the waters' edge, and are often paved with boulders, and marked at the upper edge by a belt of low bushes and grasses. From high-water mark the bank of boulder clay rises in an almost sheer wall, bare and raw looking, like the side of a recent railway cutting or canal; the lower till often rough with the great number of projecting boulders, but the upper smooth-faced like a pure clay. Capping the upper clay is a very unequally distributed layer of marine clay, in places reaching a thickness of ten feet, but over long distances entirely wanting.

An Area of Imperfect Drainage

The impervious character of the till, together with its nearly flat or gently undulating surface, gives to the country a muskeg-like character, even though it lies eighty feet or more above the bed of the river. Along the immediate banks, and for perhaps a chain or two back, there is a narrow belt of trees of fair size, and back of that stretches away a great level, plateau-like country, practically without drainage, and consequently moss-covered to a great depth, supporting a stunted and deformed growth of black spruce and tamarack. There is no river valley, the trench cut in the boulder clay being but little wider than the actual bed of the stream. The comparatively stable character of the till walls is indicated by this belt of larger growth, as, were the disintegration proceeding at all rapidly, the ordinary condition of tree growth would prevail quite to the edge of the trough.

At sixty-eight and seventy-seven miles, respectively, below Weibikwei lake, the Tabasokwia and Winiskisis channels rejoin the parent stream, the latter now of con-



Part of Winisk River, below Weibikwei Lake.

siderable volume. At a lake-like expansion studded with islands, situated seven miles below the inflow of the Little Winisk, the first tributaries of importance join the river, the Asheweig flowing from the south-west, and the Atikameg from the south-east. The former of these, which is slightly the larger, is the West Winisk of the old maps, and the stream referred to on a former page as flowing out from the main river at Misamikwash lake, 224 miles above. At its outlet it is a quiet flowing stream, with a good current a chain or more in width, and having an average depth of about four feet. A short distance below this point white birches and balsam spruces are seen for the last time on the banks, and thence to the sea the forest growth, quite to the edge of the river trough, is composed entirely of black spruce and tamarack. The islands, and here and there a projecting point, however, continue to show groves of white spruce, balsam poplar and aspen.

After a course almost directly north, with slight curves to the east and west for 126 miles, the river by a sharp turn suddenly changes its direction to a little south of east, and keeps that trend for seventy miles.

Looking down the valley from a point a few miles above the elbow, the land to the north, beyond the turn, is seen to be elevated a little above the general level, the line of higher ground probably representing the northern edge of the Silurian basin. The abrupt turn made by the river, and its long detour to the east before resuming its normal northerly direction, may probably also be attributable to the presence of the barrier offered by the rim of the limestone areal.

The Banipatau and Pikwakwud

Two tributaries, the Banipatau and the Pikwakwud, join the main river near the elbow. Both head near the Fawn branch of the Severn river, and by the last-named there is a canoe route to the Severn. The Winino brook comes in from the north about halfway down the easterly stretch, and nine miles farther on an island six miles in length, known to the Indians as Atikminis, or Caribou island, divides the river into two channels of nearly equal volume. The almost sheer walls of boulder clay, with their intermittent and irregular capping of marine clay, continue to rise in reference to the river bed, until at a point fifty miles above the mouth they attain a height of eighty-five feet above the water level, with a bed of but slightly bleached and not at all decayed sphagnum moss on top. The marine clays, with their contained fossils—a list of which is published elsewhere in this report—immediately underlie the moss. The limestones and dolomites of the Hudson Bay basin first outcrop at a distance of forty-two miles from the bay, measuring along the river. They are flat-lying, slightly magnesian, flaggy limestones, forming the bed of the river, but not appearing above the water. Within a very few miles, however, the slope of the river carries it below the surface of the limestones so that they form low walls, gradually increasing in height in reference to the surface of the water until, four miles below, the river flows through a gorge cut to a depth of thirty feet in the limestones and dolomites. This is probably a part of an old pre-glacial channel, as from here on down towards the sea the limestone walls, capped by boulder clay, alternate with banks that show till only down to high-water mark. The surface of the country, extending back from the sides of the river-trough, has the same plateau-like character stretching away as far as the eye can see, as an almost level, moss-covered plain, with only a sparse growth of stunted trees.

The limestones show gentle undulations, but are, broadly speaking, nearly flat, with a slope northerly corresponding closely with the descent of the river. A small collection of fossils, determined by Dr. Whiteaves, is referred to more at length on another page. They serve to satisfactorily fix the position of these beds as Silurian, and of about the age of the Niagara.

At a projecting point on the south-east bank, twenty-six miles from the mouth, an entirely different set of rocks is brought to the surface in the form of a double anticlinal fold, whose axis strikes south 70° east. These consist of banded green and black slates and calcareous quartzites, the whole very hard and baked looking. No actual contact with the overlying dolomites or limestones is seen, so that it is not possible to say with certainty whether or not the two sets are conformable. It seems very probable, however, that the upper beds, that gradually merge upwards from a calcareous quartzite into a highly siliceous limestone, underlie conformably the lowest stratum of limestone. No fossils were found in these beds. The ribboned character of the slates, their bright colouration, and the occurrence in them of streaks of more highly calcareous pebble-like pieces that are very suggestive of broken limestone bands, give to them a most striking appearance, and would make their recognition, if exposed at any other place on the river, almost a certainty. It was considered at the time that these might represent a part of the Nastapoka series noted by Mr. Dowling about thirty miles to the east, on Sutton Mill lake. There does not seem, however, to be a sufficient similarity between these beds and those described by Mr. Dowling to warrant this correlation. Below this point, and down nearly to the mouth of the river, the limestones and dolomites, for the most part a repetition of the same beds lying in low undulations, are almost continuously exposed, forming low cliffs, overlain by a thick mantle of boulder clay. The river along this part of its course is about thirty chains wide, with many expansions three-quarters of a mile or more in width, and dotted with islands.

The Mattawa and Mishamattawa

The Mattawa, a river of considerable volume, by which there is an Indian canoe route to the Ekwan river, comes in from the east twenty-four miles from the mouth, and ten miles farther down the Mishamattawa, or Big Mattawa, flows in from the west. This stream is used by the Indians as an inland canoe route to the mouth of the Severn, which is reached by ascending the stream almost to its head and crossing thence to the Shagamu, which flows into the west shore of Hudson bay about a day and a half's journey below the Severn.

For the last twenty-five miles of its course before reaching the shores of the bay, the river has an average width of about three-quarters of a mile, but expands to over a mile at many places. An almost continuous line of islands divides it into a number of channels all along this part of its course. For the last twelve miles above the sea these islands are generally low, and clothed only with grasses and low bushes, but varied by occasional more elevated ones that support groves of balsam poplar of good size. Above this the islands are mostly masses of till that have resisted the wear of the current; they are higher and generally well-wooded with large white spruce, that attain diameters as great as two feet, and are tall and straight.

The current is swift for the whole distance from Webikwei lake to the mouth, a distance of 240 miles, though across the boulder clay area, and through the limestones, the descent is comparatively uniform. Though there is water enough all along for tracking canoes, a channel suitable for larger boats could only be found by following a very tortuous course, and by frequently crossing from side to side, where the flat limestone ledges, approaching the surface, form almost continuous barriers across the current, with perhaps only one break where the water has any considerable depth.

Characteristics of River Bed

This even slope is characteristic of all the rivers flowing from the great central Archæan plateau downward to the west coasts of Hudson and James bays, after they have passed the more elevated Archæan country and reached the gently sloping till-covered area. The Albany, the Attawapiskat, and the Severn rivers are other examples of this. The absence of any valley might be interpreted to mean that the river, in its present form, is very recent. It must be borne in mind, however, that evidence of a considerable age is afforded by the gorge in the limestones where the river flows in a channel cut down at least forty feet into the flat-lying strata, and all along in its passage through the sedimentary belt its pre-glacial age is indicated by the cliffs of limestone that appear alternately on the one side and on the other, with boulder clay forming the banks in the intervening spaces, constituting what is practically a broad, shallow, partly till-filled gorge all the way.

It seems evident, then, that through the boulder clay area, until the limestones are reached, the present channel does not necessarily represent an older valley, but that below, through the limestones, the river has resumed possession of an older, pre-glacial channel.

Approaching the mouth the banks become lower, and for the last few miles are not generally more than about fifteen feet high, and are composed of stratified clays and sands. Bordering each side of the river at the estuary, and extending back from the shore of the bay to form a belt from two to five miles in width, a treeless tract four or five feet above ordinary high tides extends away to the east and north, and is probably continuous, almost without interruption, up and down the west shore of the bay. It is a comparatively level plain, intersected, however, by many channels that are filled at high tide with a gravelly and sandy surface sparsely covered by clumps of grass and brightened by many species of sub-Arctic flowering plants. The river has an easterly direction just at its mouth, and the south shore consequently becomes, without change of direction, the coast of the bay; and it is only by the turning away to the north of the opposite shore that the actual mouth of the river can be fixed. At this point the estuary has a width of about three miles. It is generally shallow, large boulders showing above the surface even at high tide, while at low tide bars of sand, gravel and boulders are exposed. The ordinary rise and fall of the tide is only about six feet, but this is sufficient, so flat is the bottom of the bay in this neighbourhood, to expose at low tide wide sand flats extending far out from the actual shore line and dotted with large blocks and boulders, mainly of limestone, that in places are heaped together to form points and low ridges that remain uncovered even at high tide.

The shallow character of the bay was further evidenced, when the mouth was visited in August, 1903, by the barrier of pack ice that formed a continuous line across the estuary, about five miles off shore. The small sailing vessel used by the Hudson's Bay

Company for the transport of supplies from the post at the mouth of the Severn river to the Winisk river is forced, by the shallow water off the mouth, to make a long circuit, following the channel of the river from far out in the bay.

The length of the Winisk actually traversed, from Misamikwash lake to the mouth, is 365 miles. As it is a river of considerable volume at the upper point reached, it may be confidently stated that its total length is well over 400 miles.

Its volume was estimated to be about 25,000 cubic feet per second in midsummer at a point twenty-five miles above the bay.

To avoid the difficult navigation of the west coast of Hudson bay, the Indians have well-known routes both east and west from the Winisk, the western leading to the Severn river by a stream called the Mishamattawa, which enters the Winisk six miles from the mouth. From near the head waters of this stream the Shagamu river is reached by a portage route, and that stream is descended to the coast, which is reached at a point about a day and a half's journey from the mouth of the Severn river. The eastern route leaves the Winisk eleven miles from the mouth by its tributary, the Shamattawa. This stream is ascended to a large lake on its course, and one of the tributaries entering the lake is utilized to reach a stream flowing in to the Ekwan river by which the western side of James bay is reached. By this route the hazardous journey for canoes along the exposed west coast and around the point of Cape Henrietta Maria is avoided.

The Attawapiskat River

The Attawapiskat river was examined to the main forks twenty miles above Lansdowne lake, and its southern branch, the Kanuchuan, for 135 miles farther, where it overlaps the foot of Lake St. Joseph at a distance of about fifteen miles to the north.

A micrometer survey was made of the greater part of this distance, connecting at one end with Lake St. Joseph and at the other with Fort Hope post on Eabemet lake.

The Attawapiskat watershed was first reached at Wimbobika and Kapichegima lakes, lying about twelve miles to the north-west of the north-easterly end of Lake St. Joseph. The upward continuation of the river is represented by two large brooks flowing in from the west, and one, known as the Rice-stalk river, from the north. The latter affords a canoe route to Cat lake. This has been traversed by Mr. Jabez Williams, of the Hudson's Bay Company, who reports that biotite gneisses only are exposed along the route.

These lakes, both long, narrow and trending about east, parallel to the prevailing strike of the gneisses in that vicinity, are separated by a low ridge of chloritic, feldspathic hornblende-schists that occur in a belt, at this point not more than three-quarters of a mile wide. The westerly extension of this belt was not traced, but it probably does not reach the shores of Lake St. Joseph, as it appears to be tapering in this direction. Easterly it was traced pretty continuously, as the stream valley has been excavated in these rocks practically all down its course.

The outlets of these two lakes unite a few miles below to form the small river known to the Indians as the Kawinogans, or No-Pikerel river. For twenty-five miles below the junction the river has a width of only from one to two chains, and is swift flowing and broken by numerous rapids. At frequent intervals exposures of chloritic and feldspathic schists outcrop, striking both to the north and south of east, or parallel to the general course of the river valley.

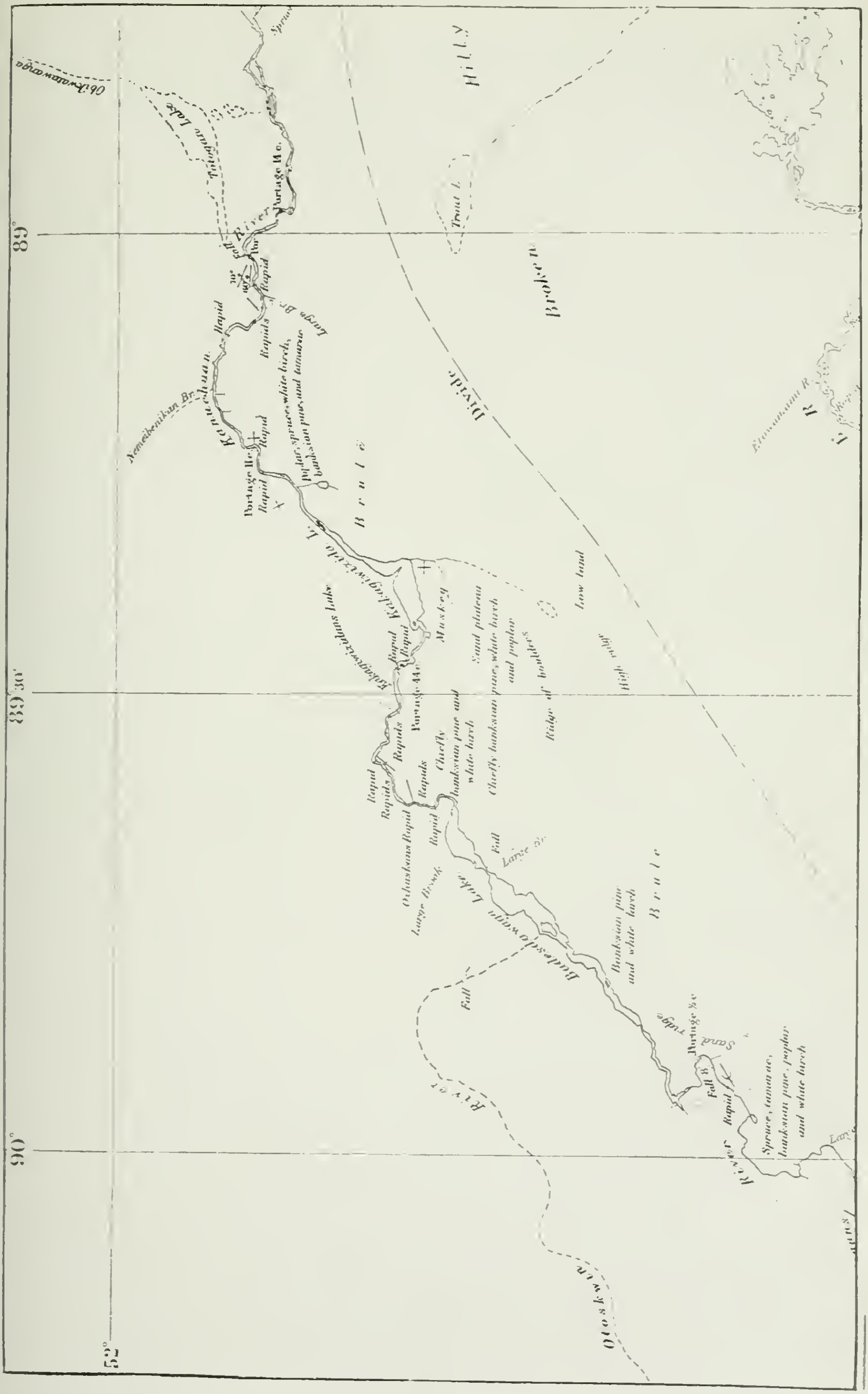
Associated with the schists are more or less schistose diorites, and massive pyritous quartz diorites. At the edge of the belt is a strip of hornblende granite gneiss similar to the biotite gneiss, excepting that in it the biotite has been replaced by hornblende.

The trend of the belt of basic rocks would carry it to the south of the long narrow lake called by the Indians Kagabades-dawaga. Excursions inland from the south shore of this lake revealed no outcrops, and as no further exposures of these rocks were seen on the river, the belt probably terminates in this direction not far east of the head of the lake. Along the lake shores ledges of rock were seen at only one point, where obscurely foliated biotite gneisses are cut by a later granite of medium grain.

Stratified fine white quartz sand, underlain by blue clay and overlain by gravel, forms banks from ten to thirty feet in height all along both sides of the lake.

Among the beach pebbles, which occur in great variety, are included dolomites and fossiliferous limestones, as well as many large semi-angular blocks, indicating that the underlying clay is probably a till.

Where the banks are low, and fresh sections are afforded by the work of the waves, a layer of peat from two to three feet thick overlies the clay. From the south shore of the lake a rolling, sandy-covered slope, the surface coated with white moss, and supporting an open growth of jackpine, white birch and spruce, gradually rises to the summit of a ridge two hundred feet or more above the river. Along the side of the ridge, which is



Kanuchuan River above Ozhiski Lake.

entirely of drift material, are numerous cirque-like depressions sixty to ninety feet deep, with steeply-sloping sides, and in a few cases holding up small ponds of water. The opposite or south-east side of the ridge falls away abruptly, at as steep an angle as the sand will assume, to another rolling sandy plateau that extends for miles to the south-east.

The Otosk or Elbow river, probably the longest of the various branches of the Attawapiskat, as it heads near the north-east end of Cat lake, flows into the lake from the north-west, about half-way down its northern side.

Kakawizida and Ozhiski

Eleven miles below, after flowing in an easterly direction past a number of rapids, with occasional outcrops of biotite granite-gneiss, the river expands to form Kakawizida lake, a shallow body of water ten miles in length and a mile wide. The same rolling, sandy plain, with extensive tracts of muskeg where it approaches the south shore, surrounds the lake. Beyond the muskeg area, which extends for two miles or more back from the lake, the land gradually rises to about a hundred feet, where glacially planed surfaces of gneiss, coarse and obscurely foliated, outcrop through the drift covering. Beyond, the sandy flat gradually gains in elevation southwards for five or six miles, and then rises sharply to form a ridge of gravel and boulders 300 feet above the lake, only a few feet wide at the summit, and falling away abruptly to the south and east to a well-wooded valley. An open forest of banksian pine covers the whole of the sand plateau.

From the summit of the ridge described others are seen, apparently of similar character and with the same general east and west trend. Twenty-nine miles farther down the river, which still keeps an easterly direction, Ozhiski or Mud lake occupies a shallow trough, twenty-one miles long and a little over two miles wide at the broadest part. Shelving ledges of biotite granite gneiss, lying nearly horizontal, or gently undulating, occur at many points along the shores. The country traversed by the river for the last fifty miles above the lake is characterized by very heavy deposits of drift, mostly stratified and often from fifty to sixty feet in thickness. Where sections are exposed along the river or lake shores by the wear of the water, the greatest thickness is seen to be occupied by very fine, white quartz sand and siliceous clay, underlain by a tough blue clay, in fine laminations, and overlain by irregularly distributed deposits of coarse sand and gravel. Underneath the whole, and resting immediately upon the bed-rock, are deposits of till of unequal thickness, that at no place are exposed in section.

Occasional lenticular layers of indurated calcareous material, one to two inches in thickness, holding approximately 59 per cent. of calcium carbonate, occur in the siliceous clays. Two specimens of the clay were examined by Dr. Hoffmann, one from the neighbourhood of Ozhiski lake and one from higher up to Kanuchuan river. Differing only in the proportion of their lime content, they are described as slightly ferruginous, feebly plastic, readily fusible clays, holding a large quantity of siliceous grit and containing from 27 to 30 per cent. of calcium carbonate. In combination with the vegetable mould of the surface these clays should form a soil very suitable for general agriculture, though they are evidently not of value for industrial use as clays.

Flowing out from the north side of Ozhiski lake the river continues northerly for fifteen miles, with many heavy rapids and a high average rate of flow, to an elbow, where it changes the direction of its course sharply to the east.

The Pineimuta Branch

Ledges of well foliated, banded, biotite granite-gneiss protrude through the drift mantle at frequent intervals along the river valley, generally lying at low angles, but in places very much contorted and crumpled. The prevailing strike is about north-east. The Pineimuta, or north branch of the Attawapiskat, comes in from the west just at the elbow. Though somewhat smaller than the south branch, this is a river of considerable volume. For the first few miles above the forks it is broad and smooth-flowing, with banks of clay and sand, and is then broken by a high fall, above which it receives a large tributary that drains Totogan lake, lying a short distance to the north of the south branch, above Ozhiski lake. Above this the Indians say that the river takes a very long bend to the north and then south-west, and heads near the sources of the Pipestone branch of the Winisk. From the elbow the river, now nearly doubled in volume, flows easterly for twenty miles into the long south-westerly bay of Lansdowne lake. It is a succession of lake expansions, with connecting rapids, which, though they are rough, can all be run by loaded canoes. Kabania, eleven miles long and generally quite narrow, is the largest of these lakes. The land about the lake is low and drift-covered, nearly horizontal, but contorted ledges of banded, biotite gneiss, with glaciated surfaces show at intervals.

Lansdowne lake, and the lower Attawapiskat river to James bay, have been described by Dr. Bell in his report, published in 1887.

Routes Between the Attawapiskat and Winisk Rivers

The tract of country lying between the Attawapiskat and Winisk rivers was crossed by three canoe routes, two starting from Lansdowne lake and one from the Attawapiskat river, ten miles above the lake, and striking the Winisk at Weibikwei lake, between Wapikopa lake and Kanuchuan lake, and at Nibinamik lake respectively. The first-named route leaves the extreme north-easterly bay of the lake, and reaches the height-of-land by way of a small, boulder-strewn brook, flowing through low land, with occasional gravel and boulder ridges of moderate height. After crossing the divide the route follows the course of the Wapitotem river, through numerous lakes, down to the south bay of Weibikwei lake. For the whole distance the country is characterized by drift ridges, rising from seventy to one hundred feet above the general level, with areas of muskeg and low, sand-covered flats occupying the intervening valleys. For the first thirteen miles north of Lansdowne lake no exposures of rock *in situ* are seen, the drift cover hiding completely the underlying rock. A low ridge of slightly schistose, hard, chloritic diorite, specked with iron-pyrites and striking east and west, is the first outcrop observed. The width of the band of which it forms a part cannot be determined even approximately, as to the north the first rock outcropping through the drift occurs on Mistassin lake, six miles farther on, and to the south the nearest is on Lansdowne lake, nineteen miles away. These, in both cases, are biotite gneisses, the last being the first of a series of exposures that occur at intervals all the way down the stream to Weibikwei lake. The trend is in a general way about east and west though satisfactory strikes are seldom seen owing to the contorted character of the strata, due principally to pegmatite invasions where the foliation is plain, or to obscure foliation.

The prevailing type of rock is a hard, reddish, banded, biotite gneiss, lying nearly horizontal, stratiform in appearance and cut by irregular masses and veins of coarse white pegmatite. The distance across by this route is sixty-five miles, and for the whole distance the country, excepting a few, low, muskeg areas, has been repeatedly swept by forest fires, so that many of the ridges show surfaces of bare boulders and gravel, and others a second growth of banksian pine, white birch, aspen poplar, spruce and tamarack. In the muskeg tracts only spruce and tamarack grow, and the trunks do not attain a size to be of industrial value.

Low, rounded bosses of biotite gneiss, varying from very coarse to quite fine, and containing a large proportion of biotite, are exposed at intervals to beyond Sagaminnis lake. The prevailing strike is a little west of south. At the north-east end of a long portage between two small lakes, lying about midway in the series, one of these low bosses is composed of interbanded fine quartzose gneiss and hornblende schist, the fine gneiss resembling a finely micaceous, schistose quartzite, and the whole striking in conformity to the foliation of the gneisses that are exposed at no great distance on either side. The strata are much shattered and seamed with quartz veins containing iron sulphide. This is probably an offshoot from, or continuation of, the belt to be next referred to.

Crossing another divide the route continues to Nibinamik lake, through numerous small lakes occurring along the course of a small tributary flowing north-westerly into the most southerly bay of the lake. The stream valley follows the trend of a belt of basic rocks from one to two miles wide, and traced in a compound curve northerly, north-westerly, and north-easterly for twelve miles.

Hypersthene Gabbro

Chloritic and hornblende schists, associated with highly altered and sheared quartz diorites, are the prevailing rocks at the lower end of the belt. Farther north on the band more massive, hard diorites, and coarse diabases altered in places to obscurely schistose chloritic rocks occur with the schists, all striking parallel to the longitudinal axis of the belt. At intervals for a distance of more than two miles massive ledges of hypersthene gabbro, similar to the Sudbury nickel-bearing irruptive, whose relations to the other rock masses were not clearly seen, but which occur at or near the western edge of the belt, are associated with a massive hard, dark-green diabase.

The belt, striking north-easterly, passes just to the east of Nibinamik lake, and should cross the Winisk river a few miles below the foot of the lake. Owing to the continuous drift covering no exposures of rock in situ were seen along this section of the river.

The most westerly route traversed ascends the Pusabiwan river, a tributary entering the Attawapiskat from the north at the foot of Kabania lake. For the first few miles to the north of the river no exposures of hard rock are seen, the surface consisting of rolling hills of sand and clay. Beyond, though the country is for the most part drift covered, numerous outcrops of biotite gneiss, flat-lying or gently undulating, are seen along the river and lake shores to the height-of-land separating these waters from those of the Michikenopik brook flowing into the south end of Weibikwei lake. Northerly from here the route follows a series of small lakes lying near the heads of streams flowing north-easterly into the Winisk for a distance of twenty miles. Large areas of muskeg, and low sandy flats occupy the greater part of the area traversed, diversified only by sand, gravel, and boulder ridges, that nowhere rise to elevations of more than eighty or ninety feet above the general level.

The second route, leaving the north-westerly bay of Lansdowne lake by a portage over a low ridge of unassorted sand, gravel and boulders, ascends a small brook through a series of lakes situated along its course, for a distance of eight miles, to a divide between the Attawapiskat and Winisk watersheds.

Occasional outcrops of biotite granite-gneiss lying at low angles are seen to within about three miles of the height-of-land, beyond which, after a short interval completely drift covered, exposures of massive diorite, and hornblendic and chloritic schist are seen, for a distance of about four miles. These, without doubt, are extensions westerly of the belt of these rocks described in connection with the first route as crossing a short distance to the north of Attawapiskat lake.

Continuing north the route follows a small stream downwards to Mameigwess lake, a body of water covering a considerable area, but of very irregular outline, and broken by many islands and long points.

Biotite gneisses are the only outcrops that show through the drift deposits covering the greater part of the surface. From the foot of Mameigwess the route follows a number of small lakes to a small stream, which it descends to a southerly channel of the Winisk river, fifteen miles below Wapikopa lake. Biotite gneisses only are exposed all the way through to the main river.

Routes Between the Winisk River and Trout Lake

Two canoe routes between the upper waters of the Winisk and Severn rivers were explored. The most westerly of these leaves the Winisk at Misamikwash lake, and the other at the first northerly expansion above Nibinamik lake.

Descending a small outlet that flows through a boulder-choked channel from the north-easterly bay of the lake, the first-mentioned route follows this stream—that by the addition of tributary brooks gradually becomes a river of considerable volume—northwards for fifty miles to a small lake known on the old maps as Sturgeon lake. For this distance the channel has a steep gradient, and the route is impeded by frequent rapids. Several lakes occur along its course, the largest, ten miles long and a mile and a half wide, lying not more than two miles to the north of Misamikwash lake. The country is generally low and drift covered, with only occasional exposures, all, excepting a few isolated outcrops of hornblende schist near Kingfisher lake, of biotite granite-gneiss.

From Sturgeon lake, a small tributary from the west, draining a chain of small lakes with connecting rapids, is ascended for thirteen miles to the divide. The rapids are many of them rough, and all are shallow, so that the stream is navigable with difficulty even by light canoes. The obstructions are caused by erratics that have been washed out from boulder and gravel ridges that cross the stream at frequent intervals. From the divide, Nemeigusabins lake and its outlet, a small stream with many rapids, lead to the south-east corner of Trout lake. The shores of Trout lake in the vicinity of the mouth of Nemeigusabins brook and for eight miles or more westerly are generally low and boulder strewn, the land back from the lake rising gradually over morainic ridges of gravel and sand. Occasional outcrops of banded biotite gneiss, well foliated and lying horizontally, or gently undulating, occur here and there in low, rounded exposures near the lake shores. Most of the country seen near the lake has been burnt over, and the present forest, over all but very wet muskeg areas, is a second growth of small size.

Avoiding the shallow streams between Sturgeon and Trout lakes an alternative route follows an almost direct line through nine small lakes or ponds, connected by ten portages aggregating a little over five miles and a half in length.

The section traversed is a nearly flat, sand-covered plain, with occasional low, drift ridges and extensive areas of muskeg.

The second route referred to follows the west branch of the Winisk down stream from Sturgeon lake for thirty-three miles in an easterly and then southerly direction, to a small lake, where the river changes its course to a northerly direction.

The country traversed by the river is similar to that crossed by the main Winisk in one of its most striking features, namely, the occurrence of parallel glacial ridges that deflect the course of the channel and of the lakes to a series of zig-zags conforming to the trend of the glaciation. The country is, however, more level and not so well drained as that bordering the main river; the proportion of swampy land is larger and the forest growth consists largely of black spruce and tamarack.

Leaving the west branch a short divide is crossed, and a stream, flowing south-westerly, probably into one of the northern bays of Wunnummin lake, is ascended in a south-easterly direction through an almost continuous chain of lakes, with short rapid intervals of river joining them, for twenty-one miles, to a minor divide separating the headwaters of this stream from another small river flowing south-easterly to the Winisk above Nibinamik lake, a distance of thirty-six miles. The country is of the same general character, and the lakes, and to some extent the river channel, show the same parallelism to the glaciation, due as before to the ridges of transported boulders and gravel.

The covering of drift material is so universal, and the relief so small, that the underlying rocks can seldom be determined. Wherever outcrops occur they are biotite granite gneisses, so that if the Wunnummin lake belt of conglomerates and schists extends to this distance easterly, as would seem probable, they are entirely concealed by surface deposits, and cross the route at one of the long intervals without exposures.

Route Between the Albany and Attawapiskat Rivers[33a]

The route principally used between the Albany and Attawapiskat rivers leaves the former river at Eabemet lake and reaches the latter at Lansdowne lake, traversing a distance of seventy-five miles. The first thirty miles from the Albany through Eabemet, Rib and Kenozhe lakes to Machawaian lake was traversed by Dr. Bell in 1886, and has been described by him in his report on "An Exploration of Portions of the Attawapiskat and Albany Rivers," published by the Geological Survey in 1887. The belt of diorites and felsitic, chloritic, and hornblende schists that crosses the Albany river at Petawanga lake crosses this route just north of Eabemet lake, in a band about nine miles wide, running N. 70° E. For the balance of the distance to Lansdowne lake, wherever outcrops are seen they are of biotite granite-gneiss of medium grain, striking about east and west, and banded fine black biotite gneiss cut by a coarse gneiss that encloses blocks of the finer.

From the north-westerly bay of Machawaian lake the divide between the Attawapiskat and Albany waters is crossed, at a distance of two miles to the north of the lake, by a portage seventy-four chains in length, traversing a muskeg with occasional ridges of transported gravel and boulders.

Manitush lake, two miles long, lying at the north end of the portage, discharges northerly by a small stream, barely navigable by canoes, into Marten Drinking river, which the route follows through Hail lake to Wintawanan lake, from which there is a route westerly through an intervening small lake to the south branch of the Attawapiskat river at Ozhiski lake. The Marten Drinking river, rather shallow and with a number of rapids along its course, is nevertheless navigable by canoes down to its mouth at one of the southerly bays of Lansdowne lake. The country between the two rivers in the neighbourhood of the route is a high, rolling plateau, rising, midway, about a thousand feet above the sea, or a hundred feet above the Albany at the point of departure. Large areas of muskeg abound, from which rise low, rounded bosses of gneiss, and ridges of sand, gravel, and boulders.

To the west of Machawaian lake the country is much more broken and rises to higher elevations. This more elevated region extends in a belt westerly past Trout and Cedar lakes, and without doubt continues still farther west, forming the height-of-land between the Albany and the south branch of the Attawapiskat. This country is referred to in the description of the route down the Kanuchuan river on a previous page, where the hills are stated to be composed of transported material to their summits.

Cultivation of the Land

In the matter of the actual cultivation of these northern areas we have little to go upon. At the Hudson's Bay Company's posts at Fort Hope and Osnaburgh potatoes have been grown, and small gardens maintained from the time of the establishment of the posts, and little difficulty has been experienced in maturing the common garden vegetables of Ontario, though occasionally the frosts of late summer have cut off all but the hardier kinds. As the posts were located with a view to their favourable situation for the purposes of the fur trade with the Indians, neither one is situated on ground well suited for cultivation, and much better results might reasonably be expected were trials made on more favourably situated tracts.

An Indian cultivating a small garden plot at the head of the Pineimuta branch of the Attawapiskat river succeeds in raising good crops of potatoes and turnips.

Fish

Whitefish and sturgeon are the best food fishes, and occur in most of the lakes. Both are taken in nets, and the latter also by spearing from scaffolds built out over rapids in the rivers. Doré and pike are also generally distributed over the whole area,

33a. See maps, pages 68 and 72.

and form an important source of food supply, though the sucker among the fishes, like the rabbit among the mammals, holds the most important place, as it can be caught everywhere, not only in the larger lakes but also in the smaller ponds and streams.

Brook trout were actually caught only in the Winisk river near its mouth, and in the streams running into the Albany river, but were seen in the rapids below Weibikwei; the Indians assert that they occur also in the lake itself.

Lake trout were caught in large numbers in Trout lake at the head of the Severn river, but are not found in either the Winisk or Attawapiskat waters.

Wild Animals

The moose (*Alces americanus*) has been found as far north as the southern shore of Weibikwei lake, in N. lat. 52° 50′, though tracks were actually seen during our exploration only as far north as the Attawapiskat river. Even here it is not nearly so plentiful as farther south in the belt of country lying near the Canadian Pacific railway and extending for about 150 miles north of it.

Caribou (*Rangifer caribou*) range all over the district.

No red deer are found anywhere throughout the region.

The fur-bearing animals, though not so plentiful as they once were, are still fairly abundant throughout the district; the otter and the beaver from long-continued trapping are less numerous, perhaps, than any other species.

Bears (*Ursus americanus*) seem to be able to hold their own pretty well, and are still taken in good numbers. There is probably but one species of the common black bear, though the Indians and traders differentiate from this the brown bear, which they claim differs from the black, not only in colour and size, but also in disposition and habits.

Wolves (*Canis lupus*), though scarce, are not unknown.

Foxes (*Vulpes vulgaris*), including the red, silver, black and cross varieties, are numerous, though they vary in numbers with the periodic increase and decrease in the the numbers of the hares.

Lynxes (*Lynx canadensis*) are fairly plentiful.

Otters (*Lutra canadensis*), and Pine martens (*Mustela americana*), are taken in good numbers, and beavers (*Castor fiber*) occur more sparingly.

Minks (*Putoris vison*), and muskrats (*Fiber zibethicus*), are plentiful. These with skunks (*Mephitis mephitica*), weasels (*Putorius vulgaris*), and wolverines (*Gulo luscus*), make up the number of the merchantable furs.

The rabbit (*Lepus americanus*) occurs abundantly all over the district, and is, perhaps, the most useful of all to the Indians, as it affords, during the winter particularly, both food and clothing.

That the raccoon occasionally strays as far north as N. lat. 52° is shown by the fact of one being taken by an Indian woman on the upper Attawapiskat river in 1903.

Indians

The Indians of the district, numbering about 700, are nomadic trappers, living principally upon fish, and obtaining from the Hudson's Bay Company, and to a smaller degree from other fur traders, the limited amount of necessaries that are not supplied by the country. A few have small huts built of logs, with fireplaces and chimneys of wattles and mud, in which they live for a part of the year, but the greater number content themselves with winter teepees constructed of poles covered with sheets of birch bark, and summer tents of cotton; indeed, house building is such an arduous task for the Indian that the traders in the district have a saying to the effect that as soon as an Indian completes a house he dies, this result being due, not to the unwonted labour involved, but to the arrival of extreme old age before the work is finished.

They are of the Ojibway tribe, though mixed to a certain extent with the Crees of the Hudson Bay basin, the purest Ojibway stock being found among the bands about the heads of the rivers. They seem to be men of larger frame than the Crees of the coast.

A greater proportion of nominal Christians are found among these Indians of the far interior than among those nearer the front, in the hinterland of Ontario. This result is due in about equal measure to the efforts of the Roman Catholic church, which maintains a permanent mission establishment at Albany, with an educational home for children, and sends visiting missionary priests periodically among the Indians of the interior; and to the Anglican church, which maintains the missionary diocese of Moosonee, by which resident missionaries are supported at various points in the interior region.

The Indians seem to accept readily the forms of Christian worship, and take great pride in their proficiency in memorizing the religious formulas presented to them.

The mode of life followed by these Indians offers great obstacles to the work of the missionaries, who are able to reach them for purposes of instruction for only short periods during each year.

For the same reason, that is on account of their nomadic life, the teaching of the children can be carried on only in the same desultory way.

Notwithstanding these disadvantages, practically all the Indians can read and write the syllabic characters designed and introduced by James Evans, an early Wesleyan missionary among the Crees.

The introduction of this system of writing has proved a great boon to the Indians in their intercourse with one another. Written entirely phonetically it is unhampered by irregularities, and can be readily acquired by one Indian from another. So general is their knowledge of this sign language that every Indian camping-place, and every point where canoe routes diverge, become local post offices, where letters written on birch bark, often, of course, containing only an account of trivial occurrences, but giving the opportunity to convey news of importance, are left for the information of following parties.

Photo by W. McInnes

Winisk river Indians near Asheway.

It is very doubtful whether the Indian has advanced much in general prosperity from the days when he lived in primitive savagery. His teepee was the same then as now; his weapons are now more effective, but game is less plentiful; he wears better clothes, or clothes that one associates with civilization, but not probably so well adapted to his needs and way of living as his old raiment of skins. Even now he has to fall back upon rabbit skins, the only furs that he can afford to sacrifice to his personal use, for protection in winter. The skins are cut into strips, each skin, by being cut spirally, producing a continuous strip. These strips are sewn together at the ends, and twisted into ropes, which are woven loosely into blankets and rough coats that very effectually keep out the most extreme cold.

Fish are taken with net and spear, and in trap-weirs. These are constructed of spruce poles driven in a line into the bottom of streams, and interwoven with twigs so as to fence off the greater part of the water, and force it to run in volume only through a gate arranged so that the water flowing through the opening quickly drops away through the interstices of a platform of poles, leaving stranded all fish coming down with the current. One or two families will often camp by the side of one of these " mechiken " for weeks at a time, supplying their wants entirely from the stranded fish, and smoke-drying any surplus collected. This is accomplished by simply stringing the split fish on poles and hanging them in the smoke-laden atmosphere of the teepee. The fat dropping from the fish in drying is carefully collected and preserved for future use in bags made of the skins of embryo rabbits, the bladders of pike, or in similar receptacles ingeniously improvised from the materials at hand.

Wild rice, a staple among the Indians farther south, is too rarely met with throughout these northern regions to form any part of the Indian's food supply, and to supplement his diet of fish and flesh he has only the various berries in their seasons and the small amount of flour that he is able to buy from the trader in exchange for his surplus furs. For tea, when the imported article is not available, the small twigs of the trailing red cedar are used.

Taken as a whole, they appear to be a fairly healthy lot, though many suffer from diseases of the skin brought on probably by a too constant diet of fish. The greatest

Photo by W. McInnes.

Lower Winisk river, showing banks of Silurian Limestone and characteristic Forest.

mortality is caused by pulmonary diseases, to which they are very prone, and to the occasional outbreak of epidemics of measles, etc., that sometimes prove widely fatal. They are far from cleanly in their personal habits, a few weeks' residence at a place in the summer time generally rendering it no longer habitable by reason of the accumulated filth.

With the exception of occasional small log huts, the Indians of the region dwell in teepees covered with birch bark, though the cotton tent, made from materials bought from the traders, is now widely used during the summer months. Near the mouth of the Winisk river, many miles north of the ranges of white birches, a winter teepee, made after the plan generally used for birch bark wigwams, was covered with blocks of moss cut from the muskeg.

Archaeology

Chipped flints were found in numbers scattered along the beach of an island in Attawapiskat lake. Two fairly perfect arrowheads were found at the same place, one chipped from white quartz and the other from flint, derived apparently directly from the drift, where it occurs as small boulders which have been carried primarily from the nodular beds in the limestones of the Hudson Bay basin.

At camping-places of the Indians broken specimens of *Pecten islandicus* were noticed among the debris of the camps. These shells occur in a very perfect state of preservation in the marine clay, and are still used by the Indians along the river as very convenient substitutes for spoons.

Forests

The average size of the trees growing within the country explored is not great. On exceptionally favourable tracts the spruces attain sizes quite large enough for commercial use as sawn lumber, and large areas would afford good pulpwood. Evidences of the constant recurrence of forest fires over the area are everywhere plainly seen. The brulé areas, varying from quite small patches to large tracts, are of every age; some are so old the forest has attained the full height of the old growth and the newer age of the trees can only be ascertained by a reference to their rings of growth, and others so recent that no vegetation covers the blackened surface. These fires are generally the result of the carelessness of Indian travellers, but may sometimes be traced to the igniting of a dry, standing tree-trunk by lightning. The oldest trees found in the whole area were growing on a till-covered island, about fifty miles from the mouth of the Winisk river. The complete isolation from the mainland by broad channels ensured its protection from fires having their origin outside its own borders. The spruces growing here were found by their rings of growth to be between 270 and 280 years old. The diameters and ages of trees, growing in a number of different localities throughout the region, were noted, and are given in the list below:—

—				Diameter in inches three feet from ground.	Age, by rings of growth.
Tamarack,	Winisk river,	32 miles from mouth	....	9	100
Black spruce	"	32 "	....	12	125
"	"	32 "	....	12	153
"	"	32 "	....	8	75
"	"	50 "	....	10	275
"	"	65 "	near bank.	8	130
"	"	65 "	"	6	115
"	"	65 "	10 chains back	3	105
Tamarack	"	65 "	"	3	80
Black spruce	"	below Wapikopa lake	....	10	130
"	"	Wapikopa lake	....	9	145
"	"	"	....	6	135
"	"	Nibinamik lake	....	9	75
"	"	"	....	5	75
"	"	above Nibinamik lake	....	15	130
Aspen poplar	"	" "	....	15	130

The rings show that the growth is generally rapid for the period between five and thirty years, and afterwards exceedingly slow.

The northern limit of a number of the common trees of northern Canada falls within the district, and of one species both the northern and southern limits.

There is a black birch that the Indians call the squirrel-bark birch. Specimens of the wood and foliage of this tree were submitted to Professor John Macoun, by whom they were forwarded to Dr. Sargent, of the Arnold Arboretum, for determination. Dr. Sargent has named this birch *Betula fontinalis.* It was not seen growing in abundance anywhere in the district, though occasional trees were noted at various points between the Albany and Winisk rivers, the most southerly occurrence being in N. lat. 51° 28′, on Dog-hole brook, flowing into Lake St. Joseph, and the most northerly in N. lat. 52° 40′, on the Wapitotem river, flowing into Weibikwei lake, on the Winisk river. The largest tree noticed had a diameter of six inches at three feet from the ground, and a height of about thirty feet. Where seen it was growing near the banks of rivers or lakes, in moist localities. A table is subjoined of the observed northern limits of a number of species.

Northern Limits of Trees

White elm, *Ulmus americana*, Albany river	N. lat.	51° 30′
Black ash, *Fraxinus sambucifolia*, Eabemet lake	"	51° 50′
Mountain maple, *Acer spicatum*, between Attawapiskat and Winisk rivers	"	52° 25′
Mountain ash, *Pyrus americana*, between Attawapiskat and Winisk rivers	"	52° 38′
Banksian pine, *Pinus banksiana*, Weibikwei lake	"	53°
White cedar, *Thuja occidentalis*, Weibikwei lake	"	53° 05′
Balsam spruce, *Abies balsamea*, Winisk river	"	54° 15′
Canoe birch, *Betula papyracea*, Winisk river	"	54° 25′
Aspen poplar, *Populus tremuloides*, Winisk river	"	54° 45′

The northern limits of balsam poplar, tamarack, and black and white spruce lie beyond the mouth of the Winisk river, the most northerly point examined.

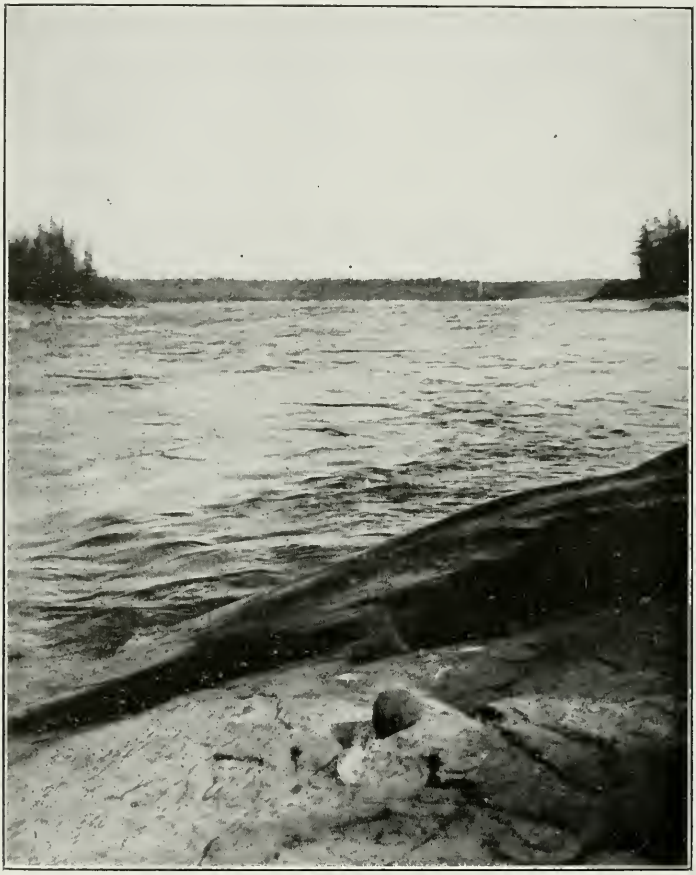


Photo by W. McInnes.

Lower Winisk river.

Climate

The climate, as would be expected in these latitudes, and in a wilderness country approximately a thousand feet above sea-level, is somewhat severe. The summer temperature, though on occasional days rising as high as 85° Fahr., averages very much lower, and the nights are, practically, always cool. Frosty nights often continue into the early summer, and recur again in the autumn before most grain-crops would be ready for harvesting. Temperatures were taken with the thermometer during two seasons, and these, averaged, gave the following results for the months of July and August on the lower Winisk river, and for July, August and part of September on the upper Winisk and upper Attawapiskat rivers:—

	6 a.m.	noon.	6 p.m.
Lower Winisk river	57°	69°	57°
Upper Winisk and Attawapiskat rivers	47°·5	61°·6	58°

The only points in the region where any attempts at cultivation of the land are made are the two Hudson's Bay Company's posts at Osnaburgh, near the foot of Lake St. St. Joseph, and at Fort Hope, on Eabemet lake.

At these posts small kitchen gardens and potato-fields are maintained with some success, though neither place is favourably situated for the purpose, the soil in both cases consisting of an almost pure sand. Timothy and clover grow luxuriantly, and all the common garden vegetables thrive at both places. Indian corn, however, is not sufficiently filled out for table use when caught by the frost. Barley has been successfully grown at Osnaburgh, and the potato crop, wherever a suitable tract of land has been utilized, has been generally fairly good at both places.

The first killing frost in 1903 occurred on the night of September 3, and in 1904 on the night of August 30.

The temperature of the water in a number of the larger lakes and rivers was taken by thermometer at six inches below the surface, and is given in the following very uniform list:—

Water Temperature

Lake St. Joseph, Albany river, June 28	59½°
Annimwash lake, Albany river, July 5	58°
Kagabades-dawaga lake, Attawapiskat river, July 16	62°
Attawapiskat river, August 8	60°
Weibikwei lake, Winisk river, August 9	62°
Nibinamik lake, Winisk river, August 23	58°
Winisk river, August 24	57°

Land Shells

A small collection of land shells, made during the summer of 1904, has been examined by Dr. Whiteaves, who enumerated the following species. It was noted that in actual number of individuals there was a decided and progressive decrease as the latitude increased:—

Vertigo ovata, Say.
Conulus fulvus (Müller).
Zonitoides arboreus (Say).
Vitrea hammonis ? (Ström).
Pyramidula striatella (Anthony).
Succinea vermeta, Say.
Succinea retusa ? Lea.
Succinea ovalis, Gould, non Say.

Freshwater Shells

Collections of the freshwater shells of the region were made each year and submitted to Dr. Whiteaves for determination, who has furnished the subjoined list, which for convenience has been tabulated according to watershed areas:—

List of Freshwater Shells collected by Mr. W. McInnes in 1903-4-5 on the Winisk, Attawapiskat, and Albany Rivers, on the Root and English Rivers, near Lac Seul, and on the Severn River at Trout Lake.

By J. F. Whiteaves.

——	Winisk River.	Attawapiskat River.	Albany River.	English and Root Rivers.	Trout Lake, Severn River.
Lampsilis luteola, (Lamarck)	*	*	*	...	...
Anodonta marginata? Say	*	*	...	...	...
Anodonta fragilis, Lamarck	...	...	...	...	...
Anodonta Kennicottii? Lea	*	*	*	...	...
Sphærium simile, Say	...	*	...	...	...
Sphærium Walkeri, Sterki	...	*	...	...	...
Sphærium emarginatum, Prime	...	*	...	...	...
Sphærium stamineum, Conrad	...	*	...	...	...
Sphærium (Musculium) secure, Prime	...	*	...	...	...
Sphærium (Musculium) partumeium, Say	...	*	...	...	...
Sphærium flavum, (Prime)	...	...	...	*	...
Sphærium rhomboideum, (Say)	...	...	*	...	...
Sphærium striatinum, Lamarck	*	...	...	...	...
Sphærium—	...	...	...	*	...
Pisidium compressum, Prime	*	*	...	...	...
Pisidium altile, Anthony	...	...	...	...	...
Pisidium fallax, var. *errans*, Sterki	...	*	...	...	...
Pisidium variabile, Prime	...	*	*	...	...
Pisidium affine, Sterki	...	*	...	...	...
Pisidium Sargenti, Sterki	...	*	...	...	...
Pisidium Mainense, Sterki	...	...	*	...	...
Pisidium abditum, Haldeman	...	...	*	...	...
Pisidium Roperi, Sterki	...	...	*	...	...
Pisidium politum, Sterki	...	...	...	*	...
Pisidium rotundatum, Prime	...	...	*	...	...
Pisidium pauperculum, var. *crystallense*, Sterki				*	
Pisidium vesiculare, Sterki	...	...	...		...
Pisidium splendidulum, Sterki, var.	...	...	*	...	...
Pisidium scutellatum, Sterki	...	*	*	...	...
Pisidium medianum, Sterki	...	*	...	...	...
Pisidium milium, Held, Small var.	...	...	*	...	...
Pisidium milium, Held, Small var.	...	...	*	...	...
Pisidium sp. nov?	...	*	...	...	...
Pisidium—? (near *P. abditum*)	...	*	...	...	...
Valvata tricarinata, Say	*	*	*	...	...
Valvata sincera, Say	...	*	*	...	...
Amnicola limosa, Say	...	*	*	*	...
Limnæa megasoma, Say	...	...	*	...	...
Limnæa stagnalis, L.	*	*	*	*	*
Limnæa stagnalis, *appressa*	*	*	*	...	...
Limnæa palustris, Müller	*	...	...	...	...
Limnæa catascopium, Say	*	*	*	...	*
Limnæa galbana (Haldeman) Dall.	*	...	...	...	...
Planorbis trivolvis, Say	*	...	...	...	...
Planorbis corpulentus, Say	...	...	...	*	...
Planorbis bicarinatus, Say	*	*	*	...	...
Planorbis companulatus, Say	*	*	*	*	...
Planorbis albus, Müller	*	*	*	...	...
Planorbis hirsutus, Gould	...	...	...	...	...
Segmentina armigera, Say	...	*	...	...	...
Physa heterostropha, Say	*	*	*	*	...
Ancylus parallelus, Haldeman	...	...	...	*	...

REPORT ON A SURVEY OF

THE EKWAN RIVER

and of the Route through

SUTTON MILL LAKES NORTHWARD[34]

By D. B. Dowling

The country included in the angle between Hudson bay and the west shore of James bay is drained by several large streams running mainly to the north-east. Those entering James bay incline to the east after running north-east for a large part of their courses. The whole surface slopes gradually to the north and east, and the greater part of it is covered by a heavy deposit of clay and sand. On the north slope, or that lying south of Hudson bay, proper, the deposit is thicker than on the slope to James bay. On the Fawn river, a branch of the Severn, Mr. Low reports[35] high cut banks of clay near the junction with the Severn, which are as much as two hundred feet above the stream.

In the valley of Sutton Mill lakes there is a heavy cut, such as that mentioned by Mr. Low on the Fawn. The lake is very deep for its width, and the banks, where they are of clay, are 100 feet above the water, while several soundings in the lake give a depth of over 200 feet. The submersion of much of this area has been proven by the presence of salt water shells in the surface deposits.

On the Attawapiskat river, Dr. Bell does not mention such an accumulation of drift, while our own observations on the Ekwan show that the general depth of the drift covering is about 100 feet.

Elevation and Drainage

The recent uplift of the land, as observed by Dr. Bell in several places to the south of this, is as much as 500 feet. At the highest point reached by the marine terraces in the vicinity of Sutton Mill lakes the elevation was determined by simultaneous readings of aneroids at the lake and on the shore of Hudson bay at the mouth of Trout river. The western limit of these clays on the Albany river is below Marten's falls and on the Attawapiskat near the mouth of the Black Fence river. On the Ekwan, the edge of the deposit was not reached, and on the Severn, the marine clays were found on the Fawn branch near the first outcrop of Laurentian rock. At the period of greatest submergence the sea covered a large part of the area under discussion, but it is quite possible that part of the elevated ridge, consisting mostly of Cambrian rocks, in the latitude of Sutton Mill lakes, was either out of water or formed shallow reefs or a chain of islands.

On the removal of the great mass of the glacier and the consequent inauguration of the retreat of the sea and elevation of the land, the former lines of drainage were more or less blocked by the deposit left by the glacier and a new system of drainage was consequently formed. That some of these streams changed their courses as the upward tilting of the land took place is very probable. In the case of the Ekwan, the upward tilting to the north caused the deflection of the stream from the valley through which it ran on its way to the sea to the north of Sutton Mill lakes. The deflected part of the river is now the section below the Little Ekwan, and is noticeable as being much newer than the upper part.

The general surface is very even on that part covered by the marine deposit, and is a gently sloping plain covered for the most part by a thin forest of black spruce and tamarck. In the river valleys, especially near the streams, other trees occur, notably the poplars (*Populus tremuloides* and *P. balsamifera*) and birch. In the case of the latter tree, few large ones occur north of the Albany river, and the Hudson's Bay Co. have established a canoe-building industry at Albany post to supply the Indians coming from farther north. On the Ekwan, a solitary birch was seen, and that was only a small sapling on one of the islands. Five individuals of the Banksian pine were seen in one group on the north bank fifty miles up the river, so that the northern limit of both birch and Banksian pine may be said to be south of this stream. Poplar follows the valleys of the streams nearly as far north as the spruce. The country behind Cape Henrietta Maria is treeless, as is also a strip of the coast both to the south and the west of the cape.

A micrometer survey of the Ekwan river was made to the mouth of the Washagami branch, a distance of one hundred and fifty miles. The general valley is a narrow cut through clay, with cut banks on either side for most of the distance to the first branch.

[34] This report forms Part F, Vol. XIV., of the Geological Survey of Canada. In addition to Ekwan river and Sutton Mill lakes, it describes part of the west coast of James Bay. The preliminary or summary report on the territory is contained in Part A, Vol. XIV., pages 110-117. The exploration was made in 1901.

[35] Annual Report Geol. Surv. Can., Vol. II (N.S.) 1886, p. 18 F.

The country on either side is covered by a mossy swamp with a sparse growth of black spruce and tamarack. The course of the river, from the mouth of the Washagami, is east-south-east, but above this it evidently takes another direction, changing its upward course toward the south, and, as its head-waters lie between the heads of the Attawapiskat and Winisk rivers, it probably flows to the north-east for some distance before turning to the east. The upper part is an older channel, and its course, as before mentioned, was probably through the Sutton Mill lakes valley to the shore of the bay, which was at that time not so far from the lake as at the present time. In the latter part of its course, it is now cutting down a new valley through marine clays which cover the underlying rocks to a depth varying from twenty to fifty feet. From the lowest rock exposure to the sea, the current is swift and it is constantly moving a large quantity of gravel and finer material towards its mouth, and into the bay into which it empties. Limestone in apparently horizontal beds is exposed at intervals in that section which lies between forty and one hundred miles from the sea. From the fossils collected it would appear that they are probably of Silurian age.

Ekwan River. Photo by D. B. Dowling

Above the Little Ekwan, the river issues from a wide valley which is cut through a higher plateau, but this valley gradually narrows before the Washagami is reached, and cut banks of clay, higher but somewhat similar to those in the river below, occur at many of the bends. These clays contain marine shells such as *Saxicava rugosa*, *Macoma calcarea*, *Mya truncata* and *Cardium ciliatum*. These were also found about 390 feet above tide at the highest point at which the clays were seen. In the bed of the river the living fresh water species noticed were:

Anodonta Kennicotti, Lea, *A marginata*, Say, and *Lampsilis luteolus* (*Lamarck*) var., as identified by Dr. Whiteaves.

The Washagami river is but a small stream, divided a few miles from the Ekwan into two branches. The northern branch comes from a long lake-valley running north and south, or parallel to that of Sutton Mill lakes, and this may also have been one of the outlets for a stream such as the upper part of the Ekwan. The lower part of this valley, or the portion near the Ekwan, is now being cut into by the stream and a short new valley eroded.

The fall in the Ekwan from the mouth of the Washagami, as given by our barometric readings, is over 300 feet. North of this, to beyond Sutton Mill lakes, extends a plateau which is at an elevation of 400 feet above tide. Through this, in latitude 54° 20′, rounded or oval masses of trap protrude to a height of from fifty to one hundred feet. Through the plateau, on a line where there is also a break in the trap rocks, a deep narrow valley has been eroded in a north and south direction, which is now occupied by the waters of Sutton Mill lakes. At the lake the surface of the clay plain is 390 feet and the surface of the water of the lake is 290 feet above tide. Soundings show that the bottom of the southern part of the lakes is 310 feet below the plain and that of the northern part 250 feet below this datum, or only forty feet above tide.

Silurian limestone is found on Trout river, which drains Sutton Mill lakes, and is also found in the bed of the lake just north of the trap rocks. The rocks at the narrows of the lakes are cliffs of trap one hundred and fifty feet high, capping beds probably of Animikie age. These are dark slates impregnated with iron ore and interbanded with beds of jaspilyte. Some of the beds contain a high percentage of magnetite. On the east shore a section of about ninety feet of these jasper and iron-bearing slates is exposed above the lake, but on the west side they have been brought down to below the water level by a series of north and south faults, and the exposures there are of trap alone. These rocks form an east-and-west ridge reaching to the upper lakes on the Washagami, and eastward to a large lake on a branch of the Trout river, which, as before stated, drains Sutton Mill lakes and runs to the north. The slates and jaspilyte or jasper-sandstone beds form a long anticline, whose axis runs east-and-west, and the majority of the beds exposed belong to the northern slope of the anticline. This ridge is terminated on the lake by a series of north-and-south faults with downthrow to the west of unknown amount. The overflow of trap appears to have been at a later date, as there seems to be some unconformity at the base of the trap, the flow having filled all the inequalities in the underlying surface. The cliff at the west side of the narrows is of trap, one hundred and fifty feet high, with none of the jaspilytes showing beneath it. On the east side, however, ninety feet of these beds are exposed, with a varying thickness of trap above them.

The James Bay Shore

The shore of James bay is low and shallow, and a short description as given in the summary report is here added. The delta at the mouth of the Moose river is divided into three channels which enter James bay. The northern one runs from the north of Middleboro island to the north-west of Ship Sands, but it is nearly dry at low water and is also impeded by large boulders, so that it is not used except by canoes and small boats. The southern channel is also reported to be shallow. The central channel, which runs along the south edge of the Ship Sands, shoals to seven feet at low tide, and vessels pass at high water after having been lightened to draw about twelve feet.

Northward from the outer bar to North point, the water is very shoal, but it deepens slightly to Nomansland. The low-tide flats are not very wide, but bars project from many of the points for long distances, as at Long Ridge and Cockispenny points. At Halfway point, limestone fragments are pushed up along the shore from rock apparently *in situ* below tide. Long Ridge point is built up mostly of gravel, with a few boulders showing on the surface. From Nomansland to the Albany river the shore is very flat, and at low tide the mud shoals extend out for several miles.

The Albany river, like the Moose, is divided at its mouth into three channels. The trading establishment and mission are situated on an island on the north side of the southern channel. North of this island is the broad opening, called locally, North river. This has a long bar at its mouth, similar in position to the Ship Sands at Moose. The southern entrance to this is the larger, and it seems to be much deeper than the channel going to the settlement. The small channel north of the bar is shallow at low water and has a bar outside on which we found a depth, at high tide, of very little over one fathom. Very shoal water, in which boulders appear, extends northward beyond Nottashay point and boats are obliged to keep nearly out of sight of land to escape the shoals. Chickaney river, which enters north of the Albany, is said to be another channel from the same river.

Shoals were observed well out from shore to near the Kapiskau river. In the inner water between Akimiski island and the mainland there seems to be a maximum depth of about two fathoms. This shoals gradually to one fathom at a distance of three miles from either shore. The mainland is generally without a beach and between the woods and the tide-line is a wide flat covered with grass. The north-west part of Akimiski island approaches the mainland much closer than is shown on the maps, and a number of shoals are scattered from hence to the point south of the Ekwan river. The boat channel, according to our guide, runs to the west of the two islands which here lie off the shore. The position of the mouth of the Ekwan river, according to several observations, is in latitude 53° 14′ 0″.

Northward from the Ekwan, the shore, for a long distance, is flanked by high gravel bars, but at low tides a broad belt of mud extends out several miles, so that travelling along this coast with canoes is very unpleasant should the time of high water be in the middle of the day or night. Landing on the beach without a long "carry" through the mud is only possible at high tide.

The rivers that enter the bay between Niahkow point and Cape Henrietta Maria are not large, and, as the former maps are mere sketches, it is difficult to locate those which are not known by a local Indian name. The first stream north of the Ekwan is a small channel said to be a branch from that river. It is marked by two gravel bars to the north about a mile from from the beach. Swan river, which is perhaps Raft river of the map, enters in latitude 53° 36′. It is in a slight bay or curve in the shore line. In latitude 54° the shore takes a curve to the west, forming a point, and, as the tree-line curves to the north-west from here, this is probably Point Mourning, the first wooded point south of Cape Henrietta Maria. Several small streams flow into this bay. The first is called by the Indians, Nowashe river—the next Patchipawapoko—then the largest along this coast, the Opinnagan, followed by the last stream, Nikitowasaki, fifteen miles north of the Opinnagan. The latitude of the mouth of the Opinnagan river, by observation, is 54° 12′ 24″.

The bay to the south of Cape Henrietta Maria is shallow and muddy with wide mud flats, but near the extreme eastern end of the cape the shore is reported to be bolder, and limestone beds are said to outcrop at high tide mark. These are probably continuations of those found on the Ekwan and Attawapiskat rivers to the south-west.

The timber along the coast gradually becomes smaller in going northward and the tree-line recedes from the shore, leaving it finally at the Opinnagan, so that the country behind the cape is more or less an open plain. The shore, where the trees are at a distance from the beach, is generally an even mud slope, covered above high tide with grass, followed by a wide belt of stunted gray willows which give an appearance like the sage bush of the plains. Behind this, a few isolated spruces of small size appear before the tree-line is reached. In sailing along this coast, it is impossible to know which way to steer so as to run parallel to the land, as nothing is to be seen ahead by which to shape one's course.

Tides, Fur-bearing Animals and Game

The tides along this narrow shore are not regular in their amount of rise and fall, which is determined in a great measure by the direction and strength of the wind. From the Ekwan river northward, the high tide appears to be about six and a half hours after the moon's meridian passage—the flood and ebb running seven and five hours respectively, while to the south of the shallow ground between Akimiski island and the mainland, the flood comes from the south and is much earlier. High tide at Lowasky river occurs at between two and a half and three hours, and at Albany about the same. The flood tide at Lowasky river runs four hours and the ebb eight. At Albany the flood runs five hours and the ebb seven. At the outer bar at Moose river the tides are from half an hour to an hour earlier.

Fur-bearing animals are not particularly numerous, but the Indians bring in to the Hudson's Bay Company's posts, fox, otter and beaver. Caribou are occasionally secured, but not in large numbers. Black bears are also occasionally killed. Last season (1901) I was informed that the Indians on Akimishi island killed three white or polar bears during the early summer, and one was seen by our party along the coast north of the Ekwan.

In the interior, the game birds are all very scarce, the fall hunt for ducks and geese being confined to the shores of the bay. The rivers afford a limited supply of whitefish, and a small species of this fish is caught in the tide-water along the west shore of James bay. The nets are set or hung on stakes on the tide flats, and are covered by the tide for a few hours each day. Sutton Mill lakes are well supplied with a slender variety of gray trout and the streams running to the north into Hudson bay are, at certain seasons, well stocked with brook trout. In August the stream draining Sutton Mill lakes was full of these fish, and several fine specimens were caught on the lake above at the narrows.

Historical Summary

The southern coast of Hudson bay, east from Port Nelson (York Factory), was visited or explored by Captains Luke Fox and Thos. James in 1631, and again visited by James in 1632. These two navigators met off the coast near the mouth of the Winisk river on August 29-30, 1631. Each had given a name to the country to the south-west. Fox called it "New Yorkshire," and James "The South Principality of Wales," probably on account of the previous name "New Wales" given by Button in 1612 to the land south-west of Port Nelson. These two navigators sailed together eastward to the entrance to James bay and there separated, Fox to go north, and James southward into the bay to winter. Fox called the cape he had left "Wolstenholmes Ultimum Vale." James, after rounding the cape, determined its latitude (55° 05′) and called it Cape Henrietta

Maria, after the queen and also after his own ship. His name for the cape has been retained, and his description of the coast near it is still very true and is in a concise form[35]:—"From Port Nelson to this cape the land trends (generally) east-south-east, but makes with points and bays, which in the particulars doth alter it a point, two, or three. The distance is about one hundred and thirtie leagues. The variation at the cape, taken by Amplitude, is about sixteene degrees. A most shoald and perilous coast, in which there is not one Harbour to be found."

He did not follow the shore far to the south of the cape, but made out to the Bear islands and so on to the south end of Charlton island, where he wintered. Returning in the summer (1632) he landed at the cape and set up a cross with the arms of the king and of the city of Bristol.

The eastern face of the point seems to have deeper water off it than along the north shore, as James anchored in six fathoms about a mile from the shore. He reports a long shoal point running out to the northward or north-east.

In a publication by the Haklyut Society, entitled "The Geography of Hudson's Bay," by Capt. Coats (an officer with the H. B. Co. from 1727-1751), the description of the coast from the Severn river to Cape Henrietta Maria is written for the information of sailors, but in it is given some indication of the character of the land as well. The following extracts from the above work give the main part of Coats' description (*see* pp. 46-52).

"From Severn river to Cape Henrietta Maria, in latitude 55° 10′ N., the course is E.S.E., to westward of which in 55° 30′ near Cape Lookout is some broken ground, banks and ridges a great way off, come no nearer than seventeen fatham; the land very low and fenny, appears here and there in tufts of tree.

"To southward of the Cape the land runs S.S.E., very low but clean even soundings with wood in some places. The shore is flatt a good ways off."

". . . . Near the same latitude (54° 38′ to 54° 28′) on the west main is a bluff of wood, called Point Mourning, from the burying of one of Captain James' men there. The land to northward of this, and westward of the cape, is all a low fenny unbounded marsh, not to be seen but in fine weather, so your lead is your principal guide."

The topography of this coast and of the western side of James bay has been but roughly sketched by these navigators, and little altered by subsequent ones. The streams draining to Hudson bay, as also those flowing eastward, were mapped from sketches made by various officers of the Hudson's Bay Company. The route through Sutton lakes, by the Little Ekwan river, was sketched by Mr. Thos. Bunn in 1803. Later, a route to the Winisk *via* the Washagami branch of the Ekwan was mapped from a track-survey or sketch by Mr. Geo. Taylor in 1808. This latter route is not used by the Indians of the present day, as perhaps the streams to be navigated are too small. The Little Ekwan is now reported to be blocked up by driftwood and the old routes are totally changed. The route to the lake is now from the Washagami eastward over a long stretch of muskeg, and that to the Winisk is made by a portage from farther up the Ekwan, direct to a small stream, a tributary of the Winisk.

The information as to the origin of the topography which appeared on the old maps is obtained from a manuscript map compiled for the Hudson's Bay Company to show the explorations of Mr. Peter Fiddler. This is now in the office of the Geographer, Interior Department. These sketches were no doubt supplied to Arrowsmith and were since reproduced on all the maps of this district.

The Attawapiskat river at the southern boundary of this district was surveyed in 1886 by Dr. R. Bell, who the same year completed his survey of the Albany river. The same season Mr. A. P. Low traversed the country to the west from Lake Winnipeg to the Severn river and descended the latter stream to the sea. Instead of following the main stream for the whole distance, he crossed from Severn lake to Trout lake lying to the east and descended the eastern branch or Fawn river, joining the main stream about fifty miles from the sea.

Ekwan River

Of the many outlets at the mouth of this stream, the principal or that having the greatest depth of water is the central one. Several small wooded islands are situated at the mouth, and to the east of these the several branches of the stream flow over boulder and gravel flats to the sea. At high tide the level of the river is only affected as far up as the first wooded island, and at low tide there is about a mile of swift current from this point to the sea. Boats entering at low tide have only about two feet of water at the steepest slope. In the spring there is probably sufficient water to float boats drawing over four feet of water.

There is a strong current in ascending the river for the first eighty miles, and, in

[35] Voyages of Fox and James to the North-west. Haklyut Society, p. 490.

this part, the whole distance is usually made by tracking the canoes. In the present condition, the sides of the valley are generally free from bushes and trees, so that there is good walking along the bank.

After passing above the islands in the mouth of the stream, it is found that the river has cut down through a terrace of clay with a small percentage of sand and pebbles. The pebbles are generally found near the surface of the terrace—here about fifteen feet above the stream. The eastern edge of this terrace slopes steeply to the sea, and, as it is wooded to near high tide mark, scarcely any trace of it is seen from the sea. The tide flat which borders the coast is probably derived from the denudation of the edge of this terrace. The absence of cliffs or cut-banks along the coast would indicate a recently receded shore-line.

The surface of the terrace was found to be covered with a thick coating of moss, and the timber on it is mostly small spruce and tamarac. Some of the trees might be from six to eight inches in diameter, but the average is much less. At the edge of the bank a fringe of much larger trees occasionally appears, but it does not extend far from the stream. The exposures on the banks show the terrace to be made up mostly of strati-

Spruce on banks of Ekwan river. Photo by D. B. Dowling.

fied clay and sand, near the surface, with a fine clay of soft texture beneath. Of the boulders and pebbles in the channel of the stream and along the sloping banks, fully fifty per cent. are of light yellow-gray limestone and the remainder are of Huronian and Laurentian crystallines. Occasionally, bits of red quartzite and iron-bearing shales from the rocks of the Nastapoka group were seen. Large boulders of greenstone, having rounded inclusions of coarser texture and lighter colours, occur here as well as on most of the streams entering James bay. These are also probably derived from the amygdaloids in the upper part of the Cambrian sections found on the east side of Hudson bay.

Not far from the mouth, the river again divides into a number of channels, and the banks in this vicinity are only about ten feet high. The current increases slightly and several swift places are caused by an accumulation of boulders in the channel. A small branch channel, running north to the bay north of Niahkow point, leaves the river from behind some of the islands of this group. The river continues with swift current and is divided in a few places by islands.

Outcrops of Limestone

Thirty-three miles from the mouth, the first strong rapid occurs, and the underlying limestones outcrop, in a ledge running across the bed of the stream. The beds are lying apparently horizontal, and are of a grayish-white dolomitic limestone holding a few badly preserved fossils, from which Dr. Whiteaves describes or identifies the following:

Favosites Hisingeri; Trimerella borealis; Reticularia septentrionalis; Euomphalus sp. idet.; and *Bronteus Ekwanensis.*

In the next ten miles, which is the distance to the portage at a series of heavy rapids, there are two stiff rapids at which the limestones outcrop. At the heaviest of these, called the Middle rapid, the fall amounts to approximately five feet. The beds exposed here are thicker and contain many more fossil remains than at the first rapid. The fossils are principally large trilobites and corals, as in the following list: *Spirifer crispus; Reticularia septentrionalis; Salpingostoma boreale; Diapho. rostoma perforatum; Phragmoceras lineolatum; Illænus* sp. indet.; and *Bronteus Ekwanensis.*

Above this the banks gradually rise in a series of steps to thirty feet, which might be taken as an indication of an old shore line.

The portage mentioned above is on the northern side of the river. Here the stream has cut a shallow gorge through the limestone. This has been slowly widened, and is the first indication of age that the river thus far has shown. Below this, from the sea up stream, the river channel is new—that is to say, it is still wearing down the sides of the valley and is bordered by cut-banks. The material thus fed into the river is being rapidly removed, and there is little of it deposited till the sea is reached.

The rapids below the portage show a certain amount of river wear, but not so pronounced as at the portage. The beds cut are not deposited in a regular manner, but are disarranged owing to the local development of coral reefs, which give the immediately overlying beds the appearance of having been disturbed and bent. These same limestones on the Attawapiskat river, just to the south, are described by Dr. Bell as cavernous limestones. It would seem that the more porous, or what seem to be the coralline masses, weather much more easily than the thinner beds. On this river there are no caverns, as the valley is not eroded deeply enough to expose much of the rock. The beds below the coral reef at the portage are thin and lying nearly horizontal, but above the portage the beds are thicker and contain a very numerous assortment of remains of gastropods and corals. The collections made here for the purpose of determining the horizon were mostly from the rocks near the upper end of the portage road. The list of species determined or described by Dr. Whiteaves, and published as a supplement to this report, in his opinion indicates a horizon rather high up in the Silurian.

Those which occur at this part of the river are given in the following list:

Halysites catenularia; Lyellia superba; Zaphrentis Stokesii; Pycnostylus elegans; Pycnostylus Guelphensis; Favosites Gothlandica; Favosites Hisingeri; Stromatoporoid sp. indet.; *Crinoidea* sp. indet.; *Fenestella subarctica; Trimerella Ekwanensis; Strophodonta* sp. indet.; *Plectambonites transversalis; Spirifer* sp. indet.; *Reticularia septentrionalis; Meristina* (?) *expansa; Reticularia* sp. indet.; *Glassia variabilis; Atrypa reticularis; Camarotœchia Ekwanensis; Ambonychia undulata; Ambonychia septentrionalis; Mytilarca pernoides; Ctenodonta su bovata; Euomphalopterus* sp. indet.; *Megalomphala robusta; Salpingostoma boreale; Gyronema speciosum; Gyronema Dowlingii; Gyronema brevispiria; Loxonema* sp. indet.; *Orthonychia obtusa; Platyceras compactum; Strophostylus amplus; Strophostylus inflatus; Strophostylus filicinctus; Endoceras* (or *Nanno*) sp. indet.; *Kionoceras cancellatum; Orthoceras Ekwanense; Orthoceras* sp. indet.; *Phragmoceras lineolatum; Illænus* sp. indet.; *Bronteus Ekwanensis; Bronteus aquilonaris;* and *Ceraurus Tarquinius.*

For nearly four miles above the portage the current is swift and several small rapids occur, the largest of which has a fall of three feet. At thirteen miles from the portage is another rapid where the exposed rock is a thinly bedded limestone in a low anticline, the axis of which runs N.E. and S.W. A steady swift current is met all the way to Flint rapid, thirty miles above the portage, but the banks are in places partly overgrown with grass and the edge of the slope fringed with willow. Both species of poplar begin to make their appearance, and some trees are of fair size. In the lower reaches the banks are for the most part bare and of clay, with boulder pavements near the stream.

All the exposures of the clay contain marine shells near the top, from which the following species were collected: *Saxicava rugosa, Mya truncata, Macoma calcarea and Cardium ciliiatum.*

No definite boulder clay was seen, as it is covered by the marine clay and the constant sliding from the surface conceals the underlying beds.

The Flint rapids are not more pronounced than many of the others, but as the river has cut partly through a series of beds of yellowish gray limestone, in which there are many inclusions of chert, the Indians have named the rapid "Piwana powestik," or Flint rapid.

The country on either side is about ten feet above the stream. Poplar shows in spots and occasionally clumps of large black spruce, but these are generally on the islands or prominent points of the river banks.

What is called Upper or Last rapid is a small fall of two feet, nine miles above Flint rapid, where the river flows over thin beds of limestone. The section of the rocks exposed consists of only a few beds, making a total of about six feet. The lower members are ashy gray in colour, somewhat mottled, and break into irregular lumpy fragments. A few fossils collected from these beds are given in the following list, from the appendix by Dr. Whiteaves.

Zaphrentis Stokesii; Favosites Gothlandica; Orthis sp. indet.; *Pleurotomaria* sp. indet.; *Actinoceras Keewatinense; Phagmoceras lineolatum; Isochilina* or *Leperditia* sp. indet.

The central beds are yellow and full of cavities of irregular shape, with a thickness of perhaps two or three feet. The top beds are gray and similar to those at the base. Fossils are scarce.

Gravel piled on upper end of island at last rapid. Ekwan River. Effect of ice shoving in spring freshets. Photo by D. B. Dowling

Above the rapid to the mouth of the Little Ekwan river, the valley is probably slightly older than below, and the banks are covered with willow and poplar. The channel is wide and dotted with numerous islands. In a few places side channels form large islands and the current in this part is much slower, averaging only about a mile and a half per hour.

Little Ekwan and Matiteto Rivers

The Little Ekwan enters from the north in a narrow valley. The stream appears to be very small and is reported to be blocked by drift timber and windfalls, so that the Indians do not travel on it with canoes. Just to the south is the mouth of the Wagakashi coming from the south in a valley which is a continuation of that of the Little Ekwan. Another stream from the south, the Matiteto, enters three miles above the Little Ekwan and there are several places in the stream between these two points where the current is swift. Here the river has cut a channel through thin bedded limestone and about a foot of this shows on the banks. It is a fine-grained yellow limestone and shows no fossils. Three miles above the Matiteto, the same beds apparently are also cut by the channel of the river, and this is the highest point on the river where we saw the underlying rocks. These exposures no doubt formed rapids in the earlier history of the channel, but they have since disappeared, and the general grade of the river is now nearly reached, except at one or two points. Similar denudation is observed at Flint and Last rapids, but, as there is a heavier bed of limestone to cut through, there is still a large amount of work for the river to do. At the portage and the series of rapids in that vicinity the rock is in thicker masses, consequently the falls are in the midst of the rock exposures.

Above the mouth of the Matiteto a higher terrace is reached and through this an older valley, opening to the east in a wide mouth, is entered. The eastern face of this terrace and the sides of the old valley show sandy deposits which are probably the shore deposits when the sea flanked the eastern edge of this plateau. Their nature was not worked out, owing to lack of time, but there is little doubt that beaches may be found in this vicinity. Through the old valley the river is now cutting another channel, and

Landslides on outer bends of Ekwan River. Photo by D. B. Dowling

for ten miles upward the stream is very active and is wearing rapidly through the clay. Above this the grade is not so steep and consequently the current is much slower. The immediate banks of the stream in many places do not reach the sides of the old valley, but the higher plateau is in view at many points, and finally, before reaching the mouth of the Washagami, the river seems to be flowing in a much narrower valley with occasional cut-banks apparently the old channel slightly deepened. The active part of the revived stream has not yet reached the underlying rock, and its work is retarded by an occasional accumulation of boulders. About six miles below the Washagami a sudden bend of the stream to the south has thrown the current against the south bank, and excavation on a large scale is going on in this locality.

The high plateau here entered, as well as its eastern slope to James bay, is covered by a coating of marine clay which probably overlies boulder clay. That some of this exists beneath the marine clay is proved at only one or two small exposures. It probably, in many places, contains no boulders and therefore the dividing line between it and the marine clay is hard to define. The reddish clay near the mouth of this river, although mainly free from boulders, appears to have received its colouring matter from a soft red shale which, though not outcropping on the bank, may occur in the bed of the river below the limestone. This may be a local development of the boulder clay, as were it a part of the marine deposit a more extensive distribution might be expected. Large boulders are not numerous in the river channel, but at intervals there are accumulations of them. Small rounded boulders and pebbles are common, but the majority seem to come from the surface of the clay or the upper part of the section. Marine shells were collected from the banks near the top of the exposures, and these are of the same species as those recorded on a previous page as having been found near the mouth of the stream. The same species were also collected from the higher parts of the plateau at an elevation of four hundred feet above tide, showing that all this region was submerged at the close of the glacial period, to at least between four and five hundred feet. The uplift since then has been greater perhaps in the northern part of this area than in that to the south near the height-of-land. The differential uplift is clearly shown in the area to the west formerly covered by the glacial Lake Agassiz, where the highest beach at the north-east corner of the Duck mountains is now 350 feet above the outlet at Lake Traverse. The plain now drained by the Ekwan and Attawapiskat rivers, on its emergence from the sea, sloped northward, and the drainage probably took a northern direction to Hudson bay but, as the plateau reached an elevation approaching its present position, this slope was lessened and the streams were diverted toward James bay. The older portions of the river channel, which are situated in the higher part of the plateau, probably carried streams which found their outlet by uniting, and flowing to the north from the vicinity of the Little Ekwan river and thus through the deep valley in which is situated Sutton Mill lakes. The present general direction for both these streams is on nearly parallel lines running north-easterly, but making a decided bend to the east and east-south-east from the vicinity of the Little Ekwan.

The surface of the plane or slope toward James bay is very regular, and the uplift and consequent retreat of the sea very uniform in its movement. A slight steepness in the slope at the rapids at an elevation of 100 feet above the sea might be accounted for by a short halt of the sea margin at this line and consequent denudation. As the drainage on all this slope is new, the greater part of the surface is still very flat and swampy, as the minor drainage is not developed.

Washagami River

The canoe route from the Ekwan river to Sutton Mill lakes follows a small branch from the north to the first small lake and thence westward, by a series of portages, to a stream flowing north to the lake. This branch, called the Washagami, is a small stream, very swift in its upper part and having a steady strong current all the way down to the Ekwan. Five miles from this stream it receives a tributary from the west, called the Nematagoi river, which appears to be nearly as large as the north branch which is supposed to be the main stream. Above this the water of the stream is clearer and comes from a series of lakes above. Several tributary brooks enter the valley, but they are all apparently small. In the upper part, the stream meanders from side to side of a valley which it has formed. This is cut down about twenty-five feet and numerous exposures show stratified clay, with a few feet at the top of a sandy clay with pebbles. A few boulders in the bed of the river are apparently derived from the surface or upper part of the clay. Probably the majority are from the harder clay beneath, down to which the channel has been cut. Some of the steeper parts of the channel, where the current is also swift, are completely paved from side to side with these boulders, now considerably rounded. The valley in the lower part approaching the Ekwan is wider and the present channel of the river seldom reaches either side.

In the distance traversed to the first lake, seventeen miles in direct line, the fall is about fifty-five feet or an average of over two feet per mile for the lower third of this distance, and this is increased in the upper to at least five feet per mile for a short distance.

On reaching the first lake it is quite noticeable that there is no longer a river valley such as in the lower part, but the lakes occupy a wider depression that may have been an old channel. The first one is Washagami lake and it is succeeded by a chain of three closely connected small lakes to another large one called Minago or Spruce lake. The first mentioned is said to be the largest or rather longest of the group. Beyond Minago lake lie Moss and Tamarack lakes. On the north side of the latter, high hills of black rocks, which are probably similar to the trap rocks of Sutton Mill lakes, are reported.

This series of lakes appears to lie in a valley now draining south, but it seems too large or wide to have been formed by the small stream now draining through it. The present stream has no doubt formed a new channel to the south of the lakes, as it is still very actively widening the bends where it touches each side of its own valley, but above this there is an older valley. The origin of this, as well as of the valley of Sutton Mill lakes, is no doubt connected with the early system of drainage, now probably diverted into other channels by the differential uplift of the coast.

The portage route from the Washagami to Sutton Mill lakes is mainly along the surface of the higher plateau through mossy muskeg interrupted by a few small lakes all draining eastward to the Little Ekwan river. Leaving the Washagami, the trail runs northward nearly a mile through muskeg, rising steadily to a gravel ridge having the appearance of a beach ridge. This is followed a mile to the north-east to the first small lake. On the north side of this ridge are several small lakes which all drain to the east from one to the other. At these lakes two short portages are made and then the second long portage is reached. This is about a mile and a quarter long through lumpy, mossy muskeg and only one slight rise is crossed where the ground is dry. It ends at a small lake about 500 yards long with low margin. From the north-east end of this, another long portage of about the same length running east north-east reaches the western edge of a deep valley running north to Sutton Mills lakes. This contains a small stream from the north-west which has cut a deep narrow gorge through the boulder clay. This stream enters the valley at Sutton Mill lakes about two miles south of the lake and meanders back and forth through a marsh at its border. The stream is navigable for canoes from the end of the trail, or for that part of its course which is in the deeper valley. Several small rapids over gravel bars are passed before the stream reaches the marsh. The Indians have erected a fishing weir at one of the upper ones. This structure is merely a close fence made of poles standing across the stream having a basket at one side also of poles sloping slightly up from the water to imprison the fish as they are going down stream. Small fish pass readily either way, but the larger ones are caught.

The timber in the valley is very much larger than on the surface of the plateau. Black spruce and tamarack are the principal trees, and on the plateau these average about four or five inches, but in the valley near the lake several about twelve inches in diameter were seen. The surface is nearly everywhere covered with moss, even on the slopes of the valley, and only in occasional places was grass seen.

Sutton Mill Lakes

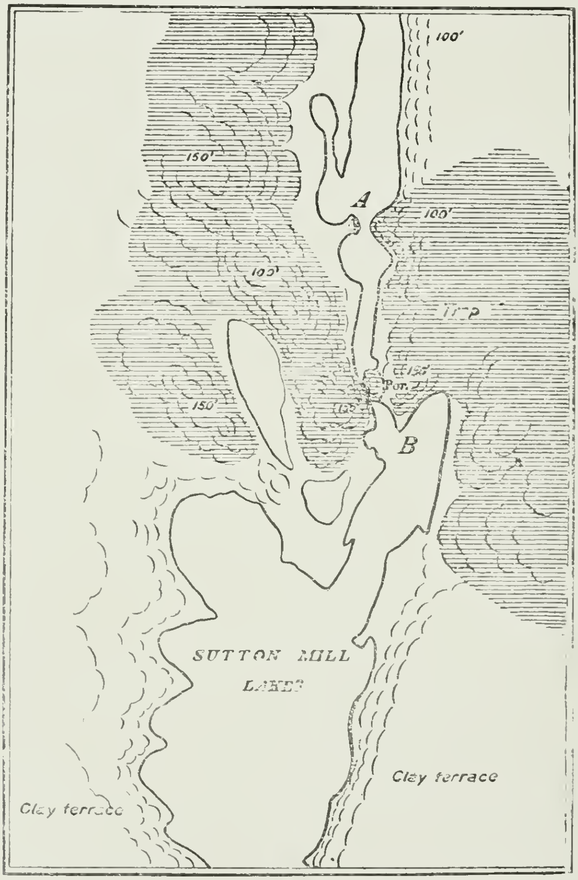
These are represented on the older maps by two fairly large wide lakes joined by a short small stream, whereas the lakes are long and very narrow, occupying a deep valley running north and south. At the south end another valley from a short distance to the west makes a bend to the east and joins the main one. The water of the lake is about 100 feet below the level of the bordering country. The slopes of the valley are steep and in many places show cut-banks of marine clay, probably overlying boulder clay. Marine shells were collected near the upper surface of the plateau at a height of 90 feet above the lake, so that practically all this area has been submerged with the exception perhaps of a ridge of trap-covered rocks which cross the lake at the narrows. Those rocks protrude through the clay plain in rounded oval ridges.

The depth of the valley below the general surface seems to be greatest in the southern lake where, by sounding, the water was found to be 210 feet deep, or a total depth for the valley below the surface of 310 feet. In the northern part, or the northern lake, the width is much narrower, but the depth in the centre runs from 100 to 160 feet or 250 to 260 feet below the general surface. In the narrows the cliffs are broken down and the debris has filled the channel, raising the water in the southern lake about five feet. The heavy mantle of drift has effectually concealed the rock, and only in the river valleys and in such a cut as this is much rock to be seen. The limestone of the Ekwan river does not come north to the lakes, as outliers of the trap hills occur just to the south of the lake in the valley into which the trail from the Washagami leads. In the northern lake, past the trap hills, limestone again appears, and an exposure of it occurs on a small island where there is about ten feet exposed. Below the water-level the cliff is abrupt to a depth of sixty feet. This shows that probably the Silurian deposits surround the Cambrian, but are at a lower level. The valley, although excavated through the superficial deposits, found as its lowest level a former break not only through the Cambrian at the narrows but also a deep cleft in the limestone beds to the north. In the valley which runs northward from the lake, the limestone beds cross the present river channel at a greater elevation above the sea than the cut through them in the lake valley.

As to the origin of the valley in which the lake lies, it seems to be clearly caused by the action of a stream, which in some manner has since been diverted, probably to flow eastward to James bay.

If the rising of the land was inaugurated in the southern part and gradually proceeded north as the pressure of the glacial mass was removed, then the general slope northward would have been steeper in front of the elevated portion and drainage channels would follow in this direction forming valleys trending north. After the elevation was accomplished or the land assumed its present contour, parts of these valleys would be so tilted as to back up the contained streams and cause them to spill down the present slight incline to the east. In this way it seems probable that such streams as the Ekwan and Attawapiskat, which make a decided turn to the east from a point south of this lake, might have originally run northward to Hudson bay. In the description of Ekwan river the difference in age of the upper and lower parts of the valley is noted and also the supposition that the stream left its present valley near the mouth of the Little Ekwan.

The great depth to which the basin is eroded may be due to other causes, and one suggested by the presence of faults at the narrows is that the changes of level to which the crust has been subjected caused a great fissure to open along the line of the lake valley and a portion of the overlying deposits was thus allowed to drop down. If, however, this was the chief cause, the break would probably be traced for a greater distance than the length of the present lake valley.

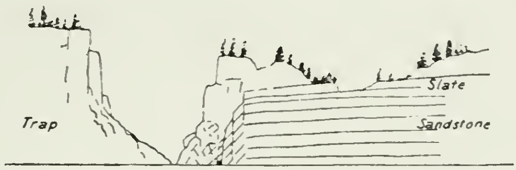


Sketch map of Sutton Mill Lakes.

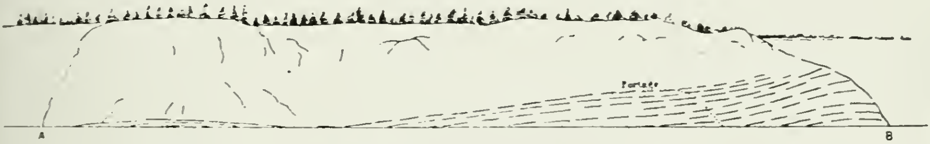
Trap, and Iron-Bearing Slates

The rock exposures occur principally at the narrows, or near the small stream connecting the two lakes. Approaching this from the south, the clay slopes give place to rocky hills rising from the water, in steep slopes and nearly bare surfaces, to about 100 feet above the lake level. Back from the lake some of the hills seem to attain still higher elevations, of probably over 200 feet. The accompanying sketch-map shows the trap-crowned hills of this vicinity. On the east side a series of fine-grained compact red and black beds is exposed; on the west the exposures are of trap to the water's edge. The fault, which runs north and south, here has a downthrow to the west of over 50 feet, carrying all the stratified lower rocks beneath the lake level. The only sections of these beds to be seen are on the east side, principally in the vicinity of the portage. Just at this place, a small cap of trap stands near the gorge, and behind it, to the east, is a narrow valley not eroded as deeply as the cut at the stream, but only to the upper beds of the sandstone and slate. Through this valley the road for the portage passes, rising to about fifty feet between its extremities.

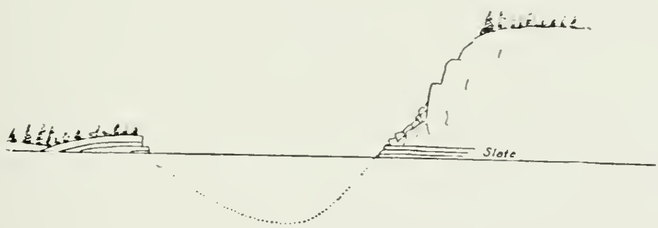
The highest point that the trail reaches is over a ledge of iron-bearing slates, above which on either hand rise the rough hills of trap. As the slates are nearly horizontal, the total thickness exposed on the portage road, together with that brought up by a slight anticline just to the south, represents all that was seen of these rocks. Northward the beds decline at a slight angle, so that they reach the water and are brought up again for a short distance at the second narrows, or the point marked A



Cross section at B on sketch.



Section from A to B on sketch.



Cross section at A on sketch.

on the sketch. Here the fault runs to the west of the projecting point so that the same beds appear on both sides of the channel, but the western point is separated from the rocks to the westward by an accumulation of drift material forming a low spit with sandy bays on either side. The deep channel is eroded through the sandstones, to a depth of 140 feet. The section published in the summary report is that of the rocks to the south of the portage road. The jaspilytes when examined in thin section are found to be compacted sandstones, the grains of which are stained to various shades of red by the presence of iron oxide, which forms in many cases a coating around them. All the beds are made up of fragments of various degrees of fineness arranged in a natural order, the coarser at the base and the finer at the top. The slaty beds just beneath the trap are made up of much finer grained particles of quartz, coloured dark by a matrix of opaque fine-grained material separating the grains. Some at least of this mass is probably magnetite. The quartz grains constitute 50 per cent. of the mass, and of this about half are of red chalcedonic quartz and the other part clear grains made up of a mass of mosaic quartz. The red beds beneath are of much coarser grain, and are seen, even in a hand specimen, to be made up of rounded particles of red colours.

At point A the dark slates have a thickness of 20 feet, and below this the red beds begin to appear in thin streaks. The partings of the fine-grained dark slates become thinner and the lower beds become red in colour.

At the portage the section consists of ninety feet of stratified beds capped by a varying thickness of trap. On the west side of the stream there is a thickness of about 150 feet. This is a dark green gabbro with a diabase structure. The predominating mineral is chlorite, with plagioclase, albite and quartz. Small dark almost opaque crystals of ilmenite surrounded by limestone are occasionally seen. The slates beneath, to a thickness of 20 feet, are dark grayish black to greenish black and are thin-bedded and of fine grain.

Near the base they resemble clay slates but are very hard and brittle, being cemented by the magnetite. An analysis of a specimen from this bed, furnished by Dr. Hoffmann, gives metallic iron 33.40 per cent, siliceous insoluble residue 48.49 per cent. The percentage of quartz increases downward in the section, and thin layers found at eighteen feet from the top are nearly all quartz. Some of the red beds near the top are somewhat crystalline in appearance, but on a polished surface the rounded grains are quite apparent. At 27 feet below the top, the rock consists of a bright red, close grained jaspilyte, which in thin section shows well rounded grains of a bright red material, in all probability an eruptive, which was broken to a sand and cemented by quartz forming hard quartzite. The cementing quartz is in a fine mosaic and some of the red grains show minute cracks and sometimes a net-work of fissures which are filled by the same mosaic. In a few of the grains that have less of the colouring matter, the material is a reddish chalcedonic quartz with a dark red staining around the margin. At about 30 feet down in the section, the red sandstones alternate with dark rusty-weathering coarse slates. At 35 feet, the dark semi-crystalline beds are composed mainly of small particles of quartz and magnetite. The percentage of magnetite, as determined by Dr. Hoffmann, is very high—the metallic iron content being 68.62, the insoluble residue 4.21 with no trace of titanic acid. This would make a very good ore but it appears to be in very thin beds alternating with the sandstones. As all these ores have a very high percentage of silica, owing to the bands of sandstone, but a reduction of this constituent might be had by selection or some mechanical process. From many of the beds between 40 and 50 feet in the section, thin members are found to be nearly pure magnetite, while the thicker beds are of the dark red sandstone containing less of the iron ore. A talus covers the section from 50 to 70 feet. Dark hard beds with narrow partings of slates similar to the top beds are found down to 80 feet. The lowest beds, or down to 90 feet, are very dark red sandstones of the same character as those above, but the outside of the grains and in many cases the whole individual is composed of the iron ore. An analysis of a specimen from the lowest bed exposed shows less iron than in the slates at the top; besides the lower members of this section are very hard. This rock contained metallic iron 27.72 per cent. and insoluble siliceous residue 61.12 per cent. These samples are not specially rich in iron, but serve to show that the whole mass of this hill contains a large amount of low grade ore. The three samples analyzed are from the top, middle and bottom of the section.

On the small island in the northern lake a cliff of limestone was found. The beds exposed are somewhat similar to those seen on the Ekwan at the upper rapids. In this cliff there seems to be a great mass of broken fragments of corals and shells, mixed with what appears to be limestone fragments, the whole forming an agglomerate. The colour is an ashy gray. Beneath the water the beds are yellowish and of a finer grain. A few badly preserved fossils were collected, but among these Dr. Whiteaves has recognized or described the following species: *Zaphrentis Stokesii; Favosites Hisingeri; Phænopora Keewatinensis; Stropheodonta* sp. indet.; *Calymene Niagarensis* (?); *Encrinurus* sp. indet. Limestone fragments are numerous along the shores to the south of this, to within four miles of the narrows, and are derived no doubt from the beds beneath the water.

In the southern Sutton Mill lake limestone pebbles are also numerous, but they are mixed with fragments of other rocks and are derived from the boulder-clay of the banks, while marine shells from the upper marine clay are also mixed with them. The timber seen along this lake is mostly spruce and tamarack. The heaviest growth is in the valley at the southern end of the lake, and along the small streams draining into it from the west. In going up the lake, the timber gradually becomes smaller, though at the portage between the two lakes there is a fair grove of spruce, and a few poplars form a fringe along the southern slope and on the lower ground south of the narrows. In the northern part there is one grove of poplar on the western ridge, four miles north of the narrows, growing on a ridge which seems to be made up of limestone fragments and therefore well drained. This grove is quite parklike, it being carpeted by grass instead of the almost universal moss which seems to cover the whole country. The spruce is mainly the black species (*Picea nigra*) and scarcely any trees of the white spruce are seen. Of the poplar, both species are found on the Ekwan, but on the lake *Populus tremuloides* seems to range farthest north. Near the north end of the lake the spruce trees become not only small, but are separated from one another by mossy openings, as if they had been set out artificially. Along the top of the bank the fringe of trees is thin, and at the outlet, Trout river, a patch of burnt country will in a few years be bare.

The country seems to be nearly devoid of game, but the waters of the lake are well stocked with a slender kind of lake trout, and in the stream draining north and at the narrows brook trout were found in large numbers up to three pounds in weight Along the shores marine shells from the clays of the sides of the valley are found along with those of fresh water species now existing. These latter embrace the following:—*Valvata tricarinata*, Say; *V. sincera*, Say; *Planorbis parvus*, Say; *Limnæa stagnalis*, *L.; L. palustris*, *Müller;* and *L. catascopium*, Say; as determined by Dr. Whiteaves.

Coast of James Bay from Ekwan River Northward

In the bay into which the river empties there are many bars, but the main channel leads straight out to sea for a short distance and is then diverted north and south by a long bar which shoals at half tide. This bar is about three miles from low tide mark. There are two or three branch channels just at the mouth, through the gravel and mud delta, but these are used only when the tide is in. Along the shore to the point about five miles north of the river the general slope of the shore is fairly steep, that is, the mud flats do not extend out very far. The resident Indians call this point "Niahkow" (the sandy point), but it seems to be made up principally of mud and boulders, with a sandy beach ridge at high tide. The boulder bar stretches out far to the east at low water. We saw it only at half tide and then had to make a long detour around it with the canoes. Several small brooks break through the ridge to the bay, and tent poles at these places indicate their occasional use as halting places or camps.

The timber line is here near the shore, but runs at some distance back of the point from Niahkow northward; for about ten miles the shore is fairly straight but shallow, with few boulders on the mud flats. The beach ridge is separated from the timbered land behind by a narrow strip of mud, which in some places is covered by grass and a few small willows. A high gravel bar lying about a mile off shore marks the mouth of a small stream, which is an outflow from the Ekwan river. The stream is small and flows in a shallow sheet over the mud flats, so that it cannot be entered even by canoes except at high tide. Here the higher beach ridge is near the timber line and a mud flat extends out 200 yards to a second gravel ridge which has been formed in front by the high tides. A lower ridge is now being formed in advance of this again, but it is covered by the highest tide. When the tide is out, it dries or uncovers to beyond the high gravel bar opposite, or to the north of the mouth of the river. The evening we arrived at this place, the Indians who were camped there pointed out to us a white object on the bar, and by examination with the glass it proved to be a wandering white bear which had come ashore on a piece of ice. Our friends were rather nervous over the matter, but the animal had disappeared by morning, and the only other traces of this species were some tracks that were seen along the shore farther to the north.

Northward from this brook there is a slight bend in the coast to the west to form a shallow bay and at about ten miles from the brook a fair sized stream called locally Wabishew Sipi (Swan river) enters the bay. The shore of this bay is flanked in many places by sand ridges, but as we passed at low tide we saw only part of the shore, and the mouth of the river being at a distance was hard to make out. As the shore here is backed by a uniform line of small spruce trees, varied occasionally by higher bunches or groups, a grove of poplar which shows on the left bank of the stream when opposite, is about the only indication of the presence here of a river. Northward from this stream the shore bends slightly to the east again, and a point sixteen miles north of the river is in the same longitude as the mouth of the brook which comes from the Ekwan river. At eight miles from Raft river, gravel bars that form small islands at half tide run out from the shore to the southeast, and behind these the shore ridge for a short distance is wanting, and the mud slopes up gradually to a grassy flat. The tree line of small spruce follows the shore pretty closely for about fifteen miles north, but it then leaves the beach and turns to the north-west.

The points are merely high gravel ridges, which are formed parallel to the shore in an irregular order. The intervals between are connected by lower ridges forming loops. Another series is also found in a few places near the tree-line belonging to an earlier set. Small streams are found running out by the gaps in the shore ridges and afford camping places between the mouths of the larger streams. At thirty miles north of the Raft river two high sand bars or small islands are again seen near the shore.

They are situated inside the tide-line and at low tide are not reached by the sea. Opposite, on the mainland, a narrow fringe of trees forms a point behind which the tree-line bears off toward the northwest. This may be the "Point Mourning" referred to by Capt. Coats, as being so named from the burying of one of Capt. James' men there. James' account does not mention this occurrence, and he appears to have landed on this coast only at Cape Henrietta Maria.

Extensive Mud Flats

Sailing along in a canoe, the shore-line seems very far away, but gulls, yellow-legs and other small birds were perched along on the edge of the mud and were the principal guide to the direction of the shore-line, as the mud flats look like smooth water, since there is always so much water draining down the slope.

Several large boulders appear at low tide at this point, and there are also two high gravel bars opposite the end of the trees. From Point Mourning northward, the shore turns about north-west as far as the Opinnagow river, and the beaches seen at high tide disappear and the slope of the shore becomes much flatter. Long shallow ridges of clay run out to the north-east, just after passing Point Mourning, and on these are scattered many boulders. The larger ones are frequently near the shore, but they do not seem to indicate having been shoved in any direction by the ice, as is so often shown on the shores of such shallow lakes as Lake Winnipegosis. The shore slopes upward very gradually, and is of mud to the highest point.

At the margin of the ordinary tides a thick wiry grass covers the surface, and is succeeded by a small scrubby willow which extends back to the timbered country. Several brooks and small rivers enter the bay just to the north-west of Point Mourning. A stream called Nowashe river, at eight miles from the point, cuts a wide but shallow channel through the mud, but it is not deep enough to enter except at high tide and is probably an overflow channel from the Patchipawapoko, the next stream which comes in at about eleven miles from the point. The mouth at low tide is wide but very shallow and dotted with boulders. The sand bars which have formed the beach end before reaching this stream, and are succeeded by mud shores. These extend along for six miles between the last stream and the Opinnagow river, which is the largest along this part of the coast. The channel leading to this river is deeper at low tide than any of the others. Instead of a broad shallow bar at the mouth, the river is divided into two channels by a grassy island near the sea. That to the south is probably the larger, but is impeded by boulders. At low tide there is a shallow part near the line of high tide where the greatest accumulation of the boulders is found, but below this and out to low tide the boulders are less frequent. At low tide the entrance to this channel is two or three feet deep, so that a small boat could get in and come up the river as the tide deepened the channel. The main difficulty would be in finding the river at all, as there is so little to mark its position—the tree line being so far from the shore.

Along this part of the coast there are no bars visible at any distance from the land, as is the case along that part near the mouth of the Ekwan.

Although the coast is very flat the navigation for small boats does not offer any great difficulties except from the want of harbours. Our guide thought that a small sail-boat could be taken into the mouths of Raft and Opinnagow rivers, and that as the shore was fairly free from boulders, the boat could if necessary be run ashore without damage at high tide and left in the mud.

The great objection to this method of finding harbour is in the fact that the tide does not maintain an even flow or ebb, being influenced to a very large extent by the direction and force of the wind. The ordinary flow of the tide may be assumed to be about six feet, but a heavy north wind may raise it to over twelve and a south wind will lessen the flow, though not to such a large amount.

Geology

The formations observed in the district consist of (1) the Cambrian rocks of Sutton Mill lakes; (2) the Silurian limestone bordering the west shore of James bay and the south shore of Hudson bay; and (3) the clays which form the general covering over nearly all the country left by the ancient glacier and the retreating ocean.

Cambrian

The rocks which are probably of this age are closely allied to those previously described by Dr. R. Bell and afterwards by Mr. A. P. Low on the east coast of Hudson bay and in the narrow belt of islands parallel to that shore—the Manitounuck, Nastapoka and Hopewell islands—and the narrow strip along the coast in the neighbourhood of Manitounuck sound and at Richmond gulf. These were described by Dr. Bell in the report for 1877-78, pp. 11-19, and called the "Manitounuck Group," and their similarity to the rocks of the Lake Nipigon region was pointed out.

The section there recorded, is in a general way, made up of quartz conglomerates, quartzites and sandstones. Associated with and over-lying them is a series of cherts and shales, mostly dark coloured. Over-lying these beds is a heavy trap overflow and the total thickness of the series is placed at about 2,800 feet. This great thickness is not found on the west side of the bay, however, but the upper part is probably there represented. The lower part is no doubt concealed by the Silurian limestones which are deposited along the margin, flanking it, not only on the Hudson bay side, but also to the south in the valley of the Ekwan river. The thickness of the marine clays and till which surround this rocky ridge, also conceals the underlying rock, and it is only in such an erosion valley as that of the lake above referred to, that exposures of the beds beneath the trap can be seen.

In the vicinity of Sutton Mill lakes the series is nearly horizontal, inclining slightly to the north toward the basin of Hudson bay and as exposed consists of a thickness of

Narrows, Sutton Mill Lakes. Photo by D. B. Dowling

90 feet of sandstone and slates, capped by an extrusive trap showing a thickness of 150 feet. The sandstones and slates here, as well as on the Labrador peninsula, are impregnated with iron oxides chiefly in the form of magnetite and hematite. The sandstones exposed are composed of rounded and flattened grains of a reddish chalcedonic quartz surrounded by a slight deposit of the iron ore, and the interspaces are filled by a fine mosaic of quartz. In the darker coloured rock the grains are surrounded, and in parts replaced, by magnetite, while the interstitial quartz is less in amount. The appearance of the beds is that of a banded jasper, consisting of red beds separated by numerous narrow seams of a dark slate. On smooth surfaces the individual grains of the sandstone are distinctly shown. The slates which occupy the upper part of the section are made up of minute fragments of quartz, both red and colourless, forming 50 per cent of the mass, while the remainder is made up of a series of opaque particles which, from the result of an analysis of the rock, is probably largely magnetite.

These rocks, when compared with those from the Animikie of Thunder bay, present many features in common. Their description as given by Mr. E. D. Ingall (Annual Report, Geo. Surv. Can., vol. III., p. 81 H.) shows that the general character is very much the same, but in the Sutton Mill lakes rocks the calcareous and dolomitic portions are wanting or have been replaced. The only mineral of economic importance observed in this series is iron. Magnetic ores of this metal are freely distributed throughout the whole of the section of the stratified series, but the fact that these ores are not generally concentrated in thick enough beds would count against their practical value. Closer examination might show that the richer parts of the section could be profitably worked. A few specimens from the exposure were brought in to the laboratory, and analyses of three were made. These are from the upper part of the section, the centre, and the lowest bed. The analyses of the three samples, as furnished by Dr. G. C. Hoffmann, are given below:—

From the upper bed—	
Metallic iron	33.40 per cent.
Insoluble siliceous residue	48.49 "
Titanic acid	none.
From centre of the section—	
Metallic iron	68.62 per cent.
Insoluble siliceous residue	4.21 "
Titanic acid	none.
From lowest bed exposed—	
Metallic iron	27.72 per cent.
Insoluble siliceous residue	61.12 "
Titanic acid	none.

The upper and lower beds represent the general mass of the sandstone and slate, the first being the slate of the beds just below the trap and not picked out as being an iron ore, while the specimen from the base of the section was of the dark red sandstone or jaspilyte, which showed streaks in which the magnetite made up a large percentage. The specimen from the centre of the section represents one of many of the richer beds in which nearly all the silica has been replaced by magnetite. There is a probability that thick enough beds of this ore could be found for profitable working, but their remoteness from the sea or any line of railway would render their present value in any case very doubtful.

Silurian

The valleys of all the streams entering the western side of James bay are cut down through the drift deposits to a flat-lying limestone, which forms a wide belt around the west shore of the bay and along the southern shore of Hudson bay. On the Albany river the upper part of the series is proved to be of Devonian age, and beneath, at a greater distance from the sea, Silurian limestones are exposed. These beds probably overlap any older ones that may be beneath, and rest directly on the Archæan.

On the Attawapiskat river Dr. Bell recognized the Silurian in the upper reaches of that stream, but a small series of fossils collected farther down, near the bay, seemed to present a Devonian facies, and the rocks of this age were then supposed to extend northward to this river. The collection of fossils from the portage on the Ekwan river was as complete as we could make it in view of this fact. Many of the species formerly collected both from the Attawapiskat and the Severn rivers were of forms apparently new to science or undescribed, so that their value as horizon markers was not very great. My collection embraced many more species and some in a good state of preservation, so that Dr. Whiteaves had no difficulty in deciding at once that they were not Devonian but Silurian and that the species brought from the Attawapiskat river were in a great measure duplicated in this collection.

It seems therefore certain that the Devonian rocks are confined to the southern part of James bay and the adjacent country, extending a short distance north of the Albany river. On the Severn river Mr. Low collected fossils which appear to be of Silurian age.

The section of the Ekwan appears to be nearly horizontal, or the beds exposed in ascending the stream seem to be in an ascending series. The first appearance of the underlying rocks noted in ascending the stream is a colouration in the boulder clay, probably from a red shale in the bed of the river. Exposures of this were not seen, but higher up at the first heavy rapid, limestone of a gray to whitish colour in lumpy beds outcrops both below and at the rapid. The beds are very hard and dolomitic and contain very few fossils. At the next rapid the beds are yellowish and appear in thinner layers and of finer grain. The thickness exposed at both these rapids does not appear to be of any great amount, probably not over 20 feet.

The exposure at the portage is of a very irregularly bedded limestone, owing to the presence of large masses of porous or coralline formation, which has formed a very irregular surface for the succeeding layer which in consequence seems contorted. Below the coralline mass the beds are thin and of fine texture. The general colour is a grayish white and the rock is hard, tough and massive, and contains a greater variety of fossils than any of the other exposures. Lists of the species found at these several rapids are given in the general descriptions for the localities. All the exposures at the rapids above this have a very similar appearance, except that in the exposures near the last rapid of this series the lower beds are fragmental, or break with a lumpy surface and are ash gray in colour. Above these are yellow beds, in which there are numerous irregular cavities. The ashy coloured beds bear a very strong resemblance to the Devonian rocks of the south shore of Lake Winnipegosis, but do not hold different fossils from those at the portage on this river. The yellow beds which are full of cavities are similar to rocks of Silurian age on Cedar lake in the Saskatchewan district.

Other exposures of these beds occur to the north of the Cambrian rocks of Sutton Mill lakes, and are found very near them so that the continuity of the series around this mass both by the south to the Severn river and to the east by the coast is almost certain. On the extreme end of the eastern point at Cape Henrietta Maria, our Indian guide described exposures of what seemed undoubtedly to be limestone of about the same characteristics as that on the Ekwan river.

Post Tertiary

On all the rock exposures in the country adjacent to the Ekwan river, where the exposed surfaces have not been subjected to denuding agencies, glacial striæ have been recorded showing a movement of the ice mass toward the south-west. Only one exposure on the Ekwan showed such a striated surface, and this gave S. 40° W. All or nearly all the surfaces exposed in the valley were eroded by river action and the scouring effect of ice in the spring floods, so that the original glacial striæ were obliterated. The till left by this ancient glacier is deposited in an even mantle over the surface and contains a few boulders, but the fragmental portions of the mass are of small size. The depression of the earth's surface, owing to the weight of the ice sheet, is shown by the presence of marine clays on the surface of the boulder clay, and as these are of nearly the same composition as the clays beneath, the line of demarcation is hard to define. The marine clays extend up the Ekwan river to past the mouth of the Washagami and northward to and surrounding the ridge of trap which protrudes through the plain at Sutton Mill lakes. The extreme limit of submergence in the district to the south is given by Dr. Bell as 500 feet. Near Sutton Mill lakes the top of the marine terrace now stands at 400 feet above tide, so that the submergence of the present coast line was greater than this amount. The fossils which determine these clays include the following species: *Saxicava rugosa. Mya truncata. Macoma calcarea* and *Cardium ciliatum.*

APPENDIX I

Preliminary list of fossils from the Silurian (Upper Silurian) rocks of the Ekwan river, and Sutton Mill lakes. Keewatin. collected by D. B. Dowling in 1901. with descriptions of such species as appear to be new.

By J. F. Whiteaves

Anthozoa[36]

Tetracoralla

Zaphrentis Stokesii. Edwards and Haime.
Ekwan river: portage road at falls, two specimens: and upper rapid, two specimens. Small island in the northern of the two Sutton Mill lakes: four specimens.

Pycnostylus Guelphensis. Whiteaves.
Ekwan river: portage road at falls, one specimen; and foot of portage road, one specimen.

Pycnostylus elegans. Whiteaves.
Ekwan river, portage road at falls: one specimen.

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[36] The Anthozoa have kindly been determined by Mr. L. M. Lambe.

Hexacoralla

Favosites Gothlandica, Lamarck.

Ekwan river: foot of portage road, five specimens; portage road at falls, one specimen; and upper rapid, one specimen.

Favosites Hisingeri, Edwards and Haime.

Ekwan river: lower rapid, one specimen; foot of portage road, one specimen; and portage road at falls, one specimen.

Small island in the northern Sutton Mill lake; one specimen.

This species occurs also in the Niagara and Guelph formations of southern Ontario.

Octocoralla

Halysites catenularia, L.

"The typical form, as identified by Canadian and United States palæontologists, under this name or that of *Catenipora escharoides*, Lamarck, and *C. agglomerata*, Hall." Lambe.

Ekwan river, foot of portage road: one specimen, that, according to Mr. Lambe, is like specimens from the Niagara and Guelph formations of Ontario and from Division 4 of the Anticosti group of Anticosti. *Lyellia superba.* (=*Trematopora superba*. Billings.)

Ekwan river, portage road at falls: one specimen.

Hydrozoa

Stromatoporoidea, genera and species undetermined.

Ekwan river, portage road at falls: two fragments, which seem to be referable to different genera.

Echinodermata

Crinoidea, genera and species uncertain.

Ekwan river, portage road at falls: a cast of the interior of a dorsal cup, that shows little more than the general shape and the impress of a few large hexagonal plates. Foot of portage road: two portions of finely annulated columns, which are circular in section and perforated by a pentalobate axial canal.

Polyzoa

Fenestella subartica, sp. nov.[37]

Zoarium spreading, somewhat fan-shaped, but probably funnel shaped when perfect. Branches very slender, carinated on the celluliferous face, and averaging from a fourth to a third of a millimetre in thickness. Bifurcations very infrequent in the only specimen collected, occurring at intervals of five mm. or more. Interstices much wider than the branches. Dissepiments about one mm. apart, or four and a half to five in the space of five mm. Fenestrules longer than wide, irregular but somewhat rectangular, nearly or quite a mm. long and approximately about half as wide as long. Zoæcial apertures circular, in two ranges, opening somewhat laterally, twenty in each range in the space of five mm., and three or four on each side in the length of a fenestrule, closely disposed but separate, slightly irregular in their disposition, sometimes alternate on the two sides of the keel, sometimes opposite, their margins indenting the borders of the fenestrules. Under a highly magnifying simple lens, the keel appears to be minutely spinose in places.

Ekwan river, portage road at falls: one fairly good specimen. Mr. R. S. Bassler, of the U. S. National Museum, to whom the writer is indebted for critical suggestions in regard to the structural peculiarities, and affinities of this and the following species, writes that the zoæcial apertures of this *Fenestrella* "seem unusually large, but this is due to the removal of the outer investment of the zoarium."

Phœnopora Keewatinensis, sp. nov.

Zoarium bifoliate, branching, consisting of a thin flattened frond which is six millimetres wide on an average, but ten mm. wide at a bifurcation, and which bifurcates at intervals of about eleven mm. Zoæcia rhombic, a little longer than wide, seven in two millimetres measuring lengthwise and eight to eight and a half measuring transversely, divided by thin, straight longitudinal partitions, which form their sides and separate them into longitudinal rows. Apertures of the zoœcia obliquely ovel. Surface marked by arching striæ, which curve convexly forward.

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[37] It is hoped that the new species described in this appendix will soon be illustrated in one of the palæontological publications of the Survey.

Small island in the northern Sutton Mill lake, one specimen. In regard to this specimen, Mr. Bassler writes as follows: It is "a *Phænopora* closely allied to several Clinton species, but which I should regard as new. In zoœcial structure it is very close to *P. multifida*, Hall, and especially to *P. fimbriata*, James. *P. multifida* has a different zoœcial growth and slightly larger zoœcia. *P. fimbriata* has about the same zoœcial measurements, but the growth of the zoarium is quite different."

Seven other species of *Phænopora* are known to occur in the Cambro-Silurian and Silurian rocks of Canada. These are: *P. incipiens*, Ulrich, from the Trenton limestone of Montreal; *P. constellata*, *P. ensiformis* and *P explanata*, Hall, also *P. punctata*, Nicholson and Hinde, from the Clinton and Niagara formations of Ontario; and *P. excellens* (*Ptilodictya excellens*, Billings), and *P. superba* (*Ptilodictya superba*, Billings), from the Anticosti group of that island.

Brachiopoda

Trimerella Ekwanensis, nom. emend.

Trimerella Equanensis, Whiteaves. 1902. Ottawa Naturalist, vol. xvi, p. 141, pl. II, figs. 1 & 2, pl. III, fig. 1.

Ekwan river, portage at falls: three ventrals and two imperfect dorsal valves.

The specific name is here slightly amended, in accordance with the more modern spelling of the name of the river.

Trimerella borealis.

Trimerella borealis, Whiteaves. 1902. Ottawa Naturalist, vol. xvi, p. 142, pl. III. figs. 2 & 3.

Ekwan river, lower rapid: a cast of the interior of both valves.

Stropheodonta, sp. indet.

Ekwan river, foot of portage road: one well preserved ventral valve, with the surface markings essentially like those of *S. varistriata*, var. *arata*.

Stropheodonta, sp. indet.

Small island in the northern Sutton Mill lake: two specimens, with the exterior marked by very fine, equal, radiating striæ.

Plectambonites transversalis (Wahlenberg).

Ekwan river, foot of portage road: two imperfect but characteristic ventral valves. In the Museum of the Survey there are specimens of this species from the Niagara group at Grimsby, Dundas, and Hamilton; from divisions 2, 3 and 4 of the Anticosti group, four miles west of the Jupiter river, at Eastpoint, and at the Jumpers, Anticosti; also from the Silurian (upper Silurian) rocks of Lake Temiscouata, N.B.

Orthis, sp. indet.

Ekwan river, upper rapid: one half of the ventral valve of a small, rather coarsely ribbed and apparently undescribed species of *O. Davidsoni* type. A similar but more perfect valve, in the Museum of the Survey, was collected on the Fawn river, or branch of the Severn, by Mr. A. P. Low in 1886.

Camarotœchia Ekwanensis, sp. nov.

Shell small, moderately convex, transversely subelliptical and wider than long.

Ventral valve with an extremely small, narrow, erect or straight beak, behind, and a well defined mesial sinus, that extends backward to about the midlength, in front; the whole surface of the valve marked with thirteen rather distinct angular radiating ribs, three in the mesial sinus and five on each side.

Dorsal valve with a still smaller beak, and with a fold corresponding to the mesial sinus of the ventral, its surface marked with twelve angular ribs, four on the fold and four on each side of it.

Hinge area and interior of the valves unknown.

Ekwan river, portage road at falls: one well preserved cast of the interior of the closed valves.

This small rhynchonelloid may possibly prove to be an extreme variety of *C. neglecta* (the *Atrypa neglecta*, Hall, of the second volume of the Palæontology of the State of New York), from which it seems to differ chiefly in its transversely and rather narrowly subelliptical marginal outline.

Atrypa reticularis, L.

Ekwan river, foot of portage road: two small specimens.

Glassia variabilis, sp. nov.

Shell very small, strongly compressed and lenticular in outline in transverse section, or moderately convex and varying in marginal outline from nearly circular and sometimes a little wider than long to subovate and a little longer than wide.

Ventral valve with the front margin either nearly straight and devoid of sinus, or faintly sinuated, or provided with a rather wide but not distinctly defined, shallowly concave or not very deep, mesial sinus, that extends backward to about the midlength. Umbo of the ventral valve small, narrow and not very prominent or produced, its beak slightly incurved and apparently perforate.

Dorsal valve with the umbo and beak smaller than those of the ventral.

Surface apparently smooth.

Spiralia directed toward the dorsal side (Schuchert); jugum, muscular impressions, and hinge dentition unknown.

Dimensions of a typical and average specimen (from the Winisk river): maximum length, slightly over eight millimetres; greatest width, eight mm. and a half; maximum thickness, four mm.

Two small loose blocks of limestone from or near the mouth of the Winisk river, collected by Mr. W. McInnes in 1903, are almost exclusively composed of nearly perfect shells of this species, many of which have the spiralia, or internal spiral cones, preserved. Some of the best of these specimens have been examined by Mr. Charles Schuchert, of the U. S. National Museum, who writes as follows in regard to them in a letter dated March 9, 1904: "The spiral cones in the Winisk shell are directed toward the dorsal side, but I cannot see the jugum. For the present I would refer it to *Glassia*. In external characters it is very near to *G. subovata* (Sowerby), but the difference in the spiralia will distinguish them, as the latter has the cones inwardly or medially directed. This difference is certainly of specific value, but for the present I should not regard it as of generic importance, as different genera of the Atrypidæ have the spiralia directed either laterally, medially or dorsally."

Ekwan river, foot of portage road, one specimen; Fawn river (or branch of the Severn), thirteen specimens; all of which are probably referable to this species, though none of them show any vestige of the spiralia or of any of the other character of the interior of the valves. They are, perhaps, a little more convex proportionately than the typical form from the Winisk river. The sinus in each of their ventral valves seems to be a little more developed. In these respects the specimens from the Winisk are more like the *Atrypa compressa* of Sowerby, and those from the Ekwan and Fawn rivers more like the *A. subovata* of the same author, both of which are now regarded as forms of *Glassia subovata*.

Spirifer crispus? Hisinger. Var.

Ekwan river, middle rapid: one good specimen of a small radiately ribbed *Spirifer*, that is apparently similar, in size and general shape, to the *S. crispus*, as described and figured by European and American palæontologists, but which has narrow and angular, not wide and rounded, ribs.

Spirifer (?) sp. indet.

Ekwan river: portage road at falls, one specimen; and at foot of portage road, one specimen; both casts of the interior of ventral valves that are possibly referable to *S. radiatus*, Sowerby, but that are much too imperfect and too badly preserved to be satisfactorily determined even generically.

Reticularia septentrionalis, sp. nov.

Shell strongly biconvex, but often with a faint, shallow, narrow longitudinal groove or depression in the median line of each valve; varying in outline in different specimens from subovate or somewhat pentagonal and a little longer than wide, to not far from circular and as wide as long, but always abruptly contracted and attenuate in the umbonal region behind; front margin of the valves straight and entirely devoid of a mesial fold or sinus.

Ventral valve with a narrow but prominent or produced umbo, a depressed, incurved and acute beak, and an extremely small delthyrium.

Umbo and beak of the dorsal smaller and less prominent.

Most of the specimens are little more than mere casts of the interior of the closed valves. Their surface is entirely devoid of ribs of any kind, and at first sight would seem to be marked only with concentric lines of growth. But, upon closer examination, numerous, obscure, close-set and very slightly raised concentric lines, or faint and minute, low, rounded ridges, can be detected on portions of the exfoliated test that happen to be preserved, and the shell structure, under a lens, is seen to be fibrous.

Characters of the interior of the valves unknown, though there are indications of a medium septum in each.

Ekwan river: lower rapids, one specimen; middle rapid, one specimen; and portage road at falls, four specimens.

This large and nearly smooth species is provisionally referred to the genus *Reticularia* on account of its general resemblance to *R. modesta* (Hall), and *R. perplexa* (McChesney), which is the *Spirifer lineatus* of Shumard and other American palæontologists, but not of Martin; though it may prove to be a *Martinia*.

Reticularia (?) sp. indet.

Ekwan river, foot of portage road: two specimens, each of which has the whole of the dorsal valve and most of the ventral preserved, though the umbo and beak of the latter are broken off. Both are transversely subelliptical in outline and wider than long, and both have a rather shallow marginal sinus in the ventral valve. They are entirely ribless, but the better preserved one of the two is finely and nodosely cancellated by numerous, close-set, minute concentric ridges, that are crossed by similar radiating ones.

At the portage road at the falls a specimen, with the same general shape and with a similar sinus in the ventral valve, was collected, but it is so much worn that its surface markings are quite obliterated, and the beak of the ventral is so imperfect that it is impossible to tell whether it was originally perforate or not. This specimen seems to correspond fairly well with E. Billings' figures of *Athyris Blancha*, from the Silurian rocks of Maine, which Hall and Clarke refer to *Meristina*, but which Schuchert says is a *Meristella*.

Meristina (?) *expansa*, sp. nov.

Shell tumid, regularly and rather strongly biconvex, transversely subelliptical and always a little wider than long; front margin of the valves not at all sinuated; surface entirely devoid of any kind of ribs.

Ventral valve with a rather depressed though slightly prominent umbo, and an incurved beak.

Dorsal valve with a much more depressed umbo and a smaller beak.

Surface markings of the exterior of the test unknown, those of its exfoliated inner layer consisting of numerous, close-set and very minute, concentric raised lines, as well as of a few rather distinct concentric lines of growth; structure of the test fibrous.

Characters of the interior of the valves unknown, though there is clearly a long mesial septum in the ventral valve, and apparently a similar one in the dorsal.

Ekwan river: portage road at falls, one specimen; and foot of portage road, an unusually large but imperfect specimen. Attawapiskat river, seventeen to thirty miles below Rainy island, Dr. R. Bell, 1886: eight specimens.

These specimens are mere casts of the interior of the closed valves, with small portions of the inner layer of the test attached to some of them. It is by no means clear whether the beak of the ventral valve of any of them is perforate or not. They are provisionally and very doubtfully referred to *Meristina*, on account of their general resemblance in external form to the European *M. tumida*, but it may be that they should rather be referred to *Meristella* or *Reticularia*. They seem to differ from *Reticularia septentrionalis* in their uniformly, transversely and broadly subelliptical contour, and in the more depressed umbo of the ventral valve of each.

Mollusca

Pelecypoda

Ambonychia undulata (Whitfield).

Leptodomus undulatus, Whitfield, 1878. Ann. Rep. Geol. Surv. Wiscons. for 1877, p. 81; and (1880) Geol. Wiscons., vol. iv, p. 293, pl. xviii, figs. 1 and 2.

Ekwan river: portage road at falls, an imperfect left valve; and foot of portage road, a nearly perfect and very convex right valve.

Both of these specimens are marked with "strong regularly rounded concentric undulations." Mr. E. O. Ulrich, who has kindly examined the five specimens of pelecypoda collected by Mr. Dowling, and to whom the writer is indebted for some critical suggestions in regard to them, thinks that *Leptodomus undulatus* is an *Ambonychia* allied to *A. planistriata*, Hall, and that the former had fine surface radii.

Ambonychia septentrionalis, sp. nov.

Shell obliquely and acuminately subovate or subrhomboidal, very inequilateral, rather strongly convex, most prominent in the umbonal region of each valve. Anterior side very short, abruptly truncated, or rather inflected, and flattened; posterior side a little longer, broadly rounded at its extremity and forming a subangular junction with the hinge line above. Umbones prominent, tumid but rather narrow; beaks incurved, anterior, and almost if not quite terminal; hinge line straight behind the beaks, equal to about two-thirds of the greatest length of the valves beneath.

Surface marked with a few faint and obscure concentric undulations and lines of growth, also by extremely minute radiating lines. Test very thin.

Hinge dentition and muscular impressions unknown.

Ekwan river, portage road at falls: a cast of the interior of both valves, with part of the test preserved.

This shell is rather similar to the *A. affinis of* Ulrich from the Middle Galena of Minnesota and Illinois, both in its shape and surface markings. But, in the former the posterior end is more broadly rounded and not so much produced below, and the radiating raised lines of the surface are much more minute.

Mytilarca pernoides, sp. nov.

Shell compressed convex, rather obliquely subovate and very inequilateral, or broadly mytiloid and subalate behind. Anterior side very short, truncated or abruptly inflected above and rounded below; posterior side a little longer, its outer margin truncated somewhat obliquely and forming an angular or subangular junction with the cardinal border above, but rounded below. Cardinal border behind the beaks straight, its entire length equal to fully two-thirds or more of the greatest length of the valves below; hinge area large; umbones apparently not very prominent; beaks appressed, incurved and almost terminal.

Surface marked with a few impressed and concentric striæ of growth; test rather thick.

Hinge with both cardinal and lateral teeth; muscular impressions unknown.

Ekwan river, portage road at falls: one testiferous left valve.

Mr. Ulrich thinks that this shell is "closely related to, if not quite the same as, *Ambonychia aphæa*, Hall," from the Niagara limestone of Illinois, which he (Mr. Ulrich) referred to *Mytilarca* in 1894, in the seventh volume of the Reports of the Geological Survey of Ohio. *A. amphæa*. however, was based upon a mere cast, which does not show the proportionate length of the hinge line, the size of the cardinal area, nor the surface markings, so that it is scarcely possible to make a satisfactory comparison between it and the specimen from the Ekwan river.

Ctenodonta subovata, sp. nov.

Shell small, inequilateral, moderately convex, subovate and one fourth longer than high. Anterior (?) side short and rounded; posterior (?) side produced, a little longer, and more narrowly rounded at its outer termination; ventral margin gently convex; superior border sloping abruptly downward in front of the beaks and much more gradually so behind them; umbones small and moderately prominent; beaks also small, incurved and placed in advance of the midlength; ligament external, short, placed on the shorter end of the hinge line.

Surface faintly, very minutely and concentrically striated.

Hinge dentition and muscular impressions unknown.

Dimensions of the only specimen collected: maximum length, twenty millimetres; greatest height, fifteen mm. and a quarter; maximum thickness, ten mm. and a quarter.

Ekwan river, portage road at falls: one testiferous specimen, with both valves.

The homologies of the shell of *Ctenodonta* are unknown, and it is not at all clear which is the anterior and which is the posterior side of this species. If the shorter is the posterior side, as in Nucula and as would seem to be indicated by the position of the ligament, then the beaks of this species are placed a little behind the midlength and *vice versa*.

"In outline this shell agrees very nearly with my *C. simulatrix* and less closely with *C. Albertina*. but these species had the ligament on the longer, instead of the shorter end of the hinge." Ulrich.

Gasteropoda

Pleurotomaria (or *Euomphalopterus*) sp. indet.

Ekwan river, upper rapid: five badly preserved casts of the interior of the shell of a widely umbilicated species of *Pleurotomaria* or *Euomphalopterus*, with a very low obtuse spire. These specimens are very similar in shape to casts of *Pleurotomaria Valeria*, Billings, which is probably an *Euomphalopterus*, but the outer whorl of each is not so distinctly keeled at the periphery.

Euomphalopterus. sp. indet.

Ekwan river, foot of portage road: a specimen of the upper half of the shell completely worn away, the basal half, which is all that is left, being narrowly umbilicated and showing part of a peripheral alation.

Megalomphala robusta, sp. nov.

Shell large for the genus, strongly convex but deeply and rather widely umbilicated on both sides, the umbilicus occupying about one half of the entire diameter though its margin is not very distinctly defined. Whorls at least three and perhaps more, increasing very rapidly in size and laterally expanding, coiled closely on the same plane and every where in close contact, but with little or scarcely any overlapping; their periphery encircled by a continuous slit-band; exposed portions of the inner ones truncated almost vertically but somewhat obliquely on each side. Outer whorl rounded on the periphery in some specimens, faintly and obtusely subangular in others, distinctly subangular around the umbilical margin at both sides, the umbilical wall being steep but somewhat oblique. Slit-band narrow, in half-grown specimens moderately elevated and bounded on each side of its summit by a spiral raised line, but this minute double keel becomes obsolete on the outer half of the last volution, in adult shells. Outline of transverse section near the aperture subreniform and much wider than high in some specimens, but somewhat triangular and nearly or quite as high as wide in others; outer lip not preserved in any of the specimens collected, but apparently not abruptly expanded; apertural slit unknown.

Surface of most of the specimens collected marked only with curved, transverse striæ of growth, but in one specimen the markings consist of small, narrow, thin transverse ridges, with flat spaces between them.

Ekwan river, portage road at falls: seven specimens, all of which are imperfect at the aperture. The largest is seventy-two millimetres in its maximum diameter.

The generic name *Megalomphala*, Ulrich, 1897, is, however, too close to *Megalomphalus*, *Brusina*, 1871.

Salpingostoma boreale, sp. nov.

Shell small, consisting of three rounded volutions that are a little wider than high and coiled on the same plane, in close contact, with little or no overlap, or at least closely contiguous if not actually in contact; umbilicus wide and open, exposing most of the inner whorls. Aperture trumpet shaped, lip widely and abruptly expanded.

Surface marked with minute rounded spiral ribs, that are crossed by small, crenate, lamellose raised ridges. The silt-band is not well shown in either of the few specimens collected, but it seems to be narrow, and continuous, at least at some distance behind the aperture.

Ekwan river: middle rapid, foot of portage road, and portage road at falls; one specimen from each of these localities. The largest of these specimens, though only twenty-three millimetres, or less than an inch, in its maximum diameter, has an abruptly expanded aperture. The other two are obviously immature shells, each about eleven mm. in its greatest diameter. In one of them the posterior half of the earliest volution is free from, and not quite in contact with, that which immediately succeeds it.

It is only in the continuity of the slit-band that this species and shells of this genus are supposed to differ from *Tremanotus*, or as Dr. Paul Fischer spells it, *Trematonotus*.

Euomphalus, sp. indet.

Ekwan river, lower rapid: a cast of the interior of part of the outer whorl of a large species.

Gyronema speciosum, sp. nov.

Shell quite large for the genus, imperforate, turbinate, a little higher or longer than wide, spire slightly higher than the outer whorl. Whorls, six or seven, rounded, ventricose; aperture widely subovate, not far from circular, lip thin and simple.

Surface marked with numerous and rather close-set small spiral ridges, that are crossed by still more numerous, more close-set and minute, transverse raised lines. On the last whorl but one there are about eight of these spiral ridges, and on the last or outer one there are not less than twelve and probably as many as fifteen.

Ekwan river, portage road at falls: two specimens. The larger of these was probably about forty-five millimetres high or long, when perfect, and its maximum width is thirty-five mm.

Gyronema Dowlingii, sp. nov.

Shell turbinate, higher or longer than wide, spire elevated, volutions rounded and ventricose; umbilicus almost or quite closed. Lower whorls of the spire marked with three rather distant, acute and prominent spiral keels. Outer whorl encircled by four comparatively large spiral keels and by a few much smaller spiral ridges, or minute raised lines. Between the second and third spiral keels there are three close-set, low and rounded, minute spiral raised lines, and there are indications of a few small spiral ridges in the umbilical region, below the lowest of the four large spiral keels.

Ekwan river, portage road at falls: one imperfect specimen with the apical whorls broken off, but with the test preserved on the last two whorls of the spire, and on part of the outer whorl.

A rather smaller species than the preceding and with very different sculpture. It is somewhat similar in shape to the *Cyclonema sulcatum* of Hall, from the Guelph formation of Ontario (which is probably a *Gyronema* rather than a *Polytropis*). But the whorls of *G. Dowlingii* are not shouldered above, its suture is not channeled, and its outer volution is encircled by only four large spiral keels. *G. Dowlingii* is still more closely allied to, but apparently quite distinct from the *C. cariniferum* of Sowerby, as figured by Lindström in his monograph of the Silurian Gastropoda and Pteropoda of Gotland, which Ulrich says is a *Gyronema.*

Gyronema brevispira, sp. nov.

Shell rather small, turbinate conical and wider than high; spire shorter than the outer volution. Whorls four or five, those of the spire obliquely compressed: last whorl of the spire angulated and carinated below, next to the suture; outer whorl obliquely compressed above, rounded and almost imperforate below, the umbilicus being represented by a minute, short and very narrow chink behind the columellar lip; aperture ovately subcircular; lip thin and simple.

Surface encircled by small narrow and acute spiral keels. On the last whorl but one there are five of these keels, and on the outer whorl eleven.

Ekwan river, portage road at falls: two specimens.

Loxonema, sp. indet.

Ekwan river, at the following localities. Foot of portage road, a specimen of a small slender species, with six whorls preserved; and, upper rapid, a much more imperfect but otherwise similar specimen. Portage road at falls, a fragment of a larger shell, with apparently similar characters, but with only two of the whorls preserved.

Orthonychia obtusa, sp. nov.

Shell straight, conical, slightly compressed at the sides, but more so on the right than on the left side, and moderately elevated, the height being less than the maximum length at the aperture or base. Apex erect, bluntly pointed and rather eccentric; base with two faint, obscure, shallow undulations on the right side. Aperture and outline of transverse section at and near the base, subovate but somewhat irregular in outline; lip shallowly undulated on the right side.

Surface markings unknown, though cases of the interior are quite smooth, and the exterior of large pieces of the thin and presumably inner layer of the test that happen to be preserved is marked with numerous, irregular and often not continuous, fine concentric striæ. Mucular impressions unknown.

Ekwan river, foot of portage road: two specimens, that are very different in shape to any species of *Orthonychia* or *Platyceras* that the writer is acquainted with.

Platyceras compactum, sp. nov.

Shell turbinate, imperforate, a little wider than high, spire small and short. Whorls certainly three and probably as many as four or five in perfect specimens (the apex being broken in both of those collected), rounded, closely coiled and increasing rapidly in size; outer whorl inflated and expanded, with two faint low rounded spiral plications near and at the aperture in young specimens, and from three to four in adult ones.

Surface marked with numerous, close-set, transverse lines of growth, that are flexuous where they cross the spiral plications.

Ekwan river, portage road at falls: one apparently adult and one half-grown specimen. The former, which is well preserved and nearly perfect, is thirty-five millimetres wide, and was probably about thirty mm. high when perfect, allowing two mm. for a small piece broken off at the apex.

Diaphorostoma perforatum, sp. nov.

Shell depressed turbinate, much wider than high; spire short, raised very little above the highest level of the outer whorl; base narrowly but deeply umbilicated. Whorls five, increasing rapidly in size, those of the spire flattened above and rounded below; the outer one rounded and ventricose, but depressed at the suture above; umbilical margin rounded and very indistinctly defined. Aperture rounded subovate, pointed above and slightly insinuated on the columellar side by the encroachment of the preceding whorl, wider and rounded below; lip thin and simple; characters of the columella not well shown in the only specimen collected.

Surface marked with numerous close-set, nearly straight and very minute, transverse raised lines, that are scarcely visible without the aid of a lens; also by a few larger and more distant impressed lines of growth.

Ekwan river, middle rapid: one nearly perfect specimen, with the test preserved.

This shell seems to be referable to the genus *Platyostoma*, Conrad (1842), but Lindström asserts that this name is preoccupied by Klein in 1753, by Meigen in 1803, and by L. Agassiz in 1829. For this reason Dr. Paul Fischer (in 1885) proposed to distinguish Conrad's genus by the name *Diaphorostoma*, though Lindström maintains that both *Platyostoma*, Conrad, and *Strophostylus*, Hall, are mere synonyms of *Platyceras*. Fischer explicitly states that the only difference between *Diaphorostoma* and *Strophostylus* is the obliquely folded columella of the latter, while Eastman, in the first volume of his recently published translation of Zittel's "Text-book of Palæontology," quotes *Strophostylus*, Hall, as a synonym of *Platyostoma*, Conrad.

Strophostylus amplus, sp. nov.

Shell imperforate, subglobose, widely expanded and slightly depressed, about as wide as high, spire small and very short. Whorls four, increasing very rapidly in size, those of the spire rounded; the outer one moderately convex as viewed dorsally, expanded widely in the direction of its height, widest above the midheight and rather narrowly rounded at the base; suture distinctly impressed; aperture very large, apparently widely subovate; outer lip thin and simple; characters of the columella not well shown in either of the specimens collected; posterior portion of the outer lip extended considerably, so as to embrace part of the preceding whorl.

Surface marked with fine transverse striæ of growth, which are curved convexly forward parallel to the outer lip.

Ekwan river, portage road at falls: three specimens, which do not show the exact shape of the aperture at all well. The interior of each is completely filled with stone, so that the inner edge of the columella is covered, but in one of the specimens there are indications of a flexuous longitudinal groove just behind the columella.

Strophostylus inflatus, sp. nov.

Shell subglobose, naticoid, imperforate, about as wide as high, spire short. Whorls probably four in perfect specimens, though not more than three are preserved in the most perfect specimen collected, increasing rapidly in size, the outer one inflated and ventricose, most convex at about its midheight; aperture not well shown in the specimen described, but aparently subovate; outer lip thin and simple, its posterior portion apparently not so extended as to embrace part of the previous whorl.

Surface marked with obliquely transverse lines of growth.

Ekwan river, portage road at falls: a cast of the interior of the shell of a large specimen with small portions of the test preserved, from which the foregoing description was made, and two small specimens; also a large testiferous specimen that is probably referable to this species, though its outer whorl is considerably compressed laterally.

Strophostylus filicinctus, sp. nov.

Shell depressed turbinate and wider than high, spire rather short, less than half as high as the outer whorl, as viewed dorsally. Whorls, six or perhaps seven, rounded but slightly flattened at the suture above, increasing rapidly in size, the outer one strongly inflated, ventricose and imperforate at the base. Aperture subcircular, lip thin and simple.

Surface marked with extremely minute and close-set, low, rounded, spiral raised lines, and by fine transverse striæ of growth. On the last volution but two of one specimen there are nineteen of these spiral raised lines, and four and a half in a millimetre. On the outer whorl of an apparently adult specimen, and near the aperture, there are three spiral raised lines to a mm.

Ekwan river, portage road at falls: two specimens, with the minute surface markings well preserved. One of these is a testiferous specimen with nearly the whole of the spire preserved, but with the outer whorl almost completely broken off; and the other a cast of the interior of the last two whorls of the shell of an adult specimen, with a small piece of the test preserved, at and near the aperture. Beside these there are four specimens that are probably referable to this species, though none of them sow any trace of the minute spiral lines upon the exterior of the test. Three of these are from the portage road at the falls, and one from the foot of the portage road.

This species would seem to be congeneric with *Cyclonema cancellatum* of Lindström, from the Silurian rocks at Gotland, which Ulrich says is a *Strophostylus.*

Cephalopoda

Endoceras (or *Nanno*) sp. indet.

Ekwan river, portage road at falls: two fragments of siphuncles, or of a siphuncle, that are presumed to be referable to either *Endoceras* or *Nanno*, on account of their apparent homologies with specimens collected by Dr. Ells and the writer in 1902 in the Chazy or Black river limestone at Kingston Mills, Ont.

Actinoceras Keewatinense, nom. prov.

This is a provisional name for some peculiar, obliquely subnummuloidal and presumably submarginal siphuncles, or portions of siphuncles, somewhat resembling those of *A. cochleatum* (*Scholtheim*). They are longicone and increase very slowly in thickness, nearly circular in transverse section, and ĕncircled, at more or less regular intervals, by narrow and rather deep, obliquely transverse constrictions. Between these constrictions the siphuncle is laterally compressed and but slightly expanded, while its transverse diameter is from two to three times as great as the distance between the constrictions.

The surface markings of these siphuncles consist of fine close-set longitudinal striæ.

Rainy island, Attawapiskat river, Dr. R. Bell, 1886: three fine and rather slender specimens. Ekwan river, upper rapid: two distorted fragments.

The best specimen, from the Attawapiskat river, which shows ten of the siphuncular constrictions, is three inches and nearly a half in length, by twelve millimetres in diameter near the smaller end, and twenty-two near the larger. In this specimen the width of the siphuncle is about twice as great as the distance between two of the constrictions. In another equally slender but shorter specimen from the same locality, which shows seven siphuncular constrictions, the width of the siphuncle is nearly three times as great as the distance between the constrictions, at the smaller end; and only twice as great at the larger.

Kionoceras cancellatum (Hall).

Orthoceras cancellatum (Hall), 1852.
Orthoceras columnare, Hall, 1866. Not *O. columnare*, Marklin, 1857.
Orthoceras Scammoni, *O. Hoyii*, *O. lineolatum*, and *O. irregulare*, McChesney, 1861; teste Hall.
Orthoceras Woodworthi, McChesney, 1865; teste Hall.
Orthoceras Cadmus, Billings, 1886.
Orthoceras angulatum, Hall, 1867. But not *O. angulatum*, Wahlenberg, 1821.
Orthoceras virgatum, Hall, 1867. Not *O. virgatum*, Sowerby, 1839.
Orthoceras subcancellatum, Hall, 1877.
Orthoceras orus, Hall, 1877.

Ekwan river: portage road at falls, two fragmentary specimens, the largest less than two inches in length; and middle rapid, two similar fragments; all of which seem to be referable to this species. Each of these specimens is a portion of a longicone orthoceratite, with a circular transverse section, a central or nearly central siphuncle, and marked with narrow longitudinal ridges, separated by wider grooves or intervals, with minute, close-set, transverse, raised lines between them. Specimens with similar external characters have been found in the Niagara and Guelph formations at three localities in Ontario and Quebec. These are the *Orthoceras Cadmus*, of Billings, from Grimsby and Elora; a specimen from Elora that the writer has referred to *O. Scammoni;* and a specimen from L'Anse à la Barbe, near Port Daniel, in the Baie des Chaleurs, in the Museum of the Survey, labelled *O. virgatum*, by E. Billings.

O. Cadmus, *O. subcancellatum* and *O. orus* are names that have been given to this shell on the assumption that Hall's *Orthoceras cancellatum* is not the same as the *Orthoceratites cancellatus* of Eichwald. Billings, in a paper entitled "New Species of Fossils from the Clinton and Niagara Formations" and published with his "Catalogues of the Silurian Fossils of the Island of Anticosti," says that his *O. Cadmus* appears to be *O. cancellatum*, Hall, not Eichwald. And in the explanation of fig. 11, of Plate 19 (10) of the Twentieth Regents' Report, Hall says that the character of the surface of impressions of the exterior of specimens from Wisconsin and Illinois that he figures and refers to *O. angulatum* and *O. virgatum*, is "precisely like that of *O. cancellatum*, Hall, from the Niagara group of New York, and differs in no essential particular from the minute surface markings of *O. columnare*." But Dr. Foord has shown that Eichwald's *Orthoceratites cancellatus* is an *Endoceras*, and the specific name *cancellatum* does not appear to be preoccupied in *Orthoceras*, and certainly is not in *Kionoceras*. And if it be objected that "once a synonym always a synonym," then the next specific name to be selected would seem to be *K.* or (*O.*) *Scammoni*, if Hall's *O. cancellatum* is not the same as the *O. canaliculatum* of Sowerby.

Orthoceras, sp. indet.

Apparently brevicone; longitudinally ridged, ridges unequal in size and irregular in distribution.

Ekwan river, portage road at falls: a fragment that is not sufficiently long to show conclusively whether it formed part of a brevicone orthoceratite or not.

Orthoceras Ekwanense, sp. nov.

Shell increasing rather rapidly in thickness, compressed, elliptical in cross section; surface of the test smooth; septa very close together, siphuncle apparently central, though the internal structure is badly preserved in the only specimen collected.

Ekwan river, portage road at falls: one specimen, a little over two inches in length, and fully two inches in its longer diameter at the larger end. Perhaps a *Rizoceras*, which is possibly an inadvertent spelling of *Rhizoceras*.

Phragmoceras linelatum, sp. nov.

Shell, or cast of the interior of the shell, apparently essentially similar to that of *P. Nestor*, as described and figured by Hall, in general shape and in that of its aperture, but with the exterior of the test marked with very numerous, closely and regularly disposed, minute transverse impressed lines, that give to the surface a minutely ribbed appearance, under a lens.

Ekwan river: middle rapid, a cast of the interior of a large body chamber; foot of portage road, one good specimen and three fragments; portage road, at falls, two good specimens and one fragment; and upper rapid, a large but imperfect cast of the body chamber and of nine or ten of the chambers between the septa.

The type of *P. Nestor* is a mere cast of the interior of the shell, with no indications of the surface markings of the test, and in *P. Nestor*, var. *Canadense*, there are remains of rather coarse longitudinal ribs.

Crustacea

Ostracoda

Isochilina or *Leperditia*, sp. indet.

Ekwan river, upper rapid; a rather large right valve about twelve millimetres long, but with only its interior exposed.

Trilobita

Calymene Niagarensis? Hall.

Calymene Blumenbachii, Billings, pars; but perhaps not of Brongniart.

Small island in the northern Sutton Mill lake: an imperfect head that is probably referable to this species, though it shows little more than a cast of the glabella, which is proportionately wider in front than that of average examples of *C. Niagarensis* from the Anticosti group of Anticosti. The Canadian Calymenes that E. Billings identified with *C. Blumenbachii* are now usually referred to four species, viz., *C. senaria*, Conrad, from the Trenton limestone; *C. callicephala*, Green, from the Hudson river group; *C. Niagarensis*, from the Niagara, Guelph and Lower Helderberg formations and from the Anticosti group; and *C. platys*, Green, from the Corniferous limestone.

Illænus, sp. indet.

Ekwan river: middle rapids, one pygidium; foot of portage road, three glabellæ and four pygidia; portage road at falls, one pygidium. The dorsal furrows of these three glabellæ are well defined, but the shape and position of the eyes or ocular lobes are not well shown in either.

Bronteus Ekwanensis, sp. nov.

Pygidium very large, attaining to a length of a little more than four inches and a little longer than wide, longitudinally and broadly subelliptical but truncated anteriorly, its posterior end being rather narrowly rounded and its lateral margin nearly straight on each side anterior to the midlength. Axis moderately convex, inversely subtriangular, longer than wide, with an obtuse apex, occupying more than one-third but less than one-fourth of the entire length of the pygidium and marked with a transverse groove near its anterior margin. Pleural region most prominent at and near the midlength of each of the pleural ribs, decreasing abruptly in convexity outward to the lateral margins of the pygidium, but much more gradually so to its posterior margin; marked by fiften large flattened convex radiating ribs, with narrow grooves between them; each rib being narrow at and near the axis and wider at some distance from it, though all the ribs fade out at a short distance from the margin and before reaching it. The median rib is shallowly bifurcate posteriorly.

Surface apparently smooth. Cephalon and thoracic segments unknown.

Ekwan river: lower rapid one, imperfect pygidium; middle rapid, the largest and most perfect pygidium collected; and foot of portage road, one imperfect pygidium and two fragments.

Bronteus aquilonaris, sp. nov.

Pygidium of medium size, apparently not exceeding an inch and a half in width, transversely subelliptical and much wider than long, with an almost flat but slightly convex axis, and still flatter pleural region. Axis short, inversely subtriangular, with an obtuse apex and somewhat concave sides, nearly twice as wide as long, almost smooth but marked with one transverse furrow near the anterior margin; median rib a little wider than any of the lateral ribs and bifurcate posteriorly; lateral ribs seven on each side, straight and flattened convex, all of the ribs fading out before reaching the margin.

Surface apparently smooth. Cephalon and thoracic segments unknown.

Ekwan river: portage road at falls, three pygidia, each with the axis imperfect; and foot of portage road, one pygidium with the axis well preserved.

Bronteus Niagarensis, Hall, from the Niagara limestone of Ontario, has a much larger pygidium, with the midrib entire and contracted at its midlength, while the lateral ribs are wider and flexuous. *B. acamas*, Hall, from "limestone of the Niagara group at Wisconsin" and Ontario (which S. A. Miller says is a synonym of *B. occasus* of Winchell and Marcy) has a much larger and more pointed pygidium, with an "entirely simple" and undivided midrib. *B. insularis* of Billings, from the Anticosti group of Anticosti, is a diminutive species with a pygidium less than half an inch wide and wider than large while *B. Pompilius*, Billings, from the Silurian (Upper Silurian) rocks at Port Daniel, has a small pygidium with a "longitudinal median lobe in the axis."

Ceraurus Tarquinius (Billings).

> *Cheirurus Tarquinius, Billings*, 1863. Proc. Portland Nat. Hist. Soc., vol. i, p. 121, fig. 22.

Ekwan river: portage road at falls, and foot of portage road. At each of these localities two heads were collected, which seem to be essentially similar to the types of *C. Tarquinius*, from Port Daniel, in the Museum of the Survey, though the characters of the posterior angles of the cephalon of that species are still unknown. In the Ekwan river specimens the eyes are opposite the second lobe of the glabellæ, the cheeks are coarsely punctured, and each of the posterior angles of the cephalon ends in a short spine.

APPENDIX II

List of plants collected by Mr. D. B. Dowling at the mouth of the Ekwan and Albany rivers, 1891.

By John Macoun, M.A., F.L.S.

Though Mr. Dowling only collected 41 species of flowering plants, the collection is in several respects an interesting one. In the first place no plants had previously been obtained from the west coast of James bay as far north as the Ekwan river, so that the range of every species collected has been extended. No truly Arctic plants were obtained, but on the other hand there were several species which require a temperate climate. Among these are *Lathyrus palustris. Rosa blanda, Mertensia paniculata* and *Erysimum cheiranthoides.*

One of the most interesting plants in the collection is the rare *Pyrethrum bipinnatum*, only found in Canada in the Hudson bay region. Other interesting species are *Primula stricta, Cypripedium passerinum, Carex turfosa*, and *Poa alpina.*

1. Anemone multifida, Poir.
2. Anemone parviflora, Mx.
3. Ranunculus circinatus, Sibth.
4. Braya purpurascens, Bunge.
5. Erysimum cheiranthoides, L.
6. Stellaria longipes, Goldie.
7. Lathyrus palustris, L.
8. Hedysarum Mackenzii, Rich.
9. Potentilla Anserina, L. Var. Grœnlandica, Sen.
10. Potentilla fruticosa, L.
11. Fragaria Virginiana, Duch.
12. Rosa blanda, Ait.
13. Rubus arcticus, L.
14. Heracleum lanatum, Mx.
15. Achillaea Millefolium, L., var. nigrescens, L.
16. Artemisia Canadensis, Mx.
17. Erigeron hyssopifolius, Mx.
18. Senecio Balsamitae, T. & G.
19. Senecio palustris, Hook.
20. Pyrethrum bipinnatum, Willd.
21. Taraxacum officinale, L.
22. Primula farinosa, L.
23. Primula stricta, Horn.
24. Mertensia paniculata, Don.
25. Pedicularis Grœnlandica, Retz.
26. Castilleia pallida, Kunth.
27. Pinguicula vulgaris, L.
28. Plantago maritima, L.
29. Cypripedium passerinum, Rich.
30. Habenaria dilatata, Gray.
31. Habenaria hyperborea, R. Br.
32. Sisyrinchium angustifolium.
33. Allium Schœ noprasum, L.
34. Juncus Balticus, Willd.
35. Triglochin maritimum, L.
36. Carex maritima, Mull.
37. Carex turfosa, Fries.
38. Eriophorum polystachyon, L.
39. Elymus mollis, Trin.
40. Poa alpina, L.
41. Poa arctica, R. Br.

RECONNAISSANCE SURVEYS OF

FOUR RIVERS SOUTH-WEST OF JAMES BAY[38]

By W. J. Wilson

Your instructions directed me to explore and survey the country lying between the Attawapiskat and Albany rivers, and also the country between the Albany and Moose rivers on the west coast of James bay. In the first place you pointed out that the Kapiskau river would afford an easy means of access to the former region, and that there was reported to be a canoe route from Moose Factory to Fort Albany which followed branches of the Moose and Albany rivers flowing through the centre of the latter area; also to make a micrometer survey of the Abitibi river from the upper crossing of Niven's line to Moose Factory and to run a micrometer line from the latter point to the crossing of Niven's line on the Moose river.

Itinerary

I left Ottawa on the 24th of May, accompanied by Mr. Owen O'Sullivan of this office as assistant, and proceeded by the ordinary canoe route from Lake Temiskaming to Moose Factory. We engaged two Indians at North Temiskaming and one at Abitibi post who remained with us all summer, and besides these three we employed guides for short periods, who know the different rivers we had to explore.

We reached Moose Factory, June 20, having been delayed very much by stormy weather. We went from Moose Factory to Fort Albany in our canoes along the coast, and after securing a guide and supplies for six weeks we continued in a boat to the mouth of the Kapiskau river, which we reached July 2. We made a micrometer survey of this river for 200 miles up. At this point the numerous short bends in the river made progress so slow that it was deemed advisable to stop micrometer work and separate into two parties. This we did July 21. I followed the main stream, making a track survey for about eighty miles, and I also explored some of the larger branches as far as I could ascend them with a canoe. Mr. O'Sullivan returned to the forks forty-four miles up from the mouth and made a track survey of the south branch called Atikameg (Whitefish) river by the Indians. He continued up this river 135 miles.

Having completed the examination of the two principal branches of the Kapiskau, we returned to the mouth of the Otadaonanis river, a large tributary which joins the main stream four miles from James bay. Here Mr. O'Sullivan remained to make astronomical observations and to extend the micrometer survey out to the bay, while I made a track survey of the branch referred to above. We then returned south, Mr. O'Sullivan making a track survey of the coast between the mouth of the Kapiskau and Fort Albany. At the latter place we again separated to examine the country between the Albany and the Moose rivers. Mr. O'Sullivan went up the Albany to the upper end of Big Island, where a large river, called by the Indians Kwataboahegan, enters from the south. He explored this river to its source. It forms part of a canoe-route between Moose Factory and Fort Albany used by the Indians only at high water, but no one seemed to know whether it would be possible to go through at this season (August 11). The branch which forms the southern part of the route is known by the same name and enters the Moose river about fifteen miles south of Moose Factory, measured along the common canoe-route. The Albany branch is also known by another name which means Stooping river, and to prevent confusion I have used this name on the accompanying map. Returning from Fort Albany to Moose Factory, I made a track survey of part of the coast. On the 16th August, I reached the mouth of Kwataboahegan river, on the Moose side, and began a track survey of it, which I continued for ninety miles up. Having met Mr. O'Sullivan, who was successful in getting through, we completed the examination of this river and returned to Moose Factory, where we repaired our canoes and got supplies for the trip home. Leaving this post early in September, we made a micrometer survey of the Moose river up to the intersection of Niven's line (1898), a distance of thirty-one and a half miles. We then returned to the Abitibi river and continued the survey up that stream to the intersection of Niven's line, at the 179th mile post, connecting with my survey of last summer. This completes the instrumental survey from Moose Factory to Lake Temiskaming by way of the Abitibi river and lake, and the canoe-route to Quinze lake. We finished the survey September 24, and came directly to Ottawa, which we reached October 8.

[38] This report is contained in Vol. XV., part A, pages 222-233, of the Geological Survey of Canada. The exploration was made in 1902.

The Kapiskau River

The Kapiskau is about a quarter of a mile wide for some distance from the mouth and has a width of from seven to ten chains to the forks. At forty miles up, a section was made which showed that the volume of water at this point was 566,000 cubic feet per minute (July 4). The width is seven chains with an additional three chains for ordinary high water, and the greatest depth is eight feet. The current is swift and strong, with frequent rapids, which become more numerous as the river is ascended up to 212 miles. Then for a distance of twenty miles there are only a few rapids and moderate current, followed by thirty miles of swift water and rapids. Above this there is almost still water to the Kapiskau lakes and for some distance beyond. The fall in a few rapids amounts to three or four feet, but for the most part it does not exceed one foot, and many of them are mere ripples which I presume disappear in high water. In the whole distance travelled on this river, we did not require to make a single portage.

The river has no distinct valley, but has cut its way into the thick clay covering that overlies the solid rock or into the soft rock itself. The banks are generally low, rising from five to twenty feet, and usually the land along the river for four or five chains back is higher than that farther away. The sediment deposited by the river when it is swollen by the spring freshets has accumulated year after year and has slowly built up a ridge close to the stream. It is also possible that the ice may have assisted in piling up the material along the banks in the same way that the shooting dykes are formed along the rivers in eastern New Brunswick and Prince Edward island. This narrow ridge is well wooded where not burned, with large spruce, poplar, and at some distance from the coast, canoe-birch, fir, balm of Gilead and an occasional tamarack and cedar. The tamarack here has escaped the ravages of the larva of the imported larch saw-fly that has done so much damage to it farther south, so that where it does occur it is green and healthy. Back from the river, five or six chains, the trees are much smaller and in many places nothing is seen but muskeg thinly covered with stunted spruce and tamarack two to eight inches in diameter, and an abundance of laurel (*Kalmia angustifolia*) and Labrador tea (*Ledum latifolium*).

Banks of Boulder Clay Succeeded by Limestone

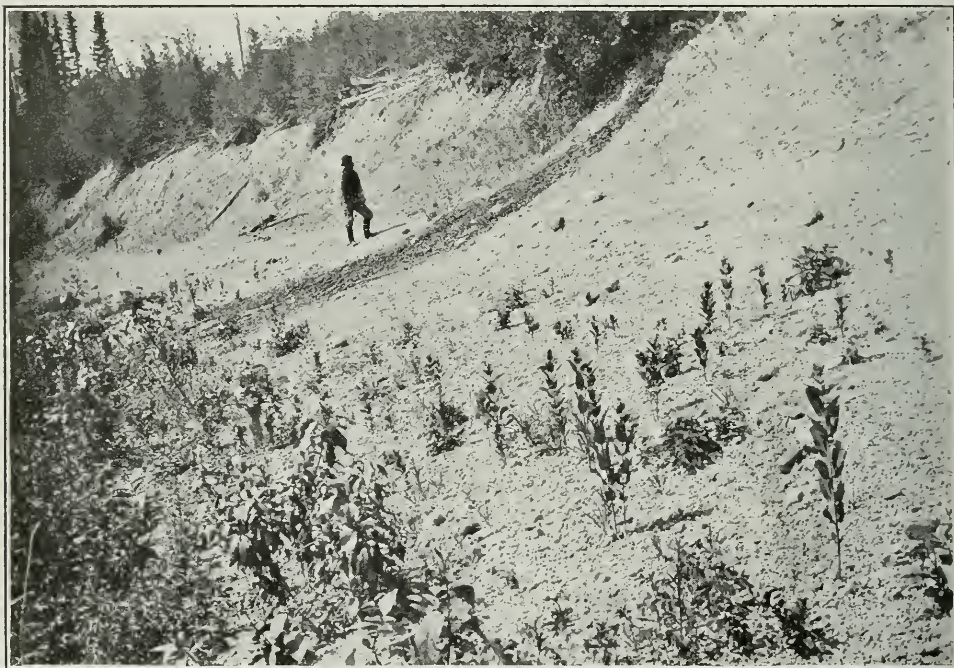
For the first 125 miles the banks are composed of bouldery clay and stratified clay and sand containing marine shells. At this distance the first rock exposures appear. The rock is a very soft, reddish-brown, argillaceous limestone mottled with greenish-gray spots, and some layers are wholly of the latter colour. In places layers of the two colones alternate. The beds as far as observed are horizontal. Near the surface where the rock is exposed to the weather it is broken up into small pieces, and when wet very rapidly changes into mud, but in digging down much larger and firmer masses are found. The rock, where first seen and for several miles up the river, is so soft that the river banks are worn down just the same as the clay banks, and no cliffs are seen. This continues up for more than fifty miles from the first exposure, when a considerable change takes place. At the 183rd mile of the micrometer survey a cliff nearly thirty feet high occurs, a section of which is as follows in descending order:—

	Feet.
Grayish limestone in angular blocks, firm	3.0
" " " " much broken, soft	1.6
" " " " slightly mottled with red	1.3
" " " " very soft	0.6
" " " " mottled with red, fairly firm	1.5
" " " " very soft	0.7
" " " " mottled with red	1.3
Grayish and reddish limestones very finely broken	0.4
Reddish limestone, mottled with gray	1.8
Grayish limestone, very soft	0.2
Reddish limestone, crumbling	1.2
Grayish limestone, firm	1.0
Mottled reddish and grayish limestone, very soft	1.3
" " " " firm	1.1
" " " " washed and covered by the river at high water	10.1
	26.3

For twenty-two miles above the point where this section was made occasional outcrops of similar rocks are exposed along the banks, but for the last ten miles they are considerably firmer and of a light yellowish or buff colour. This is well seen at the last micrometer station, 200 miles from the coast. Only one more exposure of rock was seen and that was about five miles farther up the stream, or 205 miles from the bay. These distances are given from the micrometer survey and of course follow all the bends of the river, and this makes the distance much greater than if measured in a straight line. No fossils were found in any of these rocks, but in their lithological characters they resemble very closely the Devonian rocks at the Sextant rapids, Abitibi river, where there are bands of the reddish and grayish rocks which both in the ledge and in hand specimens are identical with those on the Kapiskau river. The rocks on the Abitibi underlie beds containing typical Devonian fossils.

Country Mostly Level Plain

For 175 miles up the Kapiskau river the country is as flat as it can be, and not the slightest elevation is apparent. At the end of this distance, however, the character of the country somewhat changes, and for the next 25 or 30 miles up the monotony is relieved by low hills 75 feet high, which give a rolling aspect to the country. These hills



Clay banks of Kapiskau river. Photo by W. J. Wilson.

were evidently formed by erosion and are comparatively level on the top. This area is drier as the soil contains much sand and is covered for the most part with a thick second growth of poplar and canoe-birch, with many dry trunks of trees standing or lying scattered over the ground. Going west up the river, the land again becomes flat and the current is not so swift or the rapids so numerous, and at 260 miles the stream becomes much broader and forms a lake-like expansion of comparatively still water for six miles, when it opens out into a small shallow lake. This lake is only one mile long and half a mile wide, but is of some importance as it gives the name to the river. When approaching this lake in a canoe there is no channel or passage visible, as it is filled with tall scouring-rushes (*equisetum*), and the canoe has to be forced through these across the lake. The word Kapiskau means obstructed or blocked up, and was first applied to this lake, and afterwards to the river. For the next mile the river flows from the north-west in a sluggish broad stream with marshy banks, and again expands into a narrow lake running north and south for three miles. At the extreme north end, the river enters, and for four miles is almost dead water, after which it has a swift current with occasional rapids as far as it was followed, a distance of seven and a half miles from the lake. At the point where I turned back the river was from 30 to 40 feet wide, and in places four feet deep, while in other places there was not enough water to float a canoe. It was blocked every few chains with log jams and fallen trees which reach from bank to bank. We had to cut our way through these and this made progress so slow that I decided to return, having first climbed a tree which gave a view of the country for a long distance, and nothing could be seen but a broad plain covered with ragged bush, with an occasional clump of large green trees, mostly spruce, poplar and tamarack, but the area within a radius of five or six miles that is so covered in any one place is small. A small stream enters the largest of the Kapiskau lakes from the west, but it proved to be full of boulders, driftwood and rapids, so that it could not be navigated by canoes for more than a mile.

Half a mile west of the south end of the lake there is a ridge which, though only 75 feet above the level of the lake, stands out prominently from the level country. An examination showed that it is composed chiefly of gravel. It has the form of a kame, and is about 20 chains long and 500 feet wide. It is sparsely covered with Banksian pine, canoe-birch and poplar. Viewed from this elevation the whole surrounding country is a vast plain. The only rise to break the monotony is a slight elevation five or six miles to the north. There is a small lake a mile to the south, and peaty swamps are common. These are covered with small spruce and tamarack, and the drier ground with second growth poplar and canoe-birch. The aneroid readings give an elevation of about 400 feet above sea level at these lakes.

Large areas are covered by peat bogs, especially along the upper stretches of the river, and often the top layer along the almost perpendicular bank is composed of peat four or five feet thick.

On my way down the river I examined some of the larger branches for seven or eight miles up, and found the country in no way different from that adjacent to the main stream.

The Atikameg River

Mr. O'Sullivan reports that the Atikameg river, which he surveyed for 135 miles from the forks, presents the same characters as the main stream. There is a swift current and numerous rapids, and the upper part is very crooked, with many short bends. The banks are composed of bedded and boulder clays and are from ten to twenty-five feet high. The forest growth, close to the river, consists of spruce, poplar, tamarack, canoe-birch and fir. The spruce averages from six to twelve inches, with occasional trees twenty inches or more in diameter. Back five or six chains, from the river banks, the land is open swamp and muskeg, covered with small spruce and tamarack. No rock exposures were seen on the lower part of this river. The first rock in place is 100 miles from the forks, and is a flat-lying, honeycombed, light-yellowish dolomitic limestone. Some of the cavities are partly filled with a white mineral, which on exposure to the air crumbles into powder. Some of the layers are harder and have fewer cavities. A rock of this character is seen one mile and three-quarters farther up the river. Four miles and a half above this, the soft, grayish limestone, already mentioned as occurring on the main branch, was observed. Rocks similar in character to those seen at these three places occur at intervals almost as far as the river was examined. The specimens collected show that some of the strata are much harder than those of the Kapiskau river. Where Mr. O'Sullivan turned back, the aneroid gave an approximate elevation of 375 feet.

The Otadaonanis River

At high water this branch is navigable for canoes almost to its source, and forms a canoe route to the Albany river, by a portage connecting its head waters with the latter.

It is two and a-half chains wide at the mouth, and I was able to ascend it forty-five miles, though the water was comparatively low. Its general course is north-east, and it runs close to the main river, as well as to its principal branch, the Atikameg. The banks are composed of clay containing the usual boulders and shells. No rock exposures were seen, but small heaps of the reddish and grayish mottled limestone were lying on the banks as if deposited there by melting ice pans, and indicate that the rock is probably in place farther up the stream.

The clays exposed along the banks of the Kapiskau and its branches show considerable variety. Near the coast an unctuous bluish-gray clay is overlaid by ordinary sandy clay. Farther up the river, typical boulder clay full of striated boulders occupies the lower part, with more or less stratified material on top. There is no sharp line of separation between them, as they seem to merge into each other. In places there are thin bands of peaty material containing plant remains. Still farther up the banks are higher and the material much more sandy and gravelly, often showing false bedding. Generally the upper layers contain marine shells with few boulders, while the lower part is decidedly bouldery. Thinly laminated limestone concretions are common, usually circular in form, but as far as examined they contain no fossils. For 125 miles up the river there is no means of estimating the exact thickness of the clay covering, but above this, where it rests upon the solid rock, it varies from ten to seventy-five feet. A section six miles above the forks gives, in descending order:—

Stratified clay	10 feet.
Bouldery clay	20 feet.

The bouldery clay is very much like the overlying stratified clay in general appearance, and is of a dark slate colour, but shows no stratification and contains no fossils.

Limestone fragments, both rounded and angular, are common in the clay; also a dark, very fine-grained argillaceous arkose or graywacké with spheroidal pseudo-concretions of a lighter colour, which by differential weathering are sharply outlined. The cavities thus formed vary in size from mere specks to six inches or more in diameter. In section, examined by Mr. O. E. LeRoy of this office, the pseudo-concretion is seen to consist of angular and rounded fragments of clear quartz and turbid feldspar, shreds of biotite, muscovite and brown sphene imbedded in a matrix of calcite. The centre of the area is occupied by an oval-shaped fragment of fine clay slate. No concentric structure is aparent. The main mass of the rock differs in having a clay or kaolin matrix. These boulders are the most widely distributed and probably the most numerous of all the boulders in the drift, and are found on the west coast of James bay and all the rivers examined in this vicinity. Dr. Bell states that they extend all the way south to Lake Superior, and that the rock is found in place on Long island, off Cape Jones, on the East Main coast.[38a] Besides these there are well rounded boulders of red and gray granite, gneiss, reddish conglomerate containing jasper pebbles, greenish breccia containing pyrite; banded jasper, jaspilyte, several iron ores of low grade; hornblende schists; diorites, etc. Some of the jaspery iron ores are identical, as far as can be judged from hand specimens, with those collected by Dr. Bell and Mr. A. P. Low on the east coast of Hudson bay, and they also resemble very closely iron ores found in situ on Sutton Mill lake by Mr. D. B. Dowling.

The shells, etc., found in the clays of the Kapiskau river, as determined by Dr. J. F. Whiteaves, are as follows: *Saxicava rugosa*, *Macoma calcarea*, *M. Balthica*. *Cardium Ciliatum*. *Mya truncata*. *M. arenaria* *Leda buccata*. *Mytilus edulis*. *Seripes Grœnlandicus*. and *Balanus crenatus*. The shells of *Saxicava rugosa* are very large, one specimen measuring one and seven-tenths inches in length, and three-quarters of an inch in width.

The first two in the above list are by far the most common and are found everywhere. No striæ were observed except on boulders, as the soft rock where exposed had weathered and disintegrated.

James Bay

The most noticeable feature of the west coast of James bay is its extreme flatness. Looked at from a distance there is no distinct shore line, but the water and land seem to merge into each other. A strip varying in width from one to three miles and partly covered with grass and low shrubs, extends along the coast from the Kapiskau to the Moose river, except for a few miles north and south of Cockispenny point, where the shore is fairly high and dry, and the trees come to the water's edge. At this point one can land with canoes almost any time, but elsewhere the water is very shallow, and at low tide, bare mud flats extend out for miles. Gravelly ridges with numerous boulders are very common, and form one of the serious obstacles to canoeing along the coast.

At Cockispenny point I noted the reddish-brown and grayish limestone that has been already described as occurring on the Kapiskau. Farther south at Pisquochi large masses of a light gray and dark buff limestone containing the Devonian fossils *Spirifer divaricatus* and *Streptelasman prolificum* were observed. There seems to be little doubt that these rocks are in situ.

. . . .

[38a] Report of Progress, Geol. Sur. Can., 1886 Vol. II (N.S.), pp. 20G and 36G.

The latitude and magnetic declination of the following places are:—

—	Latitude.			Magnetic declination.		
Mouth of the Kapiskau river	52	45′	45″	12	10	25″
Mouth of the Atikameg river	52	29	40	..	..	..
200 miles up the Kapiskau river	51	55	0	7	7	36
Fort Albany	*52	14	28	11	45	0
Cockispenny point, James bay	52	0	0	..	..	..
Moose Factory (Ogilvie)	51	14	42	..	..	..
Niven's line (Moose river)	..	..	..	11	0	0
Sand Bank lake, north end of portage	51	3	30	..	..	..

* This latitude is the average of Mr. D. B. Dowling's and ours.

SURVEY OF THE

SOUTH AND WEST COAST OF JAMES BAY[39]

By Owen O'Sullivan

Itinerary

In accordance with instructions to survey and explore the west coast of James bay, I left Missinaibi with my assistant, Mr. W. Spreadborough, on June 13th, with two canoes, and arrived at Moose Factory on June 27th.

In 1898 Mr. Henry O'Sullivan made an accurate survey of the south shore of James bay as far west as Point Comfort, which, in a straight line, is forty miles north-east of the mouth of Moose river. West of Point Comfort, the shore line has been sketched in from track surveys whose absolute accuracy cannot be guaranteed, as it is impossible to follow close to the shore in canoes or boats, owing to the shallowness of the water.

I hired a small sail-boat at Moose Factory to take us across to Point Comfort, but a strong north wind drove us to East point. I therefore sent the boat back to Moose Factory and started a micrometer survey from this point northward to Point Comfort.

After completing this work we returned to East point and continued the survey to Moose Factory and northward to Cape Henrietta Maria. We walked along most of the coast to enable us to follow the high-water line, which was the best marked, but often we had to use the canoes on account of the difficult walking through mud and salt marshes. From Point Comfort to Mesakonan point, a distance of six miles, the shore rises from four to twenty feet above high tide, and shoals are seen up to three-quarters of a mile out. Well rounded gneiss, granite and argillaceous arkose boulders, averaging three feet in diameter, are piled ten feet above high tide at nearly all the points, and short sandy beaches surround the heads of the small bays. The land rises gently and is well wooded with black spruce, tamarack and Banksian pine of from five to nine inches in diameter.

Gull bay extends from Mesakonan southward to Gull point, a distance of seven miles. This bay, which is about four miles across, is very shallow, the tide running out for three miles. A swamp, called Cabbage Willows, extends eastward from the head of this bay across to Rupert bay; there is a trail through it some ten miles in length, which forms part of the winter route between Moose Factory and Rupert House.

Between Gull point and East point, a distance of seven miles to the south-west, the coast is low with mud-flats and boulders. Opposite East point, at about three-quarters of a mile from high-water line, is a reef of boulders which runs south for two miles and is then succeeded by sand and gravel bars as far as the Little Missisikabie river, a distance of six miles. This part can only be navigated with canoes at high tide. From the mouth of the Little Missisikabie to Nattabiska, twenty-seven miles, the shore is very flat and the distance between low and high water mark runs all the way from three to six miles. Hannah bay, at low tide, is simply a mud flat, with the exception of the Harricanaw river channel. From Nattabiska, which is considered the north-west limit of Hannah bay, to Moose Factory, the distance is thirty miles.

The Moose River Delta

The mouth of the Moose river is divided into three different channels; the centre one, passing south of Middleboro island, is reported to be the deepest but last year the Revillon Bros. found a deep channel from the "inner Ship hole," running north of Middleboro island, to within a few feet of the main land on the north bank of the river opposite Moose island. Here they have established a trading post in opposition to the Hudson's Bay Company.

We have only to take into consideration the enormous flow of the Moose during spring freshets, when the ice, occupying 150 miles of a comparatively level, broad river, is suddenly disengaged, carried down with irresistible force and stranded for miles along the coast, to appreciate the fact that the delta at the mouth of this river is subject to remarkable annual changes.

From the mouth of the Moose river northward, the shore continues low with mud flats and boulders as far as two miles beyond Pisquanish, which is thirty-one miles from Moose Factory. Then long reefs of boulders, sand and gravel bars extend seaward as far as Nomansland, 60 miles from Moose Factory. In this last stretch there are some

[39] This report is contained in Vol. XVI., Part A, pages 173-179, of the Geological Survey of Canada. The survey was made in 1904.

points of land, made up of gravel and sand, that have an elevation of twenty feet above high tide. At Half Way point and Cockispenny one may land with canoes at any time.

Between Nomansland and the Albany river four small rivers enter the bay; the largest, named Kinoje, has a flow of about 8,000 cubic feet per minute. This river has not cut out any channel in the mud, and can be reached with canoes at high tide only.

Mouth of Albany River

The tide between Nomansland and the Albany river runs out three miles. The Albany is the largest river entering James bay on the west coast. It has several channels at its mouth, the deepest passing north of the island on which Fort Albany is situated. Fort Albany is ninety-six miles from Moose Factory.

North of the Albany river the coast is very flat and the walking bad; we were compelled to use the canoes as far as Ekwan point, which is eighty-five miles north of Fort Albany. In this stretch, in which the difference between high and low tide is sometimes five miles, we could see nothing but mud, strewn with boulders. Between the Albany and the Ekwan, two large rivers enter the bay. The Kapiskau in Lat. 52° 45', was surveyed by W. J. Wilson in 1902, and, thirteen miles north of it, the Lowasky, a branch of the Attawapiskat, debouches. This river was surveyed by Dr. Bell in 1886.

The Attawapiskat Estuary

The Attawapiskat enters the bay through five separate channels; the third, north of Lowasky, is the deepest, and on it, six miles from the mouth, the Hudson's Bay Company has an outpost. There is also a Roman Catholic chapel.

North of the Attawapiskat, the water continues shoal to the mouth of the Ekwan riven and some distance beyond. Shoals are seen three and four miles from high-water line all along. The Ekwan is 180 miles from Moose Factory and was surveyed by D. B. Dowling in 1901. Ekwan point, six miles north of the Ekwan river, is composed of coarse sand and gravel and has an elevation of fifteen feet above high tide. The water at this point is comparatively deep and there is only a distance of sixty feet between the high and low tide marks. Ordinary tides rise about seven feet.

Ekwan Point to Raft River

From Ekwan point to Raft river the distance is twenty-nine miles; the coast continues low with mud-flats. Raft river had an approximate volume of 10,000 cubic feet per minute when we crossed it, August 9. The water was then very low. It is navigable for canoes for about ninety miles to its source in two small lakes.

Opinnagau and Lakitoosaki Rivers

Forty-five miles north of the Raft river, the Opinnagau enters the bay, and ten miles north is the mouth of the Lakitoosaki. These rivers have about the same volume, 20,000 cubic feet per minute, and are navigable for canoes for some considerable distance. The coast from the Raft to the Lakitoosaki becomes more sandy with fewer boulders, but the tide still runs out from one to two miles from high-water mark.

Sixteen miles north of the Lakitoosaki, the Big Owl river enters the bay; it is two chains wide at low tide and had an average depth of three feet at the time we crossed it (August 16). This river can be ascended with canoes for a short distance only.

Eight small streams enter the bay between Ekwan river and the Big Owl river. These streams become wider and shallower at their mouths, and their channels through the mud-flats that appear at low water are so wide that we had to drag our canoes, drawing only fourteen inches, up one of the channels for two miles in order to reach the shore.

Mud Flats Strewn with Boulders

The most easterly point of Cape Henrietta Maria is eighteen miles northward from the mouth of the Big Owl river and 300 miles from Moose Factory, following the sinuosities of the coast. This part of the coast is flanked by sand and gravel bars, some having an elevation of twenty feet above the tide mark, the water being deep right up to the shore. We terminated the survey at the east point of Cape Henrietta Maria in latitude 54° 51' 30", and we planted a post recording my name and date, August 18. Northwest from this point the shore is extremely flat, and, when the tide was out, we could see nothing but mud-flats strewn with numerous large boulders.

Inland from high-water mark we generally found a strip of low dry mud, in places a mile wide, and covered with grass, with occasional sand and gravel bars. To the rear of this, a fringe of alders and juniper-bushes, of from ten to sixty feet wide, reaches the spruce swamps and muskeg areas, which, I believe, is the character of the ground overlying the Devonian and Silurian formations extending for 150 miles west of the James bay coast.

In latitude 54° the spruce woods recede from the shore in a north-westerly direction and the coast continues north to the mouth of the Opinnegau river, then north-east to Cape Henrietta Maria. The country lying between the northern limit of trees and the cape is a barren, dry and gravel plain with sandy knolls and fresh-water ponds.

Only two exposures of rock in situ occur on the west coast of James bay, one at High Rock point, latitude 51° 23′, which reaches one foot above high tide, and the other, at Pisquanish, is seen at low tide; both are fossiliferous Devonian limestone lying horizontally.

There is little doubt that the coast of James bay is rising slowly. Among the facts noted the following may be mentioned. In several places, well defined elevated beaches are distinctly traceable for several hundred feet back from the present high tide mark. In some places the old cedar driftwood is discernible fully ten feet above the level of present high tide mark, and still above and beyond these appear other ranges of sand debris traceable through the densest part of the forest bordering the bay.

Speckled trout, Albany river waters. Photo by W. J. Wilson.

Fauna and Flora

Game was very plentiful; black ducks by the thousand breed in the southern part of Hannah bay, and the pintail and teal in even greater number, breed north of the Albany. A few ptarmigan were shot near Cape Henrietta Maria, and, on our return, a large number of geese were also shot.

Speckled trout and whitefish, averaging three pounds in weight, are caught in nets at the mouths of all the rivers.

At Ekwan point, while having lunch, I counted over one hundred porpoises passing close to the shore. Seals were often seen, and numerous skeletons of walruses and seals were lying on the beach north of the Albany.

Whales were not seen during the expedition, probably owing to the shallowness of the water all along the western coast of James bay; but in 1898, as assistant with my father, we surveyed the east coast from Rupert House to East Main Fort. There the water is deep, and the bay is studded with many islands, between which whales and porpoises were often seen playing.

The weather was most favourable. During the whole time, from June until September, we accomplished the work with two eighteen foot canoes, and did not lose more than three or four days on account of bad weather.

Gardening is carried on successfully at Moose and Albany. We never had better potatoes than those from Albany. At Moose, cabbages, radishes, lettuce, pumpkins, cucumbers, carrots, turnips, etc., grew luxuriantly.

My assistant, Mr. W. Spreadborough, made a large collection of plants during the season and prepared a list of the birds seen. The list of birds, with notes on their breeding habits, will be published in my complete report. Professor Macoun has made the following summary report on the plants, and the full list will be included in "The Flora of the Hudson Bay," soon to be published by this Department.

"Mr. Spreadborough's collection of plants, numbering 278 species, includes all that were known to occur in the region examined, and many species not before recorded from that district. Though there appear to be none new to science, several species are of great interest or rarity. The more noteworthy of these are *Linum Lewisii* var. *Stenophyllum*, a white-flowered species of flax only known before from one locality, near Fort Severn; *Potentilla Egedii*, which had until recently been confounded with *P. Anserina; Pyrethrum bipinnatum*, rediscovered on the coast of Hudson bay a few years ago; *Arnica foliosa*, a long way out of its usual range; *Gentiana Macounii*, known before in that region only from poor specimens collected at Rupert House, together with many species of willows, grasses and carices of rare occurrence.

"The flora as far north as Albany is in great part made up of species characteristic of the sub-arctic forest region, but from Raft river to Cape Henrietta Maria there is a considerable admixture of species more arctic in their character. No truly arctic species were collected, however. The collection is so complete that little, if anything, more remains to be done botanically along the coast between Moose Factory and Cape Henrietta Maria."

My thanks are due to the Hudson's Bay Company's officers whom I met in the course of my expedition, and I may mention in particular Mr. George McKenzie, chief officer in charge of the district.

I also wish to thank Rev. Mr. Holland and Mrs. Holland of Moose Factory, Mr. and Mrs. Christie of New Brunswick post, and the Reverend Fathers of the Albany Mission for pleasant hospitality.

JAMES BAY[40]

By A. P. Low

Introductory

James bay is that portion of Hudson bay lying south of a line drawn from Cape Henrietta Maria, on the west, to Cape Jones, on the east coast. From the head of Hannah bay, north latitude 50° 55′, to Cape Henrietta Maria, the distance is, roughly, 300 miles, while the average breadth is 145 miles.

From Cape Henrietta Maria the coast runs south-south-east to Mourning point, a low point covered with trees, near latitude 54° 38′, then south to Equan point, latitude 53° 53′; from there it trends well to the westward, to the mouth of the Equan river, and then east of south to the mouth of the Albany river, latitude 52° 17′, thus forming a considerable bay, and not running almost due north and south as represented on all modern maps.

From the mouth of the Albany river the direction of the shore line changes to east-south-east for a distance of forty miles to Cockespenny, when it turns south-east to the head of Hannah bay. Hannah bay is thirty miles deep, counting from a line drawn between Gull point on the east side and the mouth of Moose river, and has an average breadth of fifteen miles.

This bay is separated from Rupert bay by a long, low point, terminating in a peninsula, at one time an island. The isthmus is covered with willows and is lower than the land adjoining. The latter, on both sides, supports a thick growth of spruce and tamarac. Rupert bay is thirty-five miles deep, with an average width of twelve miles.

The east coast of James bay has a roughly north and south direction from the head of Rupert bay to the mouth of Big river, one hundred and seventy-five miles. From this river the coast takes a gradual curve to the westward, the land at Cape Jones lying about east and west.

According to Capts. Taylor and Bishop, of the Hudson's Bay Company's ships, the position of Cape Jones, as laid down on the Admiralty chart, is fully forty miles to the eastward of its true position; this being the case, the mouth of James bay is that much narrower than is represented on the maps.

The Admiralty chart, from which all modern maps of Hudson bay are constructed, was compiled in 1853 from information supplied by the Hudson Bay Company, gathered from notes and observations of the various captains of their ships; now as these observations were but approximately correct, the chart must be so also, especially in those parts unfrequented in the navigation of the bay, and such being the case, it is highly important that an accurate survey should be undertaken to correct these errors in the coast line, and enable ship captains unacquainted with the navigation of these parts, to enter James bay with a certain degree of safety, a thing impossible with the present charts.

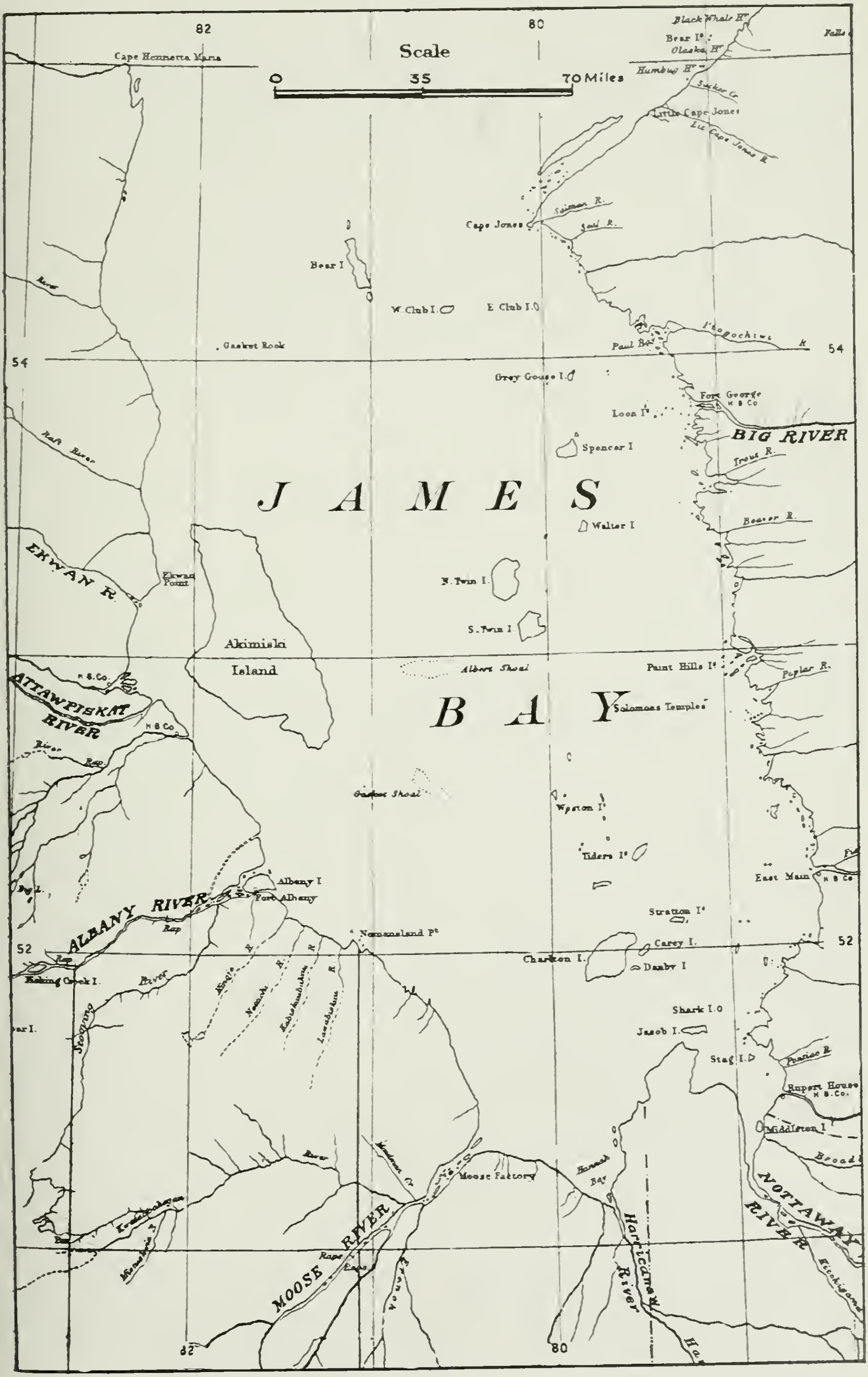
South and West Coast Lines Low and Flat

The general coast line of the west and south sides of James bay is low and flat, with shallow water, deepening very slowly outwards all along, except where the rivers have cut out channels in the mud.

Although the average rise and fall of the tide does not exceed five feet, at the time of low water, only mud flats, strewn with large boulders, can be seen to seaward from high water mark. The shore is, in most places, marshy, covered with grasses and willows, with numberless small brackish ponds and lakes for a considerable distance behind high-water mark, while beyond, on slightly higher ground, is a dense growth of dwarfed black spruce and tamarac; it is often several miles from low-water mark to where the first really dry ground may be found.

Hannah bay is so shallow that, with the exception of the river channels, it is almost completely dry at low water, and when a canoe is left by the tide, the sensation experienced by its crew is anything but pleasant, as they have to debark and stand in the mud, often beyond sight of the low fringe of bushes on the high water line, awaiting the return of the water. Rupert bay is not quite so shallow as Hannah bay, and has a channel up its centre to the mouth of the Nottaway river.

[40] This report is taken from Vol. III., Part J, pages 14-37, of the Geological Survey of Canada, 1887.


Scale
0
35
70 Miles
82
80
54
52
Cape Henrietta Maria
Bear I.
Sucker Cr.
Little Cape Jones
Salmon R.
Seal R.
Cape Jones
Bear I
W. Club I.
E. Club I.
Gasket Rock
Paul Bay
Fort George
H B Co
Loon I.
Grey Goose I.
BIG RIVER
Trout R.
Spencer I
Raft River
J A M E S
Walter I
Beaver R.
N. Twin I.
S. Twin I.
EKWAN R.
Ekwan Point
Akimiski Island
Albert Shoal
Paint Hills Is
Poplar R.
ATTAWAPISKAT RIVER
H B Co.
B A Y
Solomons Temples
Gasket Shoal
Eiders I.
Albany I
Fort Albany
ALBANY RIVER
East Main
H B Co
Stratton I.
Carey I.
Charlton I.
Danby I
Shark I.
Jacob I.
Stag I.
Pontax R.
Rupert House
H B Co.
Middleton I
Moose Factory
Hannah Bay
Harricanaw River
NOTTAWAY RIVER
MOOSE RIVER

James Bay.

East Coast Higher

Along the east side of the bay the character of the coast changes, the low unbroken, muddy shores being replaced by higher rocky and sandy banks, deeply indented with small bays and fringed with innumerable rocky, shingle and sand islands as described by Dr. Bell (Report of Progress 1877-8). The waters are much deeper and, although not free from danger on account of many hidden shoals, can be easily navigated in small craft, the islands and bays affording abundance of good shelter.

Character of Country Inland

The country inland from the bay varies similarly to the coast line. To the west and south it is almost flat, with its soil overlying nearly horizontal beds of Silurian and Devonian limestones for about one hundred and fifty miles inland to the Archean country, so that the general level rises slowly and evenly towards the interior. The soil along the rivers appears to be good, and as the climate to the southward is probably favourable for the growth of cereals and root crops, nothing prevents future settlement in this region after the filling up of the north-west, except that without an extensive system of drainage, the lands remote from the rivers will be found too wet for successful farming, as it is said by the Indians, that with the exception of lands close to the rivers, the greater part of the country for a long distance inland from the bay is a mossy swamp.

Inland from the east coast the country is of a different character. The interior of this part is a rough table-land, having an elevation of about seven hundred feet above sea level near its edge, and slowly rising inland to over two thousand feet at its highest.

The edge of this table-land leaves the coast to the north of Cape Jones, and runs in a south-south-east direction, so that to the southward there is an interval, varying from ten to thirty miles between it and the coast. In this portion the general level is not much over one hundred feet above the sea, and the soil is of post-Pliocene clays and sands, with alluvium, affording good land for cultivation, but as the climate is colder than on the west side, it is doubtful if it would allow the successful growth of any but the hardiest cereals. Good crops of potatoes, however, and other roots could be, and are grown as far north as the mouth of Big river. The land is rolling and broken by low, rocky Archean hills which make up about one-third of the entire area, all of which would make excellent grass land. The best portion of it is along the river bottoms. and on the islands and banks.

Rivers Tributary to James Bay

Eleven large and many smaller rivers flow into James bay; on the west side are the Equan, Attawapishkat, Albany, and Moose rivers; on the south, Hannah bay or Harracanaw, and the Nottaway rivers; on the east, the Rupert, East Main, Old Factory, Big and Bishop Roggan rivers.

The water-shed of the country on the west side runs in a south-west direction from Cape Henrietta Maria, and consequently the rivers to the southward, having greater drainage areas, are the largest and longest.

The first river to the south of Cape Henrietta Maria is Raft river, an inconsiderable stream, the outlet of Raft lake; it reaches the sea in latitude 54° 04′.

The next river is the Equan, a much larger stream, which takes its rise 300 miles to the westward, at the water-shed between it and the Winesk river, flowing north; it enters the bay at latitude 53° 38′.

About latitude 53° 24′ are the two mouths of the Attawapishkat river, which rises over four hundred miles inland, near the source of the east branch of the Severn river. It flows north. and drains an extensive area of unexplored country between the Equan and Albany rivers.

The Kapiskau river is a smaller stream, entering the bay at latitude 53° 05′.

The next important stream to the southward is the Albany river, the longest and largest on the west side of James bay.

This river, one hundred and forty miles in a straight line south-west from its mouth, divides into two branches. The north or main branch comes from the west; it takes its rise a short distance from the head-waters of the English river, in Cat or Catfish lake, about one hundred miles north-west of Lake St. Joseph, through which it flows, and which flows into Lake Winnipeg. The south or Kenogami branch flows from Long lake, thirty miles from the north shore of Lake Superior. At its mouth the Albany spreads out and flows between a number of low, swampy islands, forming a delta twenty-three miles long and ten miles broad, between the mouths of its channels, the most southward of which empties into the sea in latitude 52° 12′.

At the south-west angle of the bay is the wide mouth of Moose river, whose branches drain all the country to the south-west and south, from the rivers flowing into the eastern portion of Lake Superior and the head-waters of the Ottawa. The western or Missinaibie branch flows out of Missinaibie lake, at the head of the Michipicoten river, within fifty miles of Lake Superior; the middle or Metagami branch flows from the south, and drains the country north of the watershed to Lake Huron; the eastern or Abitibbi branch flows out of Lake Abitibbi a short distance from Lake Temiscamingue on the Ottawa river.

All the rivers flowing into the west side of James bay present the same physical characters; on their headwaters and upper parts, while flowing over Archæan rocks, they alternate between long lake-like expansions with little current, and short contracted portions accompanied by heavy rapids and falls, thus affording good stretches of navigable water with portages between. On their lower courses, for a distance of one hundred and fifty to two hundred miles from their mouths, where they pass over the flat Devonian and Silurian limestones, the fall is uniform, and consequently the character changes, so that in ordinary low water during the summer and early autumn, owing to this uniformity of fall and to the rivers having too great a breadth for the amount of water discharged at this period, they present an almost unbroken succession of small, shallow rapids, full of boulder and gravel bars, and only navigable for canoes of light draft.

For three or four weeks after the ice leaves the rivers, during the spring freshet, and again after the autumn rains, the higher water flattens out these numerous rapids and covers all obstructions, so that navigation with large boats, and even small steamers, is then possible; but at these times the current has a uniform rate of between five and six miles an hour, and therefore, comparatively powerful steamers would be required to ascend the streams, the boats at present used being tracked up by men along the banks.

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Harbours

In relation to the future settlement of the country around James bay and to the possibility of its use as a highway for future commerce between western Canada and Europe, the question of its harbours and their terminal facilities for railways is of the greatest importance. It is to be regretted that the natural harbours at the mouths of the different rivers in the southern part of the bay meet the requirements of modern shipping only to a very moderate degree, and that to improve them sufficiently to admit of their being used as ports by large ocean steamers would entail an expenditure hardly likely to be warranted by the trade development of the future of this region.

Mouth of Moose River

The most important harbour in this part of the bay is that at the mouth of Moose river. A description of it is given in Capt. Coate's notes on the geography of Hudson bay, 1727-51, and as it has changed but little since then, his sailing directions may here be quoted: "From the Gaskitt, fifty-eight miles S. by W., you come to Moose "river road, eight miles from Sand Heads, North Point, W.N.W., six miles in latitude "51° 34′, where you wait for the tide to go into that wide-mouthed river, which is not "less than twelve miles over from North Point to the opposite side; which opens with "three channels, but the north and east are so choked with banks and shoals there is no "using them; the mid channel will admit of a ship of twelve feet. Observing the tide "over a bar one mile broad, and one mile within Sand Heads is a little place which "affords water for a ship to be afloat, called Little Ship Hole, to distinguish it from "another four miles above Sand Heads, called Ship Hole, in three fathoms low water, "where we moor and do our business. Eight miles below the factory on Roberson's "Islands from Middleborough (island), another island runs a shoal within half a mile "of the ship, which cuts the river and prevents the ship going to the factory, which has "plenty water all above that place."

From this it will be seen that a ship, while waiting the tide to cross the bar, has to lie six miles from the mouth of the river, in a very dangerous position with a north-east gale. The channel on the bar is not over four hundred yards wide, and the Hudson Bay Company's ship, drawing fourteen feet of water, last summer, ran aground while crossing it, and had to remain in that exposed place until the next high tide.

The eight miles from the Ship Hole to Moose factory is in places very shoal, and is rapidly filling in its upper part, so that the Company's schooner, drawing eight feet of water, can only come within about two miles of the factory; whereas a few years ago her cargo was discharged close alongside that place. If a railway should be built to this harbour its terminus will need to be at Ship Hole; and to reach it a long and expensive line of embankment will have to be built from the south shore, across sand and mud flats, partly bare at low water, and, owing to its exposed position, it would need to be correspondingly strong to withstand the force of water during the late fall gales. If approached from the north side, a large bridge will be required to cross the channel to the " Ship Sands," a low, flat, muddy island, partly covered with water at high tide, and lying close to the Ship Hole; in either case the terminus will have to be built largely on made ground.

As the present anchorage, six miles without the bar, is in only thirty-six feet, and as the water gradually shoals toward the river's mouth to a depth of fourteen feet at high water on the bar, and is only eighteen feet at low water at the Ship Hole, with a less depth of water for the four miles between it and the bar, it will be seen that to fit this harbour for the entrance of moderate-sized steamers, with a draft up to twenty feet, extensive dredging operations will be necessary for almost the entire distance from the outer anchorage to Ship Hole.

Unsatisfactory as are the natural conditions of Moose harbour, those at the Albany and Rupert rivers are worse. Off the mouth of the Albany, for fifteen or twenty miles, the bottom is very flat and the deepest water not over twenty-five feet, slowly shoaling to twelve feet at the mouth, with numerous obstructive shoals and bars, the whole rendering it impossible for deep draft vessels to use it. The country around the mouth of the river is so low and swampy that it is hard to say where the land ends and the sea begins, and is totally unfit for the purpose of a railway terminus. To reach the mouth of the Rupert a narrow channel in Rupert bay must be followed, with water from thirty to twenty-five feet deep, after which it shoals to eighteen feet for seven miles to the junction of the Nottaway and Rupert river channels, and then eight miles of water varying from ten to fifteen feet, with dangerous shoals, must be passed to enter the river proper.

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Islands

Akimiski

The islands of James bay, from their geographical position and physical character, may be conveniently divided into three groups. The first consists only of the large island of Akimiski, lying off the western shore; the second includes the high drift islands, situated to the eastward of a line drawn through the middle of the bay, and separated from Akimiski on the west by a deep water channel; the third is composed of the rocky islands and sandy shoals along shore on the east coast. The island of Akimiski, or Omer's island, as it was called by Governor Bayly in 1673, is the largest in James bay, being seventy-five miles long, with an average breadth of ten miles.

Its south end lies about thirty-five miles N.-E. from the mouth of the Albany, and is consequently about twenty-five miles directly east from the coast.

The eastern shore of the island runs N.-N.-W. for thirty-five miles from its south end, and then bending more to the westward runs W.-N.-W. to its north end, which is in Equan bay, and distant about eight miles from the mainland, so that the position of the island is inaccurately laid down on the present published maps, which show it lying roughly parallel to the coast and about fifty miles distant from it. Indians coming from the northward to Albany on the ice in the winter, when travelling in a straight line from Equan point to the mouth of that river, cross the north end of Akimiski, showing that part to lie well inshore. The island closely resembles the adjoining mainland in physical character, being very low and swampy. The shore line above high-water mark is made up of muddy flats, covered in part with grasses and sedges, followed farther inland by thick growths of small willows, these in turn giving place to small black spruce and tamarac as slightly higher ground is reached. The line of these trees is often over two miles inland from high-water mark, itself a long distance from the sea at low water. As far as the tree line, and in places beyond it, are numerous small lakes and ponds of brackish water; good fresh water being only obtainable in a few places well inland.

The shore between high and low water mark is composed of a stiff, slimy mud. Scattered over it are many boulders of gneiss, large and small. At the various points the boulders are often piled together, forming higher elevations than the surrounding flats.

The water around the island is very shoal for several miles out, and as the bottom is uneven, being broken by numerous boulder shoals and bars, it is very dangerous to approach even with small boats, owing to the dirty state of the water. In fine weather the first notice given of these shoals is the bumping of the boat upon them. On the west side, between the island and the mainland, the water is shallower than on the east side, so that at low tide the distance between shore and shore is reduced in some places towards the north end to not more than one mile. This is taken advantage of by the Indians, several families of whom hunt on the island, crossing from the mainland to the island in their small canoes. They start from shore at high tide and follow the retreating water out to its lowest point, cross the narrow channel, and reach the high-water line on the opposite shore with the rising water. From its close resemblance physically to the western mainland, it is probable that Akimiski is underlaid by the nearly horizontal beds of Devonian limestone found on the rivers near the coast. If this is the case, the rocks are covered with drift material on the lower half of its east side, which is the only part of the island that has yet been examined geologically.

The fresh and brackish lakes and ponds on the island are favorite breeding places for ducks and geese, which congregate here in countless numbers in the autumn to feed on the grasses growing along the low shores. The snow goose is reported to breed here when delayed on its passage north in the spring. Rabbits and cariboo are reported to be numerous, white bears frequent its shore, and the fur of the otters killed here is remarkably good and dark. Owing to the shoal character and muddy state of the water around the island, few fish are caught along its shore.

Charlton Island

The principal islands composing the second group are Charlton, Danby, Carey, Woods, Little Charlton, Stratton, Weston, Solomon's Temples, Twins, Spencer, Walter and Grey Goose islands, along with the Bear islands, lying more to the westward. These have a close resemblance to one another both in formation and physical appearance, being composed wholly of sand, clay and boulders, with no bedded rocks in place. They all rise to considerable elevations above the sea level, present sharp escarpments composed of clay and sand along their margins, and the formation of all was probably due to the same causes, as shown later on in this report.

Charlton, the second largest island in James bay, lies about twenty miles north of Point Comfort, the end of the peninsula separating Rupert from Hannah bay, and about one-third of the distance across the bay from the east coast, its north-east point being in lat. 52° 2′ 13″. In shape it is an oblique parallelogram, having diagonals 18 miles long from north-east to south-west, and twelve miles long from north-west to south-east. As before stated, this island, like the others of the group, is composed of unstratified sand, and clay and boulders, without any rock in place.

The interior is a rough, rolling plateau, varying in elevation from 50 to 200 feet above sea-level. On the south and east sides it ends in an abrupt escarpment, highest on the south; on the west and north the high interior land descends with an unbroken slope to a low shore. Starting from South-east Point, this escarpment runs westward at an angle of twenty degrees to the shore, consequently on its west side it is a considerable distance inland. At the east end it has an elevation of seventy-five feet above sea-level. This increases for four miles, where the maximum elevation of 200 feet is reached, fifty feet above the general level of the interior plateau, and standing above it with a cut bank that height on the north side, one-quarter of a mile from the southern margin of the escarpment, beyond which it decreases slowly westward, and is lost in the general low level of the west side. The face of the escarpment was examined at several points along its length, and found to consist of a moderately fine, light sand, with some clay, coarser gravel and small boulders mixed through the mass, the whole showing no signs of stratification. Going north from the south-east point for one mile, the escarpment averages sixty feet in elevation, with its base within a few yards of high-water mark. Behind this, at a distance of 200 yards, is a second escarpment, thirty feet higher than the first. These, on their face, have the same composition as the southern escarpment. At the end of this course, and for one mile and a half beyond to House Point, the descent from the interior is less precipitous, the land rising in three terraces—the first, ten feet; the next, forty feet, and the highest one, a quarter of a mile inland, 100 feet above the sea.

From House Point for half a mile the face of the twenty-foot terrace is made up of sandy clay, with much gravel and boulders, rising out of deep water. From here the escarpment turns N. 30° W. for five miles, and then east five miles and a half, passing inland around the head of a low, muddy bay, and reaching the shore again one mile south of the north-east point.

Here, on the east side, two distinct terraces are visible, the lower being fifteen and the higher seventy-five feet above the sea. The face of the inner terrace is chiefly sand, mixed with a considerable quantity of clay, and with many boulders scattered through the mass. To the westward of the north-east point, along the shore, the lower terrace is soon lost in the upper one, which, a mile beyond the point, shows a face of forty feet, composed of an unstratified sandy clay matrix, holding large quantities of boulders and coarse gravel.

Farther to the westward the cut bank gradually loses its elevation, and two miles beyond the last described place is only about ten feet high; from here to the south-west point no banks occur, the shore line being low, and formed of sand and mud, with many loose boulders scattered over it. At frequent points along this part of the shore the boulders are heaped up together, thus rising a few feet above and breaking the monotony of the general level of the shore.

Most of the boulders are of Laurentian and Huronian gneisses and schists, associated with light yellow fossiliferous limestones of Devonian and Silurian age, non-fossiliferous, light and dark limestones similar to those found at Lake Mistassini and along the coast to the north of Cape Jones, and also masses of the dark green traps found associated with the latter rocks.

From the base of the escarpment on all sides numbers of clear, cold springs of excellent water issue at all seasons. Following the shore from the south-west point, the course is due east for half a mile along a sandy beach, about fifteen feet above high water, covered with many boulders near the point; then, turning N.-N.-E., a similar sandy shore, covered with coarse grass and low willows, is passed over for one mile and a half to a flat, muddy bay; this bay, with another on the west side, leaves at high tide only a low, narrow neck joining the south-west portion of the main island. From this bay the course of the shore changes to S. 70 E., and runs in this direction seven miles to South-east Point. Between the escarpment on the south side of the island and the shore is a considerable area of low, swampy land, not rising over ten feet above high-water mark, where a low embankment, averaging twenty feet broad, composed chiefly of boulders bedded in clay, has been pushed up by the floating ice, and forms a natural dyke to the lower land behind, which is very swampy, and partly covered with long, narrow, fresh water lakes lying parallel to the escarpment and shore. Between high and low tide on this side is a wide mud flat, strewn all over with a great number of boulders. Beyond low-tide mark the water is very shoal for a long distance out; with the exception of the stretch of coast on the east side, from South-east to half a mile beyond House Point, the above description of the shore applies to the whole of Charlton island. To the westward and northward sand and boulder shoals, bare at low water, extend out for miles from the island, rendering it impossible for ships to approach from those directions.

The bay on the east side with the escarpment passing around it, already mentioned, is two miles and a half wide and one mile deep; at low water it is completely dry and exposes a broad mud flat, with many large boulders upon it.

The land between the water and the escarpment, like that on the south side, is very low and swampy, with over one-half its area covered by small shallow lakes, formed or enlarged by numerous beaver dams, upon the three small streams that flow into this bay.

To the eastward of Charlton lie two small islands; the southern, called Danby, being two-thirds of a mile distant; the northern, or Carey, two miles from Charlton.

Between these islands and Charlton is a deep channel, through which the tide runs, with a current varying from three to five miles an hour. At House Point the water is deep close along the shore, and it was here that Captain James wintered his ship in 1631; here, also, in 1675 the Hudson's Bay Company's ships discharged their cargoes from England, and took in the furs brought from the different forts on the bay in sloops. In 1695 this depot was abandoned, and the anchorage has since been used only by the Company's ships when obliged to winter in the bay, as it is the only moderately safe place in the southern part of James bay where a ship may winter and allow the crew to obtain good water and fuel. The last ship wintered here in 1884; remains of the low huts, partly built in the ground for the officers and crew, are to be seen about one-quarter of a mile south of House Point on the first plateau island, near a fine large spring of clear water, which never dries or freezes, and is consequently available throughout the year. On the point is the frame of a large shed, formerly covered with sails, in which the ship's cargo was stored. The only drawback to this place as a wintering ground is that the strong current setting up and down the channel causes it to open early in the spring, and it then carries large masses of ice forward and backward, which, striking the ship, are a source of great damage and danger.

The soil of the high interior land being light and sandy, the rain readily soaks in, and consequently no lakes or streams are found on the surface, which is partly covered with moss. The trees growing in the interior are chiefly small white and black spruce, with a few aspen and balsam poplar, growing much thicker to the northward than on the southern parts, where they form open glades, the intervening spaces supporting a growth of small birch (*Betula pumila*) from one to two feet high. About one-half of the south-eastern portion of the plateau has been burnt over, leaving nothing but the bare sandy plain with small patches of moss growing on it, and presenting a very barren appearance. Between the escarpment and the shore, also on the low swampy lands on the west side, the trees are almost wholly made up of black spruce, with a few tamarac and balsam poplar. Fringing the shore are extensive areas of low willows, beyond which grasses and sedges alone grow over these portions at or near high-water mark, where the shore is frequently overflowed by the tide.

Cariboo and black bears in small numbers are found on the island; white bears often land after heavy gales on its northern shores; rabbits are very plentiful, but the island is chiefly known for the beavers that abound in all its small lakes, being preserved by the Hudson Bay Company, who claim to have introduced them, and only allow them to be hunted every third or fourth year. The small lakes are favourite breeding places for ducks and grey geese, which find good feeding ground on the low grassy flats along the shore; ptarmigan also breed on this island, it being their southward limit around Hudson bay.

Danby and Carey Islands

Danby island, as before mentioned, is distant two-thirds of a mile from the southern portion of the east side of Charlton island. It is roughly triangular in shape, each side having a length of two miles; one side lies parallel to Charlton, with its middle directly opposite House Point. Its shores are low and made up chiefly of sand and boulders with muddy stretches between the points, and a raised bar of sand and boulders formed by ice, similar to that of the south side of Charlton, runs around the island near high-high-water mark. Shoal water extends out from the north, east and south sides for long distances. The interior of the island is low and swampy, covered with a thick growth of small black spruce and tamarac, with a few balsam poplar.

Carey island lies two miles north-east of Danby and three miles east from the north-east point of Charlton. It is four miles long from north to south, with an average breadth of one mile. On the western side the island is low and swampy, gradually rising inland. On its south, east and north sides are escarpments rising in the highest parts seventy feet above the sea. On the east side a raised beach of some fifteen feet in elevation runs along the shore, and extends inland from one to four hundred yards, to an escarpment fifty feet higher, which has a face and top almost wholly composed of water-worn boulders, averaging nine inches in diameter, and without glacial striæ; they are packed tightly together in a condition similar to that shown by boulders on shoals at present, acted upon by the grounding and shoving of large masses of ice over them.

On the north and south sides, the face of the escarpment is largely composed of sandy clay, with large numbers of boulders scattered through the mass. The island on its lower parts is wooded with black and white spruce and a few white birch and poplar; the top of the boulder escarpment is devoid of trees, and has a very barren appearance.

The Stratton Islands

Lying N. 65° E., seven miles from the north-east point of Charlton, is the western end of two small islands called the Strattons.

The western or larger island is five miles long from east to west, one mile and a half broad in the middle, and tapering to a point at either end; the smaller island is nearly round, with a diameter of one and a half miles. The deep channel with its strong current that passes through the sound between Charlton, Danby, and Cary islands, continues across the open bay on a N.-E. course, and runs between the Stratton islands, and from these follows on the same course to near the mouth of the East Main river, where it turns northward and is lost along the coast. The channel between the Strattons is one-third of a mile wide, and is obstructed at its south entrance by a small, low boulder island, one-half mile in circumference. The current, owing to the confined limits of the channel, rushes through at a higher rate of speed than in the Charlton sound, varying from four to six miles an hour.

The channel between the Stratton islands has been tried as a wintering ground for a ship by the Hudson Bay Company, but it was found that the ice carried along on the strong current caused great damage to the vessel; the crew also suffered greatly from the ravages of scurvy, brought on it is said by the use of the stagnant water in the small lakes on the islands, where no running streams exist.

On all sides of these islands, with the exception of the above narrow deep channel, the water is very shoal, with an uneven bottom covered with sand and boulder shoals, some of which are bare at low water, but the greater number, coming within a few feet of the surface, only show their presence by the breakers upon them during gales.

The highest point of the interior of the larger island is seventy-five feet above the sea. On the south side the slope from the highest level is very gradual, and is broken by low rounded hills of boulders lying transverse to the shore line, where they terminate in short points; to the westward a raised beach twenty-five feet high, formed chiefly of boulders thickly packed in clay with sandy patches, extends back about one-quarter of a mile to a second abrupt bank of packed boulders thirty feet higher. On the lower beach is an immense rounded boulder of red Laurentian gneiss, fully ten feet cube, and consequently weighing over eighty tons.

On the east side along the sound, and partly on the north side, tightly packed boulder banks rise almost perpendicularly ten to forty feet from deep water, and resemble, when examined closely, a built, dry stone wall, while at a short distance they have the appearance of an exposure of solid rock. Along the remainder of the shore and inland are immense numbers of boulders in sandy clay, showing that the greater part of the island is made up of them.

The smaller island is low, being formed chiefly of boulder clay, with sandy shores covered with boulders on all the points. Both islands are scantily wooded on their lower parts with small white and black spruce and willows; numerous fresh and brackish ponds are situated on these parts also.

Little Charlton Island

Bearing N.-N.-W. fifteen miles from the western point of the Strattons is the eastern end of another small island, at present called Little Charlton or False Charlton, but named Trodiley island in Capt. Coates' notes.

This island is very similar in composition and size to the larger Stratton island, except that it is made up of finer material and fewer boulders than that island. Its greatest length from east to west is five miles and a half, with an average breadth of one mile. The north-east part of the island is the highest, and rises fifty feet above the sea. On the eastern half of its south side is a raised beach of sand and gravel ten feet high, extending from the water inland from one to three hundred yards, to a steep sloping bank of sand and boulders twenty feet higher, after which the land gradually rises towards the interior. The western part of the south shore is low and sandy and gradually rises inland towards the east, with no cut banks; the western extremity ends in a low, narrow boulder point, half a mile long. The north shore is covered with boulders or coarse gravel, except short stretches in the bottom of the small bays, which are sandy. Beyond the middle of the north shore, and from there to the east point the island rises abruptly inland, having banks of thirty to forty feet, composed almost wholly of small and large boulders mixed with quantities of clay and sand, from the base of which issue small streams of clear, cold water.

The western end of the island is devoid of trees, and shows a barren, sandy soil, covered with low Arctic plants, with numerous large boulders strewn over the surface. The south-eastern portion is covered with small white spruce trees, not more than ten inches in diameter at the base and less than forty feet in height, which grow in open glades, the sandy soil here being covered with deep moss.

About half way between the Strattons and little Charlton are two small, low islands, composed of sand and boulders, with low willows growing on their highest parts; many sand and boulder shoals also are to be seen in this part of the bay.

Solomon's Temple

Twenty-two miles distant, on a N. 35° W. course from the east point of Little Charlton island, is the next high island, with its north end in lat. 52° 30′ 32″, called Weston island on the present chart of the Hudson Bay Company; this island is named Solomon's Temple in Capt. Coates' notes, while four low islands a few miles to the northward, at present marked Solomon's Temple, he calls Lord Weston's islands; it is proposed to return to the old names, and call the large bold island Solomon's Temple and the low islands Weston islands.

Solomon's Temple is a narrow island, eight miles long from north to south, in the form of a crescent, convex on the west side, and terminating in long narrow points, made up of immense numbers of boulders packed tightly together. On the west side, rising gradually from either point, is a cut bank of sandy clay full of small boulders, having a face of fifty feet in its highest parts. Behind this bank the surface of the island is an undulating plain, covered with many boulders, and dotted with small shallow lakes, which fill every depression of its surface. With the exception of a few solitary stunted white spruce, no trees grow on the island, its surface being covered only with low Arctic flowering plants, grasses, sedges and mosses. Two miles beyond the north point, and seemingly an extension of it, is a small low boulder island, about one mile in circumference.

Rising of Land Around James Bay

On the northern end of Solomon's Temple great quantities of driftwood are heaped up from ten to twenty and occasionally thirty feet above ordinary high-water mark; on the shores of all the other islands similar piles of wood are found, most abundantly on their north sides; that on the higher levels is generally greatly decayed and composed chiefly of cedar. The presence of these piles of driftwood at such high levels has been taken as evidence of a rapid elevation of the land around Hudson bay. Dr. R. Bell places the rate of upheaval of the land, or "subsidence of the water," at from five to ten feet a century. Other evidence than that of the driftwood is required to sustain such a theory, as its presence at these high levels above ordinary tide may be accounted for in another manner than by a rapid elevation of the shores and islands. Owing to the shallow state of the water near the shores of the islands and mainland of James bay, the wind, when blowing on the land, has great effect in causing abnormal rises of tide by forcing the water from the deeper parts of the bay over the shallows; an instance in case was observed by the writer while anchored on the east side of Akimiski island in a moderate gale from the north-west, August 8th, 1887. Here the ordinary rise of the tide does not exceed five feet, yet, after beaching his boat at 8 p.m., by midnight the water was twelve feet deep, showing a rise of seven feet at least above the ordinary level. From this it is easy to believe that extraordinary gales in the late autumn, at long intervals apart, would back the water into the bay to such an extent as to cause a rise of tide from ten to twenty feet above its ordinary level. These high tides, accompanied by great breakers, would necessarily throw the older and lighter wood, then on a high level, farther back, and pile newer wood in front and below it, thus forming a state of affairs as at present seen.

Other facts tend to disprove a rapid elevation of land around James bay, at least in its southern part. Capt. Coates, in his notes on the mouth of the Moose River, written one hundred and fifty years ago, describes it as it exists at the present time, with little or no change in the state of the channel or shoals; if a rise of five or ten feet a century was occurring during this time, the mouth of the river would necessarily be greatly changed, and the shallow flats of Capt. Coates' time would be ten or fifteen feet above the sea. Another place where comparison between levels at different dates can be made is the isthmus connecting the peninsula at the end of the point dividing Hannah from Rupert bay. At present it is a low, muddy neck, covered with willows nowhere five feet above high-water mark, and distinct from the higher land on either side, which is covered with spruce and tamarac. Now, if the change of level claimed were actually taking place, this peninsula two hundred years ago would have been an island, with a considerable depth of water over the present isthmus, but on a map (Parte de la Nouvelle France, Hubert Jaillot, 1696), this very peninsula is marked, thus affording good evidence against a rapid change of level of this part of James bay.

The Tiders and Westons

Between Little Charlton and Solomon's Temple are seven or eight small low islands, formed of sand and boulders, and covered with low bushes on their higher interior parts; these islands are called the Tiders.

The Westons are four low drift islands, thirteen miles N.-N.-E. from Solomon's Temple, in lat. 53°. The largest is about seven miles long, and on its western end the Hudson Bay Company had a ship wrecked in 1724.

South Twin Island

Thirty-six miles N. 10° W. from Solomon's Temple, in lat. 53° 4′, is the south-east point of the South Twin island. This island is pentagonal in shape, with its face to the southward; it is seven miles long from north to south, with an average breadth of five miles. Starting from the south-east point, the shore line for one mile and a half northward passes along the base of a steep cut bank of boulder clay, containing an admixture of sand, and varying in elevation from forty to sixty feet. From here the shore turns westward, passing around a bay, one mile and three-quarters wide by one mile and a half deep; the cut bank runs one mile farther inland; low mud flats, covered partly with small brackish ponds, occur between it and high-water mark. Again approaching the shore on the north side of this bay the escarpment gradually changes to low rounded hills, sloping inland, composed chiefly of boulders, with a shore line as far as the north point formed of numerous boulder points, with low muddy bays between, covered with grasses.

Between the north and west points, four miles, is an escarpment, composed of boulder clay and gravel, forty feet high, running parallel to a shore, alternating between boulder points and sandy bays. From west to south-west point the shore line is low and of the same character as that above, with the ground rising slowly inland. Along the south side sand and clay greatly predominate; a cut bank one-quarter of a mile inland gradually rises to an elevation of forty feet near the south-east point, with a lower raised beach of ten feet in front, the latter composed of sand, the former of boulder clay.

The interior of the island rises gradually towards the centre, where it has an elevation of one hundred feet above the sea.

Small lakes fill all the depressions on its surface. With the exception of some four or five stunted white spruce, less than ten feet high, no trees grow on the island, which is everywhere covered with mosses and Arctic plants.

A fine example of the expansive power of ice may be seen half a mile inland from the south-east point, where there is a small shallow lake, at present completely drained by a small stream, which has cut out a channel through the escarpment. This old basin is nearly round, with a diameter of five hundred yards, and had a depth of about six feet. Around the old shore line is a bank of boulders and clay, four feet high and eight feet wide at the base, overgrown with vegetation, and resembling the entrenchment of a fortified camp. This has evidently been pushed up by the total freezing of the lake and the expansion of the ice.

Scattered over the surface of the island are great quantites of small, angular fragments of light yellowish fossiliferous Silurian limestone, the probable result of the breaking up of large boulders of the same.

North Twin Island

Separated by a channel five miles wide, and lying four miles to the westward of this island, with its south-west point in lat. 53° 4′, is the North Twin. Like the other island it has an abrupt escarpment on the east side, with a low shore line on the west rising slowly inland. From the south-west point along the south side, the low shore is composed of sand and gravel, with a wide margin of swampy land extending inland to the slowly rising interior. Low cut banks occur near the coast at the south-east point, where two terraces of ten and thirty feet elevation are seen, the lower formed of sand and gravel, the upper of boulder clay and sand.

On the east side is a wide, shallow bay, with low swampy land, from a quarter to a half-mile inland, to the base of a boulder clay escarpment fifty feet high. On the northern part of the east side a low terrace, fifty feet high, composed of sandy clay, with a few boulders, rises near high-water mark, and extends inland on an average a half-mile to a second terrace thirty feet higher, and of similar composition. On the north side the land adjoining the shore is made up of sandy dunes dotted with boulders, rising slowly inland, with numerous boulder points along the shore. Along the west side the shore margin is low and swampy, with sand and gravel beaches between boulder points, the latter becoming more numerous to the southward. The banks on this side are generally sloping, with a few cuttings of sandy clay full of small boulders.

Inland, the ground rises irregularly towards the centre, where it is lower than the South Twins. The surface is dotted with many small lakes, and covered with a low Arctic vegetation.

From the north-east point a low narrow bar of boulders, partly bare at low water, runs out in a north-east direction several miles towards Spencer Island.

The rising and falling tide rushing over this bar forms a strong rapid, with heavy breakers. Another reef extends from the south-east point, five miles in a S. by E. direction; a ship was wrecked on it in 1732. On the north point is the wreck of a large sloop belonging to the Hudson Bay Company, lost here in 1886, while under the charge of some Esquimaux engaged in killing white bears on the islands. In the bay on the east side a small ship's boat, painted white, was found, which must have been lost from some vessel engaged in the whale fishery in the northern part of Hudson bay, as no such boat has been lost by the Hudson Bay Company.

Walter Island and Emily Rock

Walter island lies ten miles N. 40° E. from the north end of the South Twin. It is nearly round, with a circumference of two miles, and rises with steep banks to an elevation of sixty feet at the highest point. It is almost wholly made up of boulders, which are everywhere tightly packed by ice on the sides and top of the island.

Between Walter island and the South Twin, six miles from the latter, is a small bare knob of Laurentian gneiss, called Emily rock, rising in the middle fifteen feet above high-water mark, with a circumference of fifty yards. The gneiss is dark flesh red in colour, and made up of dark red orthoclase, with some quartz and black hornblende. It contains lenticular masses of hornblende. Strike N. 30° W.

Spencer Island

Spencer island is fourteen miles distant from the north end of the North Twin, on a N. 50° E. course. This island is one mile and a half long by three-quarters of a mile broad, with a generally steep shore line covered with boulders. On the south side is a sandy bay, showing three areas of ten, twenty and fifty feet elevation, the two lower having cut faces of sand and gravel, the highest being formed of small rounded boulders tightly packed together, the same extending over a greater part of the southern interior. On the east side is another sandy bay, with a raised beach of that material fifteen feet in elevation. In this bay twenty-eight empty oil casks were found, which were probably from the same wreck as the boat on the North Twin, the Hudson Bay Company's people knowing nothing about them. To the northward the island is lower and the boulders fewer, with more intermixed sand. On the west side a wall of boulders rises directly from the water to elevations varying from twenty to fifty feet. All these islands are frequently visited by polar bears, who land to rest after heavy gales, and feed on the Arctic berries that grow in great profusion everywhere; Arctic foxes are also quite plentiful.

The other islands of this group were not examined, but it is inferred from information obtained from the Hudson's Bay Company's officers, and Capt. Coate's notes, that they are of similar origin and composition to those above described.

The Eastern Archipelago

The islands of the third group in James bay lie along the east coast, and have been described by Dr. R. Bell in the report of Progress of the Geological Survey, 1877-78, as follows: "The majority of the islands are rather low, and composed of boulders and shingle, with few or no trees, but the solid rock occurs upon a large proportion of them. No regularity can be detected in the general arrangement of these islands. They present a kind of labyrinth which it would be very difficult to map with accuracy and which is not unlike that of the Georgian bay, Lake Huron, except that on the east coast of James bay the water is shallower, and shows evidence of receding rapidly, and the islands are, as above stated, mostly covered by boulders and shingle."

Meteorological Data

From the meteorological observations taken during the summers 1887 and 1888 the following summary is compiled:

Three daily readings with the minimum temperature, taken on fifty-eight days in 1887, while on James bay, give a mean temperature of 55 degrees.

Similar readings on fifty-one days in 1888 give a mean temperature of 53 degrees. In 1887, there was fog on twenty and rain on fifteen out of fifty-eight days.

In 1888 fog occurred on twenty-eight and rain on twenty-four out of fifty-one days.

Of one hundred and fifty-three observations on the direction of the wind taken in 1887, twelve were from the N., sixteen from N.E., four from E., twenty-two from S.-E., seventeen from S., twenty-five from S.-W., twenty-one from W., and thirty-six from N.-W., the resultant direction being due west.

Two hundred and twenty similar observations in 1888 give a resultant direction of S. 87° W. Three daily readings of the thermometer at Moose Factory during the months of June, July, August and September, give the following mean temperatures: 1878, 61.7°; 1879, 54.3°; 1880, 56.2°. These taken with the mean temperatures given above would give an average mean summer temperature of 55.5°. This would be slightly higher than an average for the entire bay, as the mean temperature of Moose Factory is higher than many other places. Dr. R. Bell, in Report of Progress, 1877-78, places the average temperature of the sea along the east coast at 51°. This is much higher than the temperature of the main body of water, as the water of the east coast is warmed by the rivers flowing into the bay on that side, and being very shallow has its temperature raised by the action of the sun's rays. The difference in the vegetation growing on the outer islands and in the same latitude on the mainland shows that the temperature of the former is much lower than that of the latter, and this is due to the lower temperature of the main body of water, which is so cold that an immersion of the limbs for a few minutes at any time produces a numbness in the parts of the body so covered.

GENERAL ACCOUNT OF HUDSON BAY[41]

INCLUDING A DESCRIPTION OF THE HARBOURS

By Robert Bell

In the popular mind Hudson bay is apt to be associated with the polar regions; yet no part of it comes within the Arctic Circle, and the latitude of the southern extremity is south of London. Few people have any adequate conception of the extent of this great Canadian sea. Including its southern prolongation, James bay, it measures about one thousand miles in length, and is more than six hundred miles in width in its northern part. Its total area is in the neighborhood of 500,000 square miles, or upwards of half that of the Mediterranean. It is enclosed by the land on all sides, except the north-east, where it communicates by different channels with the outer ocean. The principal or best known of these is Hudson strait, which is about 500 miles in length, and has an avertge width of about 100 miles.

Central Drainage Basin of North America

Hudson bay, which might have been more appropriately called Hudson sea, is the central basin of the drainage of North America. The limits of this basin extend to the centre of the Labrador peninsula, or some 500 miles inland on the east side, and to the Rocky mountains, or a distance of 1,300 miles, on the west. The Winnipeg basin constitutes a sort of outlier of the region more immediately under notice, since the waters drain into it from the north, south, east and west, and discharge themselves by one great trunk, the Nelson river, into Hudson bay. The southernmost part of this basin, namely, the source of the Red river, extends down nearly to latitude 45°. The head waters of the southern rivers of James bay are not far to the north of Lake Huron, while one of the branches of the Albany rises within twenty-five miles of the north shore of Lake Superior. Including the Winnipeg system, the basin of Hudson bay has a width of about 2,100 miles from east to west, and a length of about 1,500 miles from north to south, and its dimensions approach the enormous area of 3,000,000 square miles. Over a great part of this region there is a temperate climate, and although the soil of much of it is comparatively barren, yet large tracts are very fertile. The numerous rivers and lakes of the first class embraced within these limits will prove of great value in the settlement of the country. Both the bay and strait are remarkably free from rocks and shoals which might interfere with their free navigation. The groups of islands near the east side of the bay are surrounded by deep water, and a wide channel leads up the centre of James bay. Fortunately the main body of the great bay, which is the portion which may hereafter be frequented by shipping, is entirely without shoals, reefs or islands. The depth is very uniform over most of the bay, and nowhere does it present any great irregularities. It averages about seventy fathoms throughout, deepening to one hundred and upwards in approaching the outlet of Hudson strait; while in the strait itself the soundings along the centre vary from about 100 to upwards of 300 fathoms. The bottom appears to consist almost everywhere of boulder clay and mud. Near the shores a stiff clay, affording good holding ground for anchors, is almost invariably met with on both sides.

James Bay

James bay begins at Cape Jones, on the east side, and Cape Henrietta Maria on the west, and runs south about 350 miles, with an average breadth of about 150 miles. The east side of Hudson Bay, including its southern prolongation, is known as the Eastmain coast. Between Cape Jones and Cape Dufferin, on the Portland promontory, and again in approaching Cape Wolstenholme, at the termination of this coast, the land is high and bold, some points attaining an elevation of nearly 2,000 feet above the sea. The country on the south-west side of the main bay, as well as that lying to the west of James bay, is low and generally level, with shallow water extending a long distance out from shore. Both sides of Hudson strait are high and rocky, but the northern is less precipitous than the southern.

[41] From report of 1879-80, pages 27-34 C and 35-38 C, of the Geological Survey of Canada.

The Tributary Rivers

Of the numerous rivers which run into Hudson bay from all sides, about thirty are of considerable magnitude. All those which enter on the Eastmain coast appear to flow in a uniform course directly west, or parallel to one another, and as the height of land in the centre of the Labrador peninsula is farthest inland towards the south, the rivers which fall into the southern part of this coast are the largest, and the remainder become progressively smaller as we go north. Numerous streams converge to the head of James bay from all points southward of an east and west line passing through its southern extremity. The Moose, about a mile wide, is the principal of these. On the western side, the Albany and the Churchill rivers are the longest, but the Nelson, with a course of only about 400 miles, discharges the greatest body of water into the sea. Indeed, this huge artery of the Winnipeg system of waters may be considered as one of the greatest rivers of the world. Few of the rivers of Hudson bay afford uninterrupted navigation for large vessels to any great distance from the coast. During the season of high water shallow-draft steamers might ascend the Moose and two of its branches for upwards of 100 miles. Hayes river and two of its branches might also apparently be navigated by such craft in the spring to points about 140 miles inland, and the Albany for nearly 250 miles; while larger steamers might ascend the Nelson for seventy or eighty miles from the open sea. The Nelson is the only muddy-water river entering Hudson bay. Most of the others have a slightly brownish tinge, but their waters are perfectly wholesome, and contain only very small quantities of foreign matter. The Churchill, which is the second largest river of Hudson bay, is a beautiful clear-water stream, somewhat larger than the Rhine. It is remarkable for having at its mouth a splendid harbour, with deep water and every natural advantage for the purpose of modern commerce.

Harbours of Hudson Bay

The only harbours on the west side of Hudson bay are those formed by the mouths of the rivers, but none of them, with the exception of Churchill harbour, can be entered by vessels drawing more than ten or eleven feet, and only at high water even by these. The Nelson may form an exception to this. Most of its estuary becomes dry at low tide, but a channel runs through it near the centre as far as the head of tide-water. I sounded this channel in a number of places in 1878, 1879 and 1880, and although an average depth of about two fathoms at low-water was found, continuous soundings throughout might have shown interruptions or shallower water in some places. As stated in previous reports, there is a section at the head of tide, or between the tidal portion and the regular inland channel of the river, in which not more than ten feet of water was found. This may extend for about two miles, above which an apparent continuous channel, with a depth of about twenty feet, according to our soundings, extends to the lowest limestone rapid, which is the first break in the navigable part, and is between forty and fifty miles from the head of tide, or from seventy to eighty from the open sea. If the section referred to were deepened, steamers coming in from the sea might enter this part of the river and find perfect shelter, or even proceed up the stream to any point below the rapid referred to. In continuation of the channel running down the estuary, a "lead" of deeper water extends out into the bay, and forms the "North river," or "York roads," with excellent anchorage.

The Churchill, unlike all the other rivers, has a deep, rocky and comparatively narrow mouth, which can be entered with ease and safety by the largest ships at all stages of the tide. On the point at the west side of the entrance of the harbour stands the old "Fort Prince of Wales," which is probably the largest ruin in North America. Although occupying a commanding position, and mounting about forty large guns, it was surrendered, without firing a shot, to the French Admiral, La Perouse, who destroyed it, in 1772.

Along the west coast the rise and fall at spring tides amounts to about eleven or twelve feet, on an average, and is pretty uniform, diminishing somewhat towards the south. It is greatest at the mouth of the Nelson river, where it amounts to about fifteen feet. The tides are lower all along the east side of the bay. In Hudson strait there is a very good tide, according to the report we have received of Acting Staff-Commander J. G. Boulton's reconnaissance during the past summer.

Geology of Hudson Bay Basin

Geologically, the basin of Hudson bay, excluding the western or Winnipeg division, lies within the great Laurentian area of the Dominion. Cambro-Silurian rocks, resting almost horizontally upon these, form an irregular border along the south-western side of the bay; and in the valleys of some of the rivers they extend inland from one to two hundred miles. To the south and west of James bay the Cambro-Silurian are overlaid by Devonian rocks, which here occupy a considerable area. The long chains of islands which fringe the east coast for nearly 300 miles to the northward of Cape Jones, and also the mainland in the vicinity of Richmond gulf, are composed of bedded-volcanic and almost unaltered sedimentary rocks, resembling the Nipigon series of the Lake Superior region, which may be of Lower Cambrian age. On the western side of the bay, from Churchill northward, quartzites and other rocks, which may also belong to the Cambrian system, appear to be largely developed. Valuable minerals may be looked for on this coast. The extensive level region around the south-western side of the bay is overspread with a great sheet of boulder clay, which is generally covered by the modified drift. The rocks of the outlying or Winnipeg division of the basin comprise an extensive series, ranging from the Laurentian to the Tertiary.

Resources of the Region

The resources of Hudson bay and the country immediately around it are varied and numerous, although, as yet, few of them are at all developed.

Furs

The fur trade is the principal and best known business which has hitherto been carried on in these regions; but a considerable amount of oil, derived from the larger whales, the porpoises, walruses, white bears, and various species of seals which frequent the northern parts of the bay, has been carried to New England, and small quantities, principally of porpoise and seal oil, have from time to time been taken to London by the Hudson's Bay Company. The trade in oil might be greatly extended in these quarters. Other articles have been exported from the bay, but hitherto only in trifling quantities. They embrace whalebone, feathers, quills, castoreum, lead ore, sawn lumber, ivory, tallow, isinglass, and skins of seals and porpoises.

Fisheries

The fisheries, properly speaking, of Hudson bay have not been investigated. Both the Indians and Eskimo find a variety of fish for their own use, and fine salmon abound in the rivers of Hudson strait. From one or two of them a considerable number of barrels, in a salted condition, are exported every year by the Hudson's Bay Company. Water-fowl are very numerous on both sides of the bay, and larger game on the barren grounds in the northern parts; so that the natives, with prudence, may always have a plentiful supply of food.

Farming Lands

But perhaps the most important of the undeveloped resources of the country around the bay are its soil, timber and minerals. To the south and south-west of James bay, in the latitude of Devonshire and Cornwall, there is a large tract in which much of the land is good and the climate sufficiently favourable for the successful prosecution of stock and dairy farming. A strip of country along the east side of James bay may also prove available for these purposes. To the south-west of the wide part of the bay the country is well wooded, and, although little or no rock comes to the surface over an immense area, still neither the soil nor the climate are suitable for carrying on agriculture as a principal occupation until we have passed over more than half the distance to Lake Winnipeg. This region, however, appears to offer no engineering difficulties to the construction of a railway from the sea-coast to the better country beyond, and this, at present, is the most important point in regard to it. Some of the timber found in the country which sends its waters into James bay may prove to be of value for export. Among the kinds which it produces may be mentioned white, red and pitch pine, black and white spruce, balsam, larch, white cedar and white birch. The numerous rivers which converge towards the head of James bay offer facilities for "driving" timber to points at which it may be shipped by sea-going vessels.

Minerals

Minerals may, however, become in future the greatest of the resources of the shores of Hudson bay. Little direct search has as yet been made for the valuable minerals of these regions. In 1875 I found a large deposit of rich ironstone on the Mattagami river. (See Geol. Survey Reports for that year.) In 1877 inexhaustible supplies of good manganiferous iron ore were discovered on the islands near the Eastmain coast, and promising quantities of galena around Richmond gulf and also near Little Whale river, where a small amount had previously been known to exist. Traces of gold, silver, molybdenum and copper were likewise noted on the Eastmain coast. Lignite was met with on the Missinaibi, gypsum on the Moose, and petroleum-bearing limestone on the Abittibi river. Small quantities of anthracite and various ornamental stones, and some rare minerals, were collected in the course of our explorations around the bay. Soapstone is abundant not far from Mosquito bay on the east side, and iron pyrites between Churchill and Marble island on the west. Good building stones, clays and limestones exist on both sides of the bay. A cargo of mica is said to have been taken from Chesterfield inlet to New York, and valuable deposits of plumbago are reported to occur on the north side of Hudson strait. Some capitalists have applied to the Government for mining rights in the latter region.

Hudson Bay a Highway to Europe

Situated in the heart of North America, and possessing a seaport in the very centre of the continent, 1,500 miles nearer than Quebec to the fertile lands of the North-West territories, Hudson bay now begins to possess a new interest not only to Canadians, but also to the people of Great Britain, from the fact that the future highway between the great North-West of the Dominion and Europe may pass through it. The possibility of this route being adopted for trade is not a new idea. It has been frequently suggested by far-seeing men in past years, and occasionally referred to in the newspapers. In 1848, the then Lieut. M. H. Synge, in his work on Canada, wrote: "A ship annually arrives at Fort York for the service of the Hudson's Bay Company; who can tell how many may eventually do so?" The journal of the Statistical Society of London for March, 1864, contains a paper by H. Y. Hind on "The Commercial Progress and Resources of Central British America," in which the writer says: "It is more than probable that whenever the necessity arises, the communication between Winnipeg and Hudson's bay, and thence to the Atlantic, by the aid of steamers, will be made easy and speedy for at least three months in the year." In 1876 Mr. Selwyn brought the subject officially before members of the Canadian Government, and recommended that surveys be made of Hudson bay and strait. In 1878 Col. Dennis published a pamphlet, accompanied by a valuable map, in relation to it. The report of the Minister of the Interior for 1878 contains an appendix by the writer on the practicability of building a railway from Lake Winnipeg to Hudson's bay. During the session of 1878-79, and again the following year, the Hon. Thomas Ryan, a gentleman of great enterprise, brought the matter under the notice of the Dominion Senate.

In 1880 the Parliament of Canada granted charters to two companies for constructing railways and otherwise opening a route for commerce from the North-West Territories to Europe, via Hudson bay, and during the past year one of them, the Nelson Valley Company, caused a survey to be made of a part of the distance between Lake Winnipeg and the harbour of Churchill. Their chief engineer has reported the route, as far as he located the line, to be an easy and inexpensive one for a railway. The directors of the company have again sent an engineering party to the field to carry on the survey during the present year (1881). This company has also the power of connecting with the Canadian Pacific railway in the Saskatchewan region, but the main line is intended to form a connecting link between the great system of inland navigation, which centres in Lake Winnipeg, and the sea. If constructed, the Nelson Valley railway may carry to the seaboard not only the surplus of the grain and cattle of our own North-West, but also that of Minnesota and Dakota. Lieut.-General Sir J. H. Lefroy, President of the Geographical Section of the British Association, in his address at the Swansea meeting (1880), said: "Hudson's Bay itself cannot fail, at no distant day, to challenge more attention. Dr. Bell reports that the land is rising at the rate of five to ten feet in a century, that is, possibly, an inch a year. Not, however, on this account will the hydrographer notice it; but because the natural seaports of that vast interior, now thrown open to settlemen, Keewatin, Manitoba, and other provinces unborn, must be sought there. York Factory, which is nearer Liverpool than New York, has been happily called by Professor H. Y. Hind the Archangel of the West. The mouth of the Churchill, however, although somewhat farther north, offers far superior natural advantages, and may more fitly challenge the title. It will undoubtedly be the future shipping port for the agricultural products of the vast North-West territory, and the route by which immigrants will enter the country." Sir Henry Lefroy, being personally well acquainted with Hudson bay and the North-West territories, may be accepted as a good authority on the subject.

THE HUDSON BAY ROUTE

While the question of the feasibility of navigation of the Hudson bay route for the shipment of grain, cattle and other products is not so important to Ontario as it is to the western prairie Provinces, still if this route can be made into an important commercial highway it will be of great value when railways are extended from the northern part of this Province to James bay, or to Nelson on Hudson bay.

Northern Ontario, which has now a sea coast of over six hundred miles on James bay and the adjacent part of Hudson bay to the westward, possesses vast agricultural resources, great supplies of pulp wood and other timber, and wide mineral areas. The Hudson bay route will, if it proves a commercial success, afford an alternative route to that via the St. Lawrence for the export of our merchandise. Moreover, it will serve as a route by which imports can be brought, at a comparatively low cost for freight, to the province's northern and north-western districts. For instance, the freight on Nova Scotia coal to the James and Hudson bay coast, being all by water, will be low.

Literature on the Route

A compilation of the literature bearing on the Hudson bay route was published in pamphlet form by the Department of the Interior, Ottawa, in 1908.[42] This pamphlet contains an account of the more important observations made up to that time, together with conclusions as to the commercial feasibility of the route. Starting with the earliest period, it is said: " In the course of a century and three-quarters (to 1870), seven hundred and fifty vessels, ranging from seventy-gun ships to ten-ton pinnaces, crossed the ocean, passed through the straits, and sailed the bay in the service of the (Hudson's Bay) Company. And only two were lost. A marvellous record, when it is remembered that all the craft were sailers, and most of them small and of crude construction, and that the bay and strait afforded none of the modern accessories to navigation in the way of coast aids."

The opinions of a number of captains. in the service of the Hudson's Bay Company or in command of whaling ships, are given. Then follow quotations from reports by Dr. Bell, Commander Gordon, who commanded the Neptune expeditions of 1884 and 1885, which were undertaken by the government with the view of ascertaining the actual conditions pertaining to the bay and strait: Commander Wakeham, under whom the Diana expedition of 1897 was despatched for the purpose of making a further test over a longer season, both spring and fall, than those from which Commander Gordon had made his deductions; Lieutenant Schwatka, of the United States Navy, who spent about two years and a quarter in Hudson bay and strait, and adjoining country, and Mr. A. P. Low, who accompanied the expedition of 1897 and commanded the Neptune expedition of 1904-5.

The summing up is as follows:—

"The reports and opinions quoted evidence quite a diversity of view as to the period of safe navigation. Doubtless some are too optimistic, while others are too cautious. But leaving aside the sanguine opinions and considering only the conservative views, the conclusion is clear that Hudson strait and bay afford a safe commercial route to Europe for at least three months in the year, from towards the end of July to about the end of October. It would not be a feasible route compared to that via Montreal, but it would be an adequate subsidiary one—a means of relief from grain blockades such as now endanger the continued development of the west."

Recent Reports

During the last three or four years, since it has been decided to build a railway to the mouth of the Nelson river, or to Churchill, investigations have been undertaken by the Dominion Department of Railways and Canals concerning the character of the harbours and the navigation of Hudson bay and strait. The results of these investigations are given in the annual reports of the Department.

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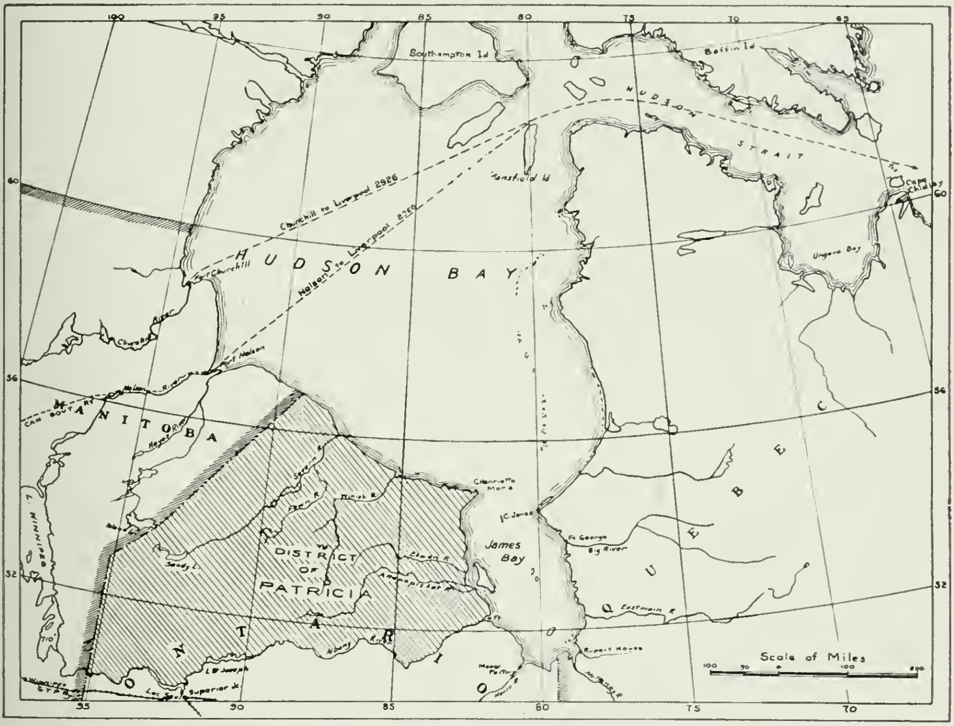
[42] "The Hudson Bay Route, a compilation of facts with conclusions," by J. A. J. McKenna.

Comparative Distances

From the map on this page it will be seen that the distance from Port Nelson to Liverpool is 2,966 miles; Montreal, via the Strait of Belle Isle, is 2,761 miles, and via Cape Race, 2,927; New York, by the northern route, is 3,079 miles distant from Liverpool. Winnipeg, by the Canadian Pacific railway, is 1,422 miles from Montreal.



District of Patricia and Hudson Bay Route.

Railway Extension

The length of the railway line to be built from the Saskatchewan river, at the Pas station on the Canadian Northern railway, to Port Nelson, is 410 miles.

From the map, scale 35 miles to 1 inch, that accompanies this volume, it will be seen that from Cochrane, the present terminus of the Temiskaming and Northern Ontario railway, to Port Nelson, the railway can be extended in a line continuous with that of the part of the government railway already constructed. It is to be hoped that mineral areas will be found in the more distant parts of older Northern Ontario and in the district of Patricia that will justify the extension of the railway to Port Nelson. The people of Ontario will, in that event, possess a semi-transcontinental railway ending at a seaport.

While the harbours in, at least, the southern part of James bay are poor, it is likely that within a few years they will be utilized as terminals for one or more railways. Examinations are being made of the mouths of the Nottaway and the Rupert, and of the coast of the bay farther to the south and west.

APPENDIX I

Following is the Act passed by the Parliament of Canada in the session of 1911-12, extending the boundaries of the Province of Ontario to include the territory described in the foregoing pages, being Bill No. 152 of the House of Commons for that session:

AN ACT TO EXTEND THE BOUNDARIES OF THE PROVINCE OF ONTARIO

WHEREAS, on the thirteenth day of July, one thousand nine hundred and eight, the House of Commons resolved that the limits of the Province of Ontario should be increased by the extension of the boundaries of the Province so as to include the territory hereinafter described, as in the said resolution is more particularly set out, upon such terms and conditions as may be agreed to by the Legislature of Ontario and by the Parliament of Canada: Therefore, subject to the consent of the said Legislature, His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. This Act may be cited as *The Ontario Boundaries Extension Act.*

2. The limits of the Province of Ontario are hereby incresaed so that the boundaries thereof shall include, in addition to the present territory of the said Province, the territory bounded and described as follows:—Commencing at the most northerly point of the westerly boundary of the Province of Ontario, as determined by "The Canada (Ontario) Boundary Act, 1889," chapter 28 of the statutes of 1889 of the United Kingdom, (the said westerly boundary being the easterly boundary of the Province of Manitoba); thence continuing due north along the same meridian to the intersection thereof with the centre of the road allowance on the twelfth base line of the system of Dominion Land Surveys; thence north-easterly in a right line to the most eastern point of Island lake, as shown in approximate latitude 53° 30′ and longitude 93° 40′ on the railway map of the Dominion of Canada, published, on the scale of thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior; thence north-easterly in a right line to the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson bay; thence easterly and southerly following the shore of the said bay to the point where the northerly boundary of the Province of Ontario as established under the said Act intersects the shore of James bay; thence westward along the said boundary as established by the said Act to the place of commencement; and all the land embraced by the said description shall, from and after the commencement of this Act, be added to the Province of Ontario, and shall, from and after the said commencement, form and be part of the said Province of Ontario, upon the following terms and conditions and subject to the following provisions:—

(*a*) That the Province of Ontario will recognize the rights of the Indian inhabitants in the territory above described to the same extent, and will obtain surrenders of such rights in the same manner, as the Government of Canada has heretofore recognized such rights and has obtained surrender thereof, and the said Province shall bear and satisfy all charges and exenditure in connection with or arising out of such surrenders;

(*b*) That no such surrender shall be made or obtained except with the approval of the Governor in Council;

(*c*) That the trusteeship of the Indians in the said territory, and the management of any lands now or hereafter reserved for their use, shall remain in the Government of Canada subject to the control of Parliament.

3. This Act shall come into force on a day to be fixed by proclamation of the Governor in Council published in *The Canada Gazette*, but such proclamation shall not be made until after the Legislature of Ontario shall have consented to the increase of the limits of the Province herein provided for, and agreed to the terms, conditions and provisions aforesaid.

Below is given the Act of the Ontario Legislature expressing the consent of the Province to the extension of its limits. It was passed in the session of 1912.

AN ACT TO EXPRESS THE CONSENT OF THE LEGISLATIVE ASSEMBLY OF THE PROVINCE OF ONTARIO TO AN EXTENSION OF THE LIMITS OF THE PROVINCE

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. The Legislative Assembly of the Province of Ontario hereby consents to the Parliament of Canada increasing the limits of the Province of Ontario so that the boundaries thereof shall include in addition to the present territory of the Province the territory bounded and described in the Act of the Parliament of Canada set forth in the Schedule to this Act.

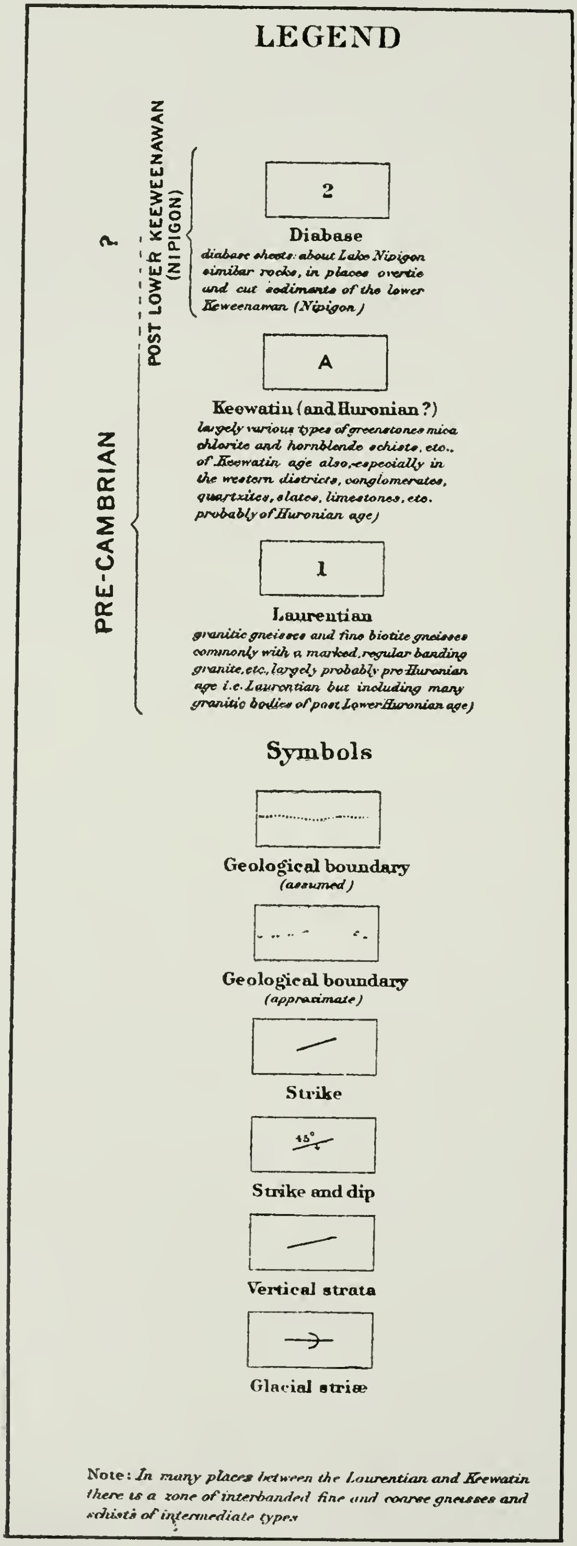
2. The said Legislative Assembly further consents to the Parliament of Canada making provision respecting the effect and operation of such increase of territory in the manner set forth in the said Act.[43]

Harbour and Railway Line

Ontario's strip of territory five miles in width, lying between the district of Patricia and the Nelson river, is to be located within fifty miles of the Hudson bay coast. An additional area, one half mile in width and five miles in length, is to be located along the south shore of the Nelson river. The latter area is to be contiguous to the five mile strip. Together they will afford ten miles of waterfront for harbour facilities and railway terminals.

[43] The schedule repeats Bill 152 of the House of Commons of Canada.

APPENDIX II



Legend showing symbols, and figures and letters indicating rock outcrops, on maps printed on pages of this volume.

INDEX.

ANNUAL REPORT

OF THE

Inspector of Division Courts

FOR THE

PROVINCE OF ONTARIO

FOR THE YEAR

1911

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1912.

Printed by
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29-37 Richmond Street West,
TORONTO.

To His Honour Colonel the Honourable Sir John Morison Gibson,
K.C.M.G., Etc., *Lieutenant-Governor of Ontario.*

May it Please Your Honour:

The undersigned has the honour to present to Your Honour the Report of the Inspector of Division Courts, of the Province of Ontario, for the year ending 31st December, 1911.

Respectfully submitted,

J. J. FOY,

Attorney-General.

Toronto, February 27th, 1912.

SIR,—I have the honour to submit herewith, to be presented to His Honour the Lieutenant-Governor, the Report of the Inspector of Division Courts, for the year ending 31st December, 1911.

I have the honour to be, Sir,

Your obedient servant,

J. B. MACDONALD,

Inspector.

To the Honourable J. J. FOY, K.C., M.P.P.,

Attorney-General, Toronto.

ANNUAL REPORT

OF THE

Inspector of Division Courts

FOR THE

Province of Ontario

FOR THE YEAR ENDING 31st DECEMBER, 1911.

TORONTO, FEBRUARY 27TH, 1912.

To His Honour Colonel The Honourable SIR JOHN MORISON GIBSON, *K.C., M.G., Lieutenant-Governor of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the honour to submit the Annual Report upon the Division Courts of the Province of Ontario for the year ending 31st December, 1911.

The tables embraced in this Report are tabulated as in former years, and show an increase of 5,934 in the number of suits entered (65,373) exclusive of transcripts of judgments and judgment summonses, as compared with the previous year, and a decrease in the amount entered of $79,306.14, largely caused by the greater number of suits entered under $10.

A list of the clerks with their Post Office addresses is shown in table B and table C supplies the same information as regards Bailiffs.

The boundaries of the limits of the several divisions are given in table D., and the names of the judicial officials of the different Counties and Districts will be found in the same table.

ALTERATION OF LIMITS.

The boundaries of the limits of the Divisions in the District of Algoma were changed at a meeting of the Division Court Board, held at Sault Ste Marie, and will be found, as arranged, in the description as published.

The limits of the Divisions in the District of Muskoka were similarly treated by the Board at a meeting held at Bracebridge.

NEW COURTS.

A new division was created in the District of Kenora, with a Court at Dryden.

A new Division was also created in the District of Sudbury.

The Courts are continuously being carefully inspected, and every effort made to assist the officials in the proper discharge of their duties.

All of which is respectfully submitted.

I have the honour to be,

Your Honour's obedient servant,

J. B. MACDONALD,

Inspector.

TABLE

Return of Division Court Business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Algoma	1	609	24,337 90	15	901 10	5	548 28	11,957 16	11,920 21	585 23	577
	2	54	1,944 31	8	386 13	1	....	620 84	620 84	....	61
	3	157	4,746 95	11	474 73	7	42 49	2,683 08	2,400 23	282 85	151
	6	35	1,601 16	5	244 67	2	67 55	652 90	720 45	....	33
	7	212	5,380 29	4	94 31	10	313 79	3,751 77	3,557 33	278 50	158
Brant	1	595	21,413 28	32	1,134 27	51	432 42	8,515 90	8,568 14	380 18	545
	2	83	2,599 57	11	356 15	5	37 06	1,270 97	1,290 16	17 87	77
	3	42	1,024 24	1	6 65	2	....	416 06	415 31	75	43
	4	42	1,407 86	6	296 93	15	128 87	1,009 61	992 48	17 13	39
	5	11	457 57	1	28 14	......	....	226 94	226 94	....	10
Bruce...........	1	142	4,416 36	4	230 81	4	....	1,311 70	1,311 70	....	......
	2	42	1,643 04	3	131 33	......	1 00	938 52	938 52	1 00	41
	3	45	1,658 57	2	157 08	5	192 41	854 86	663 23	191 63	37
	4	72	3,108 59	2	58 93	2	....	1,573 63	1,573 63	....	65
	5	69	1,851 64	6	503 38	8	23 48	1,131 59	1,155 05	....	67
	6	10	279 20	2	207 12	......	10 00	308 75	318 75	....	10
	7	85	3,120 54	7	536 60	3	....	598 37	598 37	....	81
	8	125	4,124 45	19	996 09	25	25 99	2,214 92	2,194 56	20 36	145
	9	23	924 29	2	55 36	......	61 60	632 64	692 64	1 60	24
	10	34	1,433 73	......	....	......	4 00	397 37	397 37	....	28
	11	70	1,587 74	2	73 33	......	....	672 96	672 96	....	36
	12	92	3,578 59	8	515 64	45	....	943 50	943 50	....	84
Carleton	1	2,193	96,717 14	45	2,032 11	532	782 29	18,667 50	18,409 78	1,040 01	2,030
	2	24	1,110 35	3	90 12	......	....	979 92	979 92	....	21
	3	44	1,122 34	1	67 81	3	....	901 67	901 67	....	46
	4	26	1,218 29	......	....	1	....	367 56	316 30	51 26	......
	5	36	2,733 96	1	162 55	2	50 00	1,012 41	1,062 41	....	25
	6	56	2,585 98	3	118 82	4	....	1,563 79	1,542 89	20 90	50
	7	44	1,433 59	......	....	2	9 87	657 96	653 53	14 30	43
Dufferin	1	145	5,537 21	12	947 78	11	20 00	3,033 38	3,013 34	40 04	133
	2	109	6,140 97	4	532 00	11	262 09	2,106 88	2,348 92	20 05	95
	3	12	505 00	2	128 39	2	....	92 04	92 04	....	11
	4	7	447 22	1	16 75	......	....	183 80	183 80	....	6
	5	54	2,774 38	2	396 26	4	....	1,097 07	1,059 32	37 75	42
Elgin	1	250	8,409 74	16	732 11	19	....	3,999 03	3,999 03	....	233
	2	25	1,060 64	4	386 40	3	....	345 05	345 05	....	22
	3	917	28,972 54	32	2,401 38	117	....	12,156 89	12,245 59	5 57	873
	4	108	4,419 53	10	511 82	4	13 00	2,288 06	2,278 57	9 49	15
Essex	1	35	1,548 98	2	107 57	6	40 50	508 43	521 33	27 60	30
	2	118	3,056 00	8	186 68	15	56 08	1,447 46	1,483 54	20 00	115
	3	53	1,943 21	15	1,633 41	10	12 93	1,933 34	1,865 50	80 79	47
	4	75	2,752 40	11	942 73	20	6 72	1,991 06	1,963 78	34 00	90
	5	139	4,052 15	6	120 33	19	30 53	2,270 17	2,174 26	126 44	132
	6	29	1,480 25	9	655 57	4	20 60	605 79	602 79	3 00	29
	7	584	17,989 11	35	386 22	216	526 93	8,060 57	7,462 60	597 97	385
	8	202	7,725 33	15	640 91	22	63 99	3,927 80	3,844 93	146 86	191
	9	40	2,059 71	7	463 04	4	101 86	1,496 77	1,569 12	29 51	38
	10	4	331 26	1	48 12	......	2 52	125 25	121 32	3 92	2

A.

to the 31st day of December, A.D. 1911, inclusive, shewing:

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of jury trials by jurors called in pursuance of section 142, D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's returns of emoluments.	Bailiff's returns of emoluments.	Unclaimed moneys in pursuance of section 43 D.C.A.
						$ c.		$ c.	$ c.		$ c.			$ c.	$ c.	$ c.
32	1		1	91	1	6 00				2	10 00			1,342 70		
2				9	1	6 00	1							90 20	16 71	
6				40										279 00	180 00	
2				4	1	6 00								87 21	104 48	
			1	54										393 10	*198 52	
50	3	2	2	159	1	12 00		21 47		3	25 00	8		1,201 10	571 42	
6			1	30				2 40						184 15	139 19	
1	2			12	1	12 00		88						72 75	35 98	
2				14				1 25						94 95	62 80	
1								46						30 25	15 55	
4		18		38	1	4 44		3 34						232 85	201 22	
1				5				1 18						87 76	53 43	
2				7				1 78						110 75	67 22	
10	1			17				3 55						158 95	60 17	
2	2			18	2	15 60		1 36						148 02	91 00	
				2				21						23 30	45 66	
4				31				2 71				1		139 80	30 00	
5	2			38				3 50				7		328 20	252 98	
1				3				70						47 27		
4				9				1 61		1	15 00			80 12		
2				32				1 25						127 15	52 55	
8				25				3 41		1	5 00			239 20		
151	5		2	444				81 97	597 93	4	20 00	137	5	4,989 65	{ 1,427 52 1,504 27	42 72
3								1 20						68 53	60 50	
1	1			13				85				2		79 00	79 65	
1				2				78						53 52	32 43	
7				3				3 35				1		79 85	59 54	
6				7				2 70				2		123 95	109 93	
1				12	1	10 00		1 12						95 40	74 63	
10	1			37				5 64				2		345 35	154 36	
14				28				5 60						198 95	137 77	
1				1				67						29 14	52 70	
1	3							43						12 87	21 50	
12				13				3 38				1		131 85	20 76	
15	6			56				7 93				15		648 15	323 08	
3	2			2				1 20				2		54 65	53 45	
44	3		1	265	1	12 00		25 22		1	4 00	27		1,848 95	1.006 60	
11	2			18			1	4 88		3	25 00			188 80	300 18	
4				7				1 60				2		70 00	76 67	
3			3	41				3 21		2	12 00	4		300 60	95 57	
6			1	12				2 22						161 65	106 51	
5			1	20				2 69				6		246 90	153 06	
5	3		1	56	1	12 00		3 46				2		318 65	201 80	
2	3		2	4				1 49						82 30	91 25	
11	1		4	183				12 02		5	45 00	56		1,809 24	{ 515 01 460 24	
11				18				7 31		2	10 00	5		521 80	281 31	
6	1			5				2 19				1		116 45	102 92	
2								59						15 84		

* Part of year only.

TABLE

Return of Division Court Business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Frontenac	1	797	21,019 21	9	682 72	124	127 59	6,714 35	6,807 68	34 26	756
	2	32	701 21	......	....	......	71 20	122 49	147 63	46 06	32
	3	33	936 91	2	107 43	5	....	562 34	562 34	....	32
	4	116	2,766 93	5	90 07	21	....	1,707 88	1,687 88	20 00	108
	5	....	528 00	......	....	......	....	....	....	....	....
	6	28	1,273 69	2	60 55	1	110 74	441 74	551 74	....	28
	7	44	1,998 42	2	102 19	3	13 50	793 61	722 14	71 74	34
Grey	1	488	13,408 16	31	1,587 70	71	....	5.720 17	5.714 57	5 60	488
	2	92	3,544 05	13	824 92	8	37 56	1,529 16	1,552 72	14 00	75
	3	156	1,524 34	10	386 23	16	....	1,725 27	1,725 27	....	149
	4	61	2,062 16	8	524 35	5	15 00	1.457 37	1,426 12	31 25	45
	5	121	5,560 59	17	1,270 38	6	155 55	3,134 83	3,055 .81	79 02	105
	6	40	1,272 23	7	765 04	4	....	559 71	559 71	....	37
	7	64	2,825 44	11	500 88	2	....	1,342 68	1,342 68	....	57
	8	72	2,707 13	6	125 19	9	30 50	723 26	678 52	75 24	63
Haldimand	1	76	3,071 13	5	158 21	14	30 38	1,379 47	979 39	430 46	78
	2	64	1,618 63	14	532 05	32	11 25	871 39	749 48	80 15	35
	3	195	6,129 22	10	386 56	48	210 36	2,337 55	2,291 72	256 19	184
	4	79	3,376 50	9	483 00	9	38 43	1,115 41	1,097 65	56 19	70
	5	8	305 34	6	282 39	......	....	305 34	305 34	....	7
Haliburton	1	18	902 00	9	372 63	2	....	892 40	878 40	14 00	18
	2	85	3,475 51	4	186 93	1	....	1,526 67	1,526 67	....	77
	3	45	2,329 85	7	317 56	6	....	683 25	683 25	....	41
	4	12	434 53	2	146 43	3	....	288 30	288 30	....	11
Halton..........	1	78	2,455 88	13	1,136 42	28	62 48	896 47	810 63	148 32	74
	2	61	2,220 88	10	592 44	6	13 85	1,528 00	1,510 93	17 09	57
	3	98	3,904 22	6	503 62	......	58 98	1,706 72	1,575 57	189 74	100
	4	51	1,858 97	7	151 22	6	....	605 93	605 93	....	46
	5	18	557 53	2	92 51	4	....	419 27	413 27	6 00	17
	6	39	1,153 75	......	....	......	....	144 82	144 82	....	30
Hastings........	1	709	18,449 49	25	1,516 73	31	565 83	9,253 64	9,391 77	427 70	490
	2	46	1,390 27	7	626 24	10	127 93	784 89	797 80	115 02	45
	3	2	55 75	1	54 55	......	....	....	....	....	....
	4	104	2,794 00	8	342 34	10	23 75	1,751 16	1,542 43	232 48	101
	5	75	2,323 17	2	98 02	1	29 60	946 11	973 71	2 00	72
	6	95	3,630 14	6	409 89	3	....	2,171 05	2,171 05	....	92
	7	53	1,165 44	5	358 70	......	102 20	789 83	775 58	116 45	51
	9	243	6,863 93	18	848 90	21	37 22	3,001 58	2,989 21	49 59	244
	10	88	3,990 30	4	332 06	......	43 11	1,667 35	1,582 00	84 45	80
	11	62	1,540 26	2	166 62	1	130 84	629 21	565 96	194 09	63
	12	75	3,308 91	9	467 74	7	....	1,076 85	901 12	175 73	62
Huron	1	194	5,550 01	21	1,036 04	11	172 88	3,221 62	3,299 04	95 46	186
	2	82	3.870 33	7	442 70	11	334 62	1,939 10	2,048 46	225 32	9
	3	64	2,369 17	12	422 03	7	12 76	1,500 06	1,435 92	76 99	55
	4	59	1,584 19	6	489 19	1	....	497 93	468 78	29 15	42
	5	39	1,377 85	6	320 60	5	3 00	521 63	524 63	....	37
	6	22	1,141 75	9	638 19	1	....	498 39	498 39	....	19
	7	7	274 85	1	28 50	......	22 40	95 06	117 46	....	7
	8	123	3,050 25	2	99 93	10	223 92	1,251 06	1,321 56	153 42	129
	9	45	2,222 74	5	192 09	......	....	1,147 23	1,097 26	49 70	37
	10	25	877 95	......	....	2	....	138 90	138 90	....	22
	11	14	747 11	1	18 00	......	....	203 31	191 31	12 00	11
	12	29	829 81	3	142 30	......	....	301 99	301 99	....	27

A.—Continued.

to the 31st day of December, A.D. 1911, inclusive, etc.—Continued.

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of jury trials by jurors called in pursuance of section 142, D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's returns of emoluments.	Bailiff's returns of emoluments.	Unclaimed moneys in pursuance of section 43, D.C.A.
						$ c.		$ c.	$ c.		$ c.			$ c.	$ c.	$ c.
29	......	......	....	285	1	12 00	1	17 54	......	5	27 00	22	....	1,519 25	53 46 708 62	....
......	......	......	....	11	......	....	....	36	......	......	....	......	....	51 15	....	......
......	27	......	....	10	......	....	....	66	......	......	....	......	....	68 40	67 67	......
3	......	......	....	25	......	....	....	3 04	......	......	....	......	....	245 25	157 95	......
......	......	......	....	......	......	....	....	....	......	......	....	......	....	....	11 59	......
1	......	......	....	3	......	....	....	1 18	......	......	....	......	....	57 85	1 75 55 90	....
10	......	......	....	5	......	....	....	2 97	......	......	....	......	....	95 25	76 46	......
18	5	......	1	167	1	11 00	....	10 89	......	......	....	15	....	1,166 91	700 00	......
6	5	......	....	6	......	....	....	3 78	......	1	15	......	....	242 80	158 18	......
6	1	......	....	72	......	....	....	3 39	......	......	....	4	....	328 85	167 88	......
8	1	......	....	8	......	....	....	2 09	......	......	....	3	....	152 39	156 28	......
16	2	......	....	17	2	4 00	....	5 80	......	......	....	1	....	336 65	351 58	......
3	2	......	....	11	......	....	....	1 38	......	......	....	......	....	81 81	123 61	......
7	......	......	....	16	......	....	....	2 65	......	......	....	......	....	79 85	70 00	......
9	3	......	....	19	......	....	....	3 12	......	......	....	......	....	200 45	110 00	......
11	2	......	....	17	1	12 00	....	3 29	......	......	....	2	....	181 35	114 40	......
1	2	......	....	25	......	....	....	1 18	......	......	....	5	....	156 82	100 66	......
11	7	......	....	61	1	11 00	....	5 63	......	......	....	13	....	421 95	268 00	......
8	......	......	....	13	3	33 00	....	3 41	......	1	5 00	1	....	198 65	155 36	......
......	......	......	....	2	......	....	....	37	......	......	....	......	....	16 88	12 81	......
......	......	......	....	1	......	....	....	66	......	......	....	1	....	48 97	73 97	......
8	1	2	....	12	......	....	....	3 65	......	......	....	......	....	247 33	77 90	......
4	......	......	1	1	......	....	....	2 20	......	......	....	......	....	112 15	134 32	......
1	......	......	....	5	......	....	....	40	......	......	....	......	....	26 35	....	......
4	1	......	....	23	......	....	....	2 23	......	3	5 00	6	....	229 05	113 36	......
4	......	......	....	19	......	....	....	2 11	......	......	....	2	....	131 05	70 52	......
8	......	......	....	28	......	....	....	3 95	......	......	....	......	....	197 31	88 83	......
2	......	......	....	16	......	....	....	1 53	......	......	....	2	....	180 65	52 61	......
1	......	......	....	5	......	....	....	55	......	......	....	1	1	44 48	47 00	......
9	......	......	....	7	......	....	....	1 20	......	......	....	......	....	*27 90	65 00	......
27	3	......	2	248	......	....	....	17 96	......	1	5 00	3	....	1,631 65	906 50	......
1	......	......	....	11	......	....	....	1 21	......	......	....	......	....	128 17	113 78	......
......	......	......	....	......	......	....	....	....	......	......	....	......	....	3 75	13 63	......
3	1	......	....	32	......	....	....	2 37	......	1	5 00	......	....	220 80	149 53	......
3	......	......	....	20	......	....	....	2 01	......	......	....	1	....	144 54	81 66	......
3	......	......	....	12	......	....	....	3 06	......	......	....	2	....	156 40	189 48	......
2	......	......	....	19	......	....	....	95	......	......	....	2	....	116 00	54 08	......
11	1	......	1	93	......	....	....	5 16	......	1	5 00	2	....	162 86	407 71	......
12	......	......	....	17	......	....	....	4 38	......	......	....	......	....	....	96 30	......
......	......	......	....	14	......	....	....	1 14	......	......	....	......	....	109 25	100 29	......
7	......	......	....	17	......	....	....	3 28	......	1	5 00	2	....	238 90	170 44	......
8	2	......	3	46	......	....	....	5 00	......	......	....	1	....	438 51	180 35	......
13	1	......	1	15	......	....	....	4 67	......	1	9 00	3	....	199 25	116 98	......
9	......	......	....	10	......	....	....	4 32	......	......	....	......	....	155 30	55 00	......
......	......	......	....	21	......	....	....	1 05	......	......	....	......	....	122 20	54 60	......
2	......	......	....	7	......	....	....	1 16	......	1	5 00	......	....	90 10	45 10	......
3	......	......	....	3	......	....	....	1 23	......	......	....	1	....	59 40	65 81	......
......	......	......	....	2	......	....	....	18	......	......	....	......	....	14 65	12 38	......
4	2	......	....	51	1	12 00	....	2 40	......	......	....	1	1	256 00	161 14	......
8	......	......	....	7	......	....	....	2 90	......	......	....	2	....	72 55	91 12	......
3	......	......	....	6	......	....	....	1 08	......	......	....	......	....	50 78	40 56	......
3	......	......	....	3	......	....	....	96	......	1	5 00	......	....	32 20	25 16	......
2	......	......	....	11	......	....	....	89	......	......	....	......	....	51 45	30 00	......

*Part of year only.

TABLE

Return of Division Court Business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Kenora	1	267	12,051 69	4	240 07	6	1,416 49	5,327 57	5,650 62	1,093 44	158
	2	22	995 49	2	119 07	......	21 35	435 47	415 36	20 11	21
Kent............	1	763	25,026 00	37	2,231 92	168	1,489 06	8,446 34	9,146 26	789 16	783
	2	179	5,307 56	16	388 08	44	117 73	2,263 40	2,310 69	70 44	166
	3	71	918 53	9	195 67	7	40 80	495 34	523 79	13 35	71
	4	91	2,742 57	10	732 77	23	25 82	2,192 52	2,202 57	15 77	52
	5	213	6,180 50	22	1,360 88	23	133 48	3,492 95	3,439 72	186 71	204
	6	41	1,550 22	3	109 98	13	14 25	572 31	572 31	....	57
	7	190	7,267 46	16	1,198 76	6	20 59	3,710 35	3,699 42	31 52	184
Lambton	1	743	19,652 92	29	1,663 72	91	732 97	10,058 40	10,046 83	744 54	712
	2	81	2,359 73	8	362 35	3	25 00	1,280 25	1,305 25	....	78
	3	50	1,920 32	7	303 49	4	9 64	1,052 41	1,062 05	....	48
	4	55	1,214 38	9	148 91	24	....	1,419 08	1,222 25	196 75	53
	5	28	825 94	2	19 60	3	....	220 16	220 16	....	26
	6	18	830 73	6	198 02	1	....	198 46	198 46	....	17
	7	19	367 79	3	94 59	......	137 32	175 34	312 66	....	19
	8	163	4,965 32	17	901 39	26	38 06	2,164 26	2,154 54	47 78	157
	9	162	3,061 27	23	1,171 61	7	9 03	2,238 53	2,247 56	....	53
Lanark..........	1	156	5,835 05	12	613 18	17	28 05	2,973 31	2,898 21	103 15	147
	2	14	890 44	2	92 41	......	48 93	491 63	505 56	35 00	11
	3	149	4,519 41	4	154 54	25	131 75	2,021 27	2,153 02	....	138
	4	371	11,035 45	25	1,342 17	19	146 03	5,251 43	5,054 91	176 52	354
	5	65	2,444 74	4	277 26	4	....	973 16	973 16	....	60
Leeds and Grenville	1	752	13,424 66	9	375 55	9	249 62	8,162 64	8,365 50	46 76	749
	2	83	3,225 76	9	412 40	15	239 23	1,587 04	1,571 85	254 42	79
	3	89	2,473 23	4	804 10	3	174 18	1,828 66	1,855 74	147 12	89
	4	53	2,990 85	5	257 67	4	173 36	1,743 62	1,829 65	87 33	49
	5	61	1,319 70	2	134 14	1	5 55	740 40	715 27	25 13	59
	6	111	3,486 38	11	401 45	5	28 49	1,321 50	1,270 03	51 47	83
	7	12	853 13	1	32 12	......	46 03	418 91	408 29	10 62	10
	8	81	3,414 58	7	277 87	6	....	1,566 40	1,566 40	....	72
	9	24	1,214 31	1	131 15	2	1 00	590 16	590 16	1 00	24
	10	14	449 34	......	....	1	9 97	239 20	64 28	174 92	13
	11	20	507 36	......	....	1	....	241 66	241 66	....	20
	12	19	576 70	2	95 53	......	....	410 60	410 60	....	18
Lennox and Addington....	1	108	3,386 43	6	230 74	25	17 44	1,728 60	1,682 98	63 16	103
	2	12	590 00	4	160 71	1	31 00	510 47	511 47	30 00	11
	3	7	66 36	2	158 27	......	....	33 00	33 00	....	5
	4	24	1,115 56	6	342 15	......	51 80	345 35	389 75	7 40	21
	5	35	1,970 05	1	1 15	6	11 33	423 78	423 78	11 33	28
	6	21	687 11	......	....	1	26 73	367 84	335 90	31 94	19
	7	46	1,635 26	......	....	......	81 73	483 59	559 32	6 00	43
	8	34	863 42	1	34 56	5	79 37	496 42	398 14	98 28	....
	9	6	229 04	2	224 75	1	....	119 06	119 06	....	5

A.—Continued.

to the 31st day of December, A.D. 1911, inclusive, etc.—Continued.

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of jury trials by jurors called in pursuance of section 142, D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's returns of emoluments.	Bailiff's returns of emoluments.	Unclaimed moneys in pursuance of section 43, D.O.A.
						$ c.		$ c.	$ c.		$ c.			$ c.	$ c.	$ c.
111				90										777 10	284 10	40 00
1														48 85		
44	3		1	138	2	12 00		23 59		2	20 00	82	1	1,647 90	488 93 472 94	
13				72	2	24 00	1	5 29				11		398 80	282 59	
				42				51						131 20	68 01	
5				34				2 54				6	3	236 25	139 73	
9	1			56	3	17 00		6 48				9	1	507 80	203 15	
3				12	1	12 00		1 57						110 47	74 01	
13	3			33	1	19 00		7 03						314 05	379 95	
31	7		3	301				16 24		2	10 00	33	1	1,235 95	655 38	
3				27				1 74						158 80	118 49	
2				8				1 73				1	1	133 35	169 51	
2	1			12	1	15 00		1 64				6		141 85	146 25	
2				10	1	12 00		80				1		39 45	55 76	
2				2				1 07						34 37	39 94	
				7	1	12 00		18						39 50	51 48	
6	3		1	41				4 20		1	5 00	10		346 25	241 45	
9				10	1	11 00		3 54		1	5 00	1		157 75	176 98	
6	2			46				4 86		1	5 00	7		413 95	100 77 234 78	
4								1 08						75 78		
10				52				4 46		2	10 00	4		338 30	162 70	
15				106				10 01				2		732 65	396 28	
5	2			22				2 58		1	10 00	2		119 55	94 68	
11	1			380				10 78				1		1,201 60	370 49 172 69	
4	2			35				2 06						160 10	141 89	5 62
3	4			38				2 34						159 50	38 20	
5			1	10				2 73				1		142 25	142 07	
2				21				1 19						111 80	45 79	
12				19				3 99				1		262 50	233 95	
				4				65						22 92	75 03	
8				21				3 45						205 25	131 58	
3				2				1 19						61 75	26 68	
1				2				58				1		33 11	24 26	
				6				39						42 01	53 02	
1				4				58						44 86	50 16	
5	5			37				2 81		1	3 00	4		245 95	180 30	
1				2				52						30 96		
				2										9 95	5 12	
3			1	4				1 26						63 60	46 24	
6				7				2 41		2	15 00	3		83 66		
1	1			5				61						38 62	22 92	
3				8				1 59						92 70	60 86	
1	2			13				52						80 66	86 37	
2				4				4						11 50	9 86	

TABLE

Return of Division Court business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Lincoln	1	65	2,641 26	3	191 71	1	....	1.124 13	1,124 13	....	58
	2	444	12,725 28	24	1,324 19	62	187 33	6,046 15	5,950 06	283 42	429
	3	72	2,171 47	15	1,149 02	9	27 70	1,997 04	1,999 07	25 97	23
	4	28	1,120 07	5	281 51	7	14 00	1,079 16	1,083 16	10 00	24
	5	143	4,796 34	20	847 35	11	10 00	1,599 86	1,535 49	74 37	128
Manitoulin	1	68	2,556 04	3	145 57	4	159 49	1,005 84	1,031 96	133 39	65
	2	45	1,955 59	3	216 78	10	16 66	577 66	594 32	....	42
	3	18	594 55	1	86 58	2	....	422 93	430 93	12 00	18
	4	....	....	......	....	......	....	....	....	....	....
Middlesex	1	1,699	61,152 88	33	1,946 09	87	561 97	23,195 07	23.300 39	456 65	1,070
	2	74	2,305 01	5	349 64	1	....	1,775 69	1,775 69	....	74
	3	51	1,790 73	4	252 31	2	....	703 14	648 82	54 32	47
	4	48	1,715 82	10	474 68	6	....	550 68	550 65	....	44
	5	88	3,604 14	12	699 70	4	63 54	1,676 42	1,690 97	48 99	84
	6	90	3,485 57	18	1,149 10	13	56 57	1,161 56	1.201 96	16 17	83
	7	34	953 60	......	17 48	......	....	482 60	482 60	....	33
	8	10	469 38	5	141 07	......	5 00	225 43	220 43	5 00	8
	9	391	8,011 80	14	836 84	52	61 57	3,101 39	2.884 82	216 64	386
Muskoka........	1	201	4,450 12	6	102 79	31	44 60	3,664 38	3.633 95	75 03	181
	2	95	4,406 51	12	861 99	.....	100 16	1,445 91	1.534 09	11 98	88
	3	156	5.394 46	21	1,173 03	17	....	2,307 58	2,270 04	37 54	108
	4	18	641 67	7	407 71	2	....	253 77	253 77	....	18
Nipissing.	1	100	4,059 47	11	748 13	9	78 04	1,534 64	1.572 79	42 89	79
	2	103	2,420 34	2	63 05	6	39 00	1.677 22	1,716 22	....	103
	3	455	19,823 08	25	1,387 05	21	11 00	7.812 99	7.823 99	....	421
	4	177	10,828 10	10	618 14	3	116 90	2,320 47	2,139 01	298 36	144
	5	44	1,753 83	2	202 04	5	45 17	830 99	876 76	....	41
	6	86	3,658 71	21	906 91	5	....	2,015 14	2,015 14	....	61
	7	1,005	50,394 41	56	3,623 28	101	1,493 87	20,602 96	20,651 86	444 97	909
	8	573	29,467 89	49	3,274 42	10	284 81	9,385 34	9,036 75	633 40	443
	9	280	12,135 45	43	3,324 90	25	....	3,503 90	3.466 48	37 42	258
Norfolk.........	1	156	362 87	37	18 60	26	....	1,724 68	1,657 53	67 15	17
	2	31	1,373 13	10	463 11	9	37 95	633 22	615 87	55 30	32
	3	18	1,388 22	2	340 37	1	....	141 33	141 33	....	12
	4	46	1,982 68	7	281 62	4	221 00	1,013 36	1,017 02	127 34	42
	5	30	905 48	4	249 65	10	....	637 03	637 03	....	30
	6	146	6,144 62	3	227 18	15	....	3,253 64	3,253 64	....	132
	7	61	1,520 30	5	340 41	9	....	844 08	844 06	....	60
	8	13	670 38	2	90 25	3	13 50	176 92	190 42	....	13
Northumberland and Durham ..	1	89	3,043 99	8	562 32	7	31 10	1,361 04	1,326 49	65 65	89
	2	43	1,130 82	4	473 56	......	24 26	938 83	925 96	37 31	41
	3	187	3,823 29	10	487 66	7	528 54	2.648 38	3,145 62	31 30	187
	4	67	2.062 91	4	271 25	10	91 82	729 30	748 22	72 90	65
	5	187	6,106 74	12	663 62	12	10 77	1,933 92	1,938 69	6 00	176
	6	20	913 64	......	....	2	....	320 15	320 15	....	24
	7	96	40,70 14	7	402 68	10	37 63	1,518 06	1,378 81	176 88	86
	8	69	2,704 00	2	25 35	7	107 82	555 09	489 03	66 03	73
	9	87	2,753 43	2	110 30	9	....	2,471 82	2,471 82	....	86
	10	34	677 40	6	174 64	2	....	467 68	467 68	....	34
	11	143	4,221 46	9	274 03	18	122 65	4.421 48	4,306 50	114 96	164

A.—Continued.

to the 31st day of December, A.D. 1911, inclusive, etc.—Continued.

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of Jury Trials by Jurors called in pursuance of Section 142 D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's Returns of Emoluments.	Bailiff's Returns of Emoluments.	Unclaimed moneys in pursuance of section 43 D.C.A.
						$ c.		$ c.	c.		$ c.			$ c.	$ c.	
6	2	......	....	7	......	....	....	2 88	......	......	....	......	....	153 60	61 79	......
15	7	......	1	155	......	....	....	10 53	......	3	18 00	3	2	970 30	530 29	......
3	......	......	....	13	......	....	....	2 82	......	1	5 00	2	....	207 86	145 49	......
4	......	......	....	5	......	....	....	1 35	......	......	....	......	....	93 40	61 42	......
14	......	......	....	41	......	....	....	4 47	......	......	....	......	....	288 00	120 00	......
3	......	......	....	8	......	....	....	....	......	......	....	......	....	146 65	182 10	......
6	......	......	1	18	......	....	....	....	......	......	....	3	....	77 27	68 84	......
......	1	......	1	3	......	....	....	....	......	......	....	2	....	42 58	47 09	......
......	......	......	....	......	......	....	....	....	......	......	....	......	....	....	....	......
114	15	......	....	489	4	41 00	....	59 64	325 18	8	31 00	8	1	3,625 90	1 164 35	3 23
1	......	......	....	14	......	....	....	1 78	......	......	....	......	....	142 88	119 36	......
4	......	......	....	12	......	....	....	1 87	......	1	5 00	......	....	105 01	75 62	......
4	......	......	....	11	1	12 00	....	1 50	......	1	5 00	......	....	150 79	151 21	......
4	......	......	....	16	......	....	....	3 13	......	......	....	1	....	173 45	167 44	......
7	......	......	....	16	......	....	....	3 25	......	......	....	2	....	214 45	126 49	......
1	......	......	....	11	......	....	....	79	......	......	....	......	....	65 85	58 43	......
1	......	......	....	2	......	....	....	46	......	......	....	......	....	31 44	25 99	......
5	......	2	1	159	......	....	....	4 39	......	......	....	5	....	701 51	258 67	......
18	......	......	....	57	......	....	....	....	......	......	....	1	....	471 28	122 97	......
5	3	......	2	17	......	....	....	....	......	......	....	......	....	210 30	182 19	......
12	......	......	2	46	......	....	....	....	......	1	10 00	2	....	328 50	151 57	......
......	......	......	....	1	......	....	....	....	......	......	....	......	....	54 50	....	......
8	......	......	....	13	......	....	....	....	......	......	....	......	....	219 65	122 97	......
7	......	......	1	20	......	....	....	....	......	......	....	1	1	236 20	246 30	......
34	......	......	....	58	......	....	....	....	......	5	17 00	5	1	1,320 45	664 96	......
25	......	......	....	8	......	....	....	....	......	......	....	1	....	459 55	296 34	......
3	......	......	....	7	......	....	....	....	......	......	....	7	....	121 28	263 01	......
5	......	......	....	6	......	....	....	....	......	......	....	......	....	221 32	264 66	......
96	13	......	....	125	......	....	....	....	161 16	8	39 00	31	2	2.805 80	1,690 16	2 50
57	......	......	1	59	......	....	....	....	......	......	....	10	....	1,432 85	1,248 32	......
22	......	1	....	......	......	....	....	....	......	......	....	9	2	805 90	428 42	......
16	......	......	....	51	......	....	....	6 49	......	......	....	17	1	348 88	147 00	......
5	......	......	....	8	......	....	....	2 84	......	1	10 00	......	....	88 05	71 70	......
6	......	......	....	......	......	....	....	1 95	......	1	10 00	......	....	39 20	33 09	......
4	......	......	2	11	......	....	....	1 81	......	......	....	1	....	113 40	....	......
......	......	......	....	5	1	10 00	....	63	......	......	....	4	....	93 65	84 62	......
14	......	......	....	40	2	23 40	....	6 05	......	1	5 00	8	....	288 35	312 18	......
1	......	......	....	16	......	....	....	1 27	......	......	....	3	....	138 75	107 02	......
2	......	......	....	2	1	11 00	....	86	......	1	6 00	......	....	35 45	17 02	......
3	2	......	....	18	3	24 00	....	2 40	......	1	5 00	......	....	253 10	171 03	......
2	......	......	....	19	......	....	....	1 04	......	2	5 00	......	....	77 90	85 47	......
......	2	......	....	90	1	12 00	....	2 46	......	......	....	3	....	339 50	176 39	......
1	......	......	....	14	......	....	....	1 70	......	1	10 00	2	....	148 45	67 67	......
10	......	......	....	54	......	....	....	5 83	......	1	10 00	3	....	331 20	198 96	......
2	......	......	....	5	......	....	....	1 01	......	......	....	1	....	40 52	65 50	6 00
9	......	......	....	22	......	....	....	4 21	......	5	43 00	7	....	235 99	172 95	......
3	......	......	....	......	......	....	....	2 64	......	......	....	4	....	156 65	105 57	......
1	2	2	....	18	......	....	....	2 14	......	......	....	......	....	198 48	115 38	......
......	......	......	....	15	......	....	....	36	......	......	....	2	....	92 20	72 22	......
5	......	......	....	34	......	....	....	3 75	......	......	....	2	....	311 10	....	......

TABLE

Return of Division Court Business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Ontario	1	205	8,213 67	24	1,956 25	19	86 82	4,072 34	3.975 76	96 58	183
	2	70	2,293 27	9	611 30	3	....	1,205 21	1,205 21	....	73
	3	38	1,221 12	2	95 00	4	....	585 97	585 97	....	....
	4	146	5,733 61	8	629 98	10	94 36	1,762 99	1,616 70	146 29	137
	5	77	2,098 00	7	557 45	4	....	2,655 91	2,651 91	....	53
	6	30	956 26	5	214 10	......	....	163 92	163 92	....	....
	7	30	1,645 74	8	266 12	3	23 28	1,133 84	1,028 81	128 31	29
Oxford..........	1	813	27,646 27	13	620 72	147	180 51	19,432 27	19,383 27	49 00	591
	2	60	1,666 41	8	203 60	4	....	1,112 04	1,112 04	....	64
	3	76	1,590 86	8	171 11	4	....	1,590 86	1,590 86	....	51
	4	137	5,219 09	12	753 12	8	111 07	3,088 19	2,854 13	233 26	123
	5	325	8,412 68	16	750 24	38	39 31	3,817 46	3,826 85	253 99	314
	6	240	8,125 18	10	590 12	25	2 00	3,345 78	3,308 88	43 90	223
	7	45	2,382 94	......	....	2	2 99	1,303 70	1,288 20	15 50	35
Parry Sound ...	1	175	6,162 78	5	289 95	13	139 06	2,964 50	2,783 89	180 61	163
	2	15	767 61	9	394 33	......	....	294 65	294 65	....	13
	3	16	622 68	1	200 00	1	2 29	359 74	359 74	2 29	17
	4	133	5,753 47	18	1,128 03	11	45 00	2,308 92	2,298 57	55 35	120
	5	27	1,272 92	2	10 94	......	....	525 33	481 24	44 09	24
	6	79	4,687 64	6	59 79	1	281 59	1,028 51	1,272 27	2 37	....
	7	100	4,656 97	9	451 50	17	128 12	1,285,58	1,413 70	....	94
Peel	1	90	3,140 35	8	186 12	25	21 00	915 79	936 79	....	86
	2	37	1,637 40	9	393 03	4	17 54	842 00	805 01	36 99	33
	3	19	1,039 51	1	53 55	1	24 65	266 46	266 11	25 00	15
	4	31	1,427 84	4	338 61	1	....	1,527 87	1,527 87	....	29
Perth	1	451	17,654 52	39	2,534 37	90	101 76	4,631 88	4,709 97	23 67	402
	2	82	3,369 25	16	859 36	20	....	1,409 92	1,351 81	58 11	83
	3	144	4,700 94	10	363 40	25	4 55	2,255 91	2,260 46	....	140
	4	9	317 13	1	271 54	......	....	398 09	398 09	13 70	8
	5	60	1,714 94	9	565 56	9	....	1,352 43	1,338 73	....	66
	6	158	5,778 15	24	909 58	29	....	4,017 47	4,017 07	....	145
Peterborough....	1	607	18,977 46	26	1.641 50	107	56 28	8,263 36	8,077 62	185 74	685
	2	44	1,226 26	3	404 61	2	118 62	633 14	690 39	61 37	41
	3	52	1,775 77	4	730 83	1	25 65	919 48	911 45	33 68	50
	4	9	230 25	1	77 20	......	....	100 30	20 30	80 00	9
	5	96	2,438 99	1	23 81	8	30 00	1.654 27	1,675 27	9 00	56
	6	1	37 01	......	....	......	....	....	....	....	....
Prescott and Russell	1	41	1,577 46	1	27 70	2	....	124 94	124 94	....	37
	2	41	1,601 77	1	....	2	....	687 39	687 39	....	38
	3	20	777 77	......	....	1	....	407 25	407 25	....	19
	4	111	3.506 96	12	554 01	4	....	1,181 26	1,181 26	....	103
	5	19	959 03	3	47 31	......	....	338 45	301 22	37 23	17
	6	89	3,283 22	5	220 81	1	....	2,716 23	2,691 08	21 15	77
	7	279	5,693 70	1	69 05	44	....	2,218 83	2,218 83	....	313
	8	20	608 31	1	4 92	......	....	364 17	364 17	....	6
	9	43	1,894 43	......	....	3	3 00	1.232 41	1,214 21	21 00	38
	10	144	4,936 97	10	480 01	8	29 00	2,251 22	2,268 22	12 00	134
	11	96	4,381 42	7	531 84	1	....	3,164 76	3,104 20	60 56	86

A.—Continued.

to the 31st day of December, A.D. 1911, inclusive, etc.—Continued.

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of Jury Trials by Jurors called in pursuance of Section 142, D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's returns of emoluments.	Bailiff's returns of emoluments.	Unclaimed moneys in pursuance of Section 43, D.C.A.
						$ c.		$ c.	$ c.		$ c.			$ c.	$ c.	
15				60				8 19				1		450 65	418 79	
2				22				1 58				2		134 70	106 32	
								75						99 95	119 30	
10			1	34				5 45						330 29	184 69	
70				14				2 89		1	10 00	2		159 27		
1				10				88						61 47	21 01	
1			1	2				1 09						78 50	67 51	
63	8			302	7	59 50		26 46		3	15 00	7	1	1,543 35	1,064 33	
1				19				1 21				1		121 20	82 70	
3	6			16				3 68		1	5 00	2		125 00	130 00	
14				49	1	10 00		5 51		1	5 00			303 95	253 48	
10				140				6 86		2	10 00	8		668 50	325 90	
16				53	3	32 00		7 97				8		464 65	283 80	
8				12	1	22 00		2 75		1	5 00			77 43	50 49	
12	4			34								3	1	361 95	137 50	
2				2										56 90	80 27	
1				2										27 64	34 29	
30				15						3	20 00	4		357 05		
3				2										54 31	50 52	
														173 19	130 93	
6				11										237 52		
4	1			23	4	32 00		2 93				3		337 45	120 93	
3			2	8				1 75				1		96 01	68 81	
3				2	1	12 00		1 26						35 53	57 39	
2				3				1 74						111 21	65 74	
42	8			107				18 97				23	3	1,189 55	649 09	
9				12				4 26				8		226 25	178 66	
3	1	25		36				3 22				5		336 65	173 75	
1				3	1	12 00		25						19 45	14 34	
5				26				2 39						121 60	123 60	
13				43				5 77				6		355 00	200 00	
24	1			187	2	22 00		16 80		3	15 00	23		1,159 90	708 00	
3				13				89						76 07		
2				6	1	12 00		1 46						120 85	54 15	
	2			3				15						19 29		
5				35	1	7 00		2 72		2	10 00	2		168 15	124 44	
														1 30	67	
4								1 69						137 00	57 30	
5	20			12				2 88				3		78 42	50 34	
1				3			1	67						41 70	27 76	
7	1			39				3 44		1	5 00			257 68	124 84	
1				1				73						39 52		
12				12				3 81						185 89	114 35	
10				133				5 38						547 25	210 00	
1				3				58						34 60	47 08	
5				6				2 03				1		108 70	112 07	
10				34				4 84						288 40	173 75	
10				13				4 66						230 23	114 63	

TABLE

Return of Division Court Business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Prince Edward..	1	482	8,370 94	6	9 00	195	746 94	3,467 33	3,650 93	563 34	669
	2	6	151 90	1	....	2	....	61 65	61 65	....	6
	3	2	111 67	5	4 05	......	....	26 56	26 56	....	2
	4	5	190 61	......	....	2	....	186 85	186 85	....	....
	5	22	581 05	......	....	3	9 70	181 01	173 28	17 43	21
	6	8	124 69	1	....	......	18 75	125 87	140 62	4 00	8
	7	25	769 81	......	48 50	......	....	313 04	313 04	....	25
	8	1	....	......	....	......	....	....	....	....	....
Rainy River	1	162	9,986 90	1	153 82	2	239 28	3,559 97	3,305 03	494 22	138
	2	51	1,976 12	7	635 68	7	30 27	1,146 05	1,147 85	28 47	47
	3	73	3,569 58	......	....	2	66 80	1,524 77	1,416 90	171 97	66
Renfrew	1	243	8,176 01	7	225 78	29	207 16	2,915 32	2.779 69	191 17	232
	2	14	570 89	1	57 05	......	10 50	274 66	285 16	....	13
	3	202	7.888 39	6	213 84	10	24 71	2,999 78	2.971 59	52 90	187
	4	151	4,478 34	9	308 80	9	280 17	2,306 02	2,410 83	175 36	144
	5	129	2,396 57	2	108 00	2	....	2,504 57	2,504 57	....	58
	6	69	2,931 36	5	147 49	2	8 99	1,053 42	1,055 92	6 49	66
	7	108	3,981 84	3	43 66	3	115 63	2.056 69	1.998 87	173 45	101
Simcoe.....	1	432	14,618 36	13	613 72	35	68 73	5.759 79	5,761 81	66 71	406
	2	104	4,097 61	5	263 73	27	105 92	1.833 83	1,882 45	57 30	97
	3	85	3,488 49	10	1,020 68	13	56 46	1,331 40	1,346 84	41 02	76
	4	200	6,459 45	10	674 51	12	135 38	1,934 64	1,939 50	130 52	201
	5	48	1,967 02	5	524 87	5	37 00	885 72	856 47	66 25	44
	6	259	9,640 14	14	736 15	30	167 13	3,462 50	3,192 89	269 61	156
	7	24	1,020 57	7	314 27	2	10 27	645 45	650 45	5 27	22
	8	97	4,500 08	9	459 51	7	2 45	1,888 74	1,766 43	122 31	86
	9	454	11,413 04	18	1.308 13	41	118 13	5,543 09	5,661 22	....	274
	10	89	2,552 02	6	367 82	20	695 68	1,803 84	2,384 82	114 70	84
Stormont, Dundas and Glengarry	1	66	2,521 84	2	49 11	10	15 00	1,655 05	1,574 70	95 35	63
	2	181	5,296 95	4	65 69	29	255 62	4,657 25	4,756 59	99 34	184
	3	465	11,328 64	11	639 43	149	127 97	5,212 38	5,522 99	117 36	450
	4	51	1,759 85	5	276 54	10	....	695 74	658 54	37 20	48
	5	83	2,916 75	5	181 77	18	233 64	1,077 42	1,113 57	197 49	9
	6	52	2,133 90	5	274 00	4	16 15	672 79	616 29	56 50	32
	7	48	1,682 63	1	10 39	3	24 19	811 62	792 52	43 29	45
	8	129	5,570 80	5	285 48	15	57 85	2,324 64	2,268 18	56 46	118
	9	52	2,247 03	6	282 30	3	....	635 67	635 67	....	48
	10	137	7,008 55	10	474 34	7	189 64	3,592 85	3,761 41	109 83	120
	11	69	2,538 21	3	157 30	4	12 26	1.151 17	1,152 13	11 30	35
	12	104	3,626 90	6	446 54	8	5 02	2,093 34	2.074 93	23 43	110
Sudbury	1	689	28,514 00	30	1,478 00	19	1,321 65	15,230 10	14,975 90	1.575 85	649
	2	82	2.982 10	9	996 37	......	....	716 64	606 64	105 00	84
	3	161	6,511 03	20	1,143 17	3	402 51	2,647 19	2,404 05	645 65	154
	4	77	3,235 77	4	215 78	4	....	915 42	902 22	13 25	74
Thunder Bay....	1	1,056	41,489 20	23	1,589 54	54	269 52	16,601 26	16,219 26	382 26	782
	3	920	42.612 84	36	2,001 18	46	623 42	16,699 62	16,239 07	1,083 97	893

A.—Continued.

to the 31st day of December, A.D. 1911, inclusive, etc.—Continued.

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of jury trials by jurors called in pursuance of section 142, D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's returns of emoluments.	Bailiff's returns of emoluments.	Unclaimed moneys in pursuance of section 43, D.C.A.
						$ c.		$ c.	$ c.		$ c.			$ c.	$ c.	$ c.
6	3			310				3 35				8		1,077 25	477 34	
		1		1				9						17 64	10 29	
								6						5 80	6 23	
								18						27 59	17 92	
	14			7				33						56 87		
				4				6						15 15	8 14	
				2				81						43 05	20 11	
								3						95		
22				11						3	2 00	2		333 87	*69 67	
4				11				12 00				1		146 05	117 96	12 00
7				3						1	10 00			135 70	92 25	23 30
9	2			53				5 27				3		449 07	212 43	
1				49										33 45	27 15	
14				43				7 18		1	10 00	1		433 40	224 59	
6	2			40				3 82		1	10 00	2		321 70	151 61	
34	1	8		39				4 28						267 35	284 82	
5								2 99						167 46	110 80	
7			1	19				3 82		1	5 00	2		234 57	291 76	
26	1			113	2	23 00		13 88				15		1,050 60	269 35	
5				24	2	33 00		3 97		2	20 00	2		272 15	171 73	
9				8	1	12 00		4 08				3		222 30	220 37	
11				47	1	12 00		6 37				1		365 55	288 66	
4	4		1	5				1 96				4		96 15	55 07	
25				78				10 41		3	15 00	10		601 04	239 79	
1			1	2				91						72 55	100 47	
10	3			19				4 36		2	10 00	2		243 15	123 33	
21	2		1	129				11 25				19		938 70	504 00	
5			1	18				2 48				4		187 30	168 72	
3				13				2 41				1		136 58	127 00	
9				41				7 10				1		596 69	249 52	
15				222	1	12 00		9 33				45	3	1.137 08	566 42	
3				16				1 59				1		72 28	138 77	
4	48		1	21				2 35		1	5 00	5		202 41	124 53	
4				16				1 99							75 00	
3	3			17				1 47				1		119 50	138 62	
11			1	20				5 21		3	50 00	1	1	284 25		
2	2		3	8				1 67						14 39	107 55	
17	1							7 58		1	5 00	1		296 80	288 26	
8				9				3 35						150 84	180 80	
2			1	13				2 81						194 10	172 60	
36		4		102								2		1,219 40		15 23
				7										*56 45	*8 45	
7	2			16										362 88	143 62	
3				5								2		144 72	*149 30	
90				184					42 50			6		2,212 05	815 18	
73			3	103						3	21 00	5	1	1,534 25	1.233 01	

*Part of year only.

TABLE

Return of Division Court Business from the 1st day of January

Name of County, United Counties, or District.	Number of Divisions.	Number of suits entered exclusive of transcripts of judgments and judgment summonses.	Amount of claims entered exclusive of transcripts of judgments and judgment summonses.	Number of transcripts of judgments received from other Courts.	Amount of claims received by transcripts of judgments from other Courts.	Number of judgment summonses issued.	Balance of cash in Court from the previous year.	Total amount of suitors' money paid into Court.	Total amount of suitors' money paid out of Court.	Balance of cash in Court.	Number of suits entered where the amount claimed does not exceed $100, exclusive of transcripts of judgments from other Courts.
			$ c.		$ c.		$ c.	$ c.	$ c.	$ c.	
Victoria	1	20	1,193 61	8	401 64	......	....	958 47	958 47	....	17
	2	41	1,843 75	4	162 12	......	....	604 71	604 71	....	37
	3	67	2,412 18	3	217 50	3	24 76	1,954 30	1,975 06	4 00	57
	4	13	469 03	......	....	......	....	291 95	291 95	....	....
	5	318	12,410 82	7	530 41	20	24 70	4,552 60	4,537 24	40 06	293
	6	24	936 97	1	13 48	1	3 75	454 98	448 42	10 31	24
	7	29	599 29	5	200 34	......	4 29	350 69	204 40	46 29	....
Waterloo	1	423	159,77 72	13	1,033 92	57	65 66	8,633 72	8,558 57	75 15	395
	2	161	3.874 15	12	894 75	12	104 14	3.667 07	3,598 57	68 50	156
	3	414	10.593 65	8	296 56	42	2 00	5,358 66	5,359 66	1 00	391
	4	72	2,645 33	11	717 81	11	243 67	1.682 63	1,780 76	145 54	66
	5	32	666 40	8	863 77	6	12 08	653 24	654 32	11 00	18
	6	46	998 81	3	71 32	2	....	1,029 72	1,029 72	....	45
	7	9	310 69	......	....	......	3 20	126 92	125 67	4 45	8
Welland	1	432	13,139 93	28	1,089 81	53	259 46	4,967 05	4,803 31	344 73	479
	2	14	518 77	6	264 53	4	....	151 12	137 72	14 00	13
	3	166	5,561 07	12	905 82	18	33 05	2,824 66	2,882 16	2 50	159
	4	377	12,056 88	24	1,229 65	30	979 01	5,222 57	5,291 64	909 94	384
	5	45	1,031 20	6	393 14	3	108 63	457 50	526 33	39 80	45
	6	62	1,804 69	......	....	......	3 22	1,029 40	1,026 18	3 22	59
Wellington.....	1	652	18,807 47	16	874 07	134	122 83	8,627 77	8,638 95	111 65	629
	2	9	593 74	1	25 43	......	....	309 46	309 46	....	7
	3	9	631 77	2	186 03	....	....	230 45	230 45	....	7
	4	58	2,390 80	9	507 55	3	60 77	1,033 01	1,017 01	16 00	54
	5	35	1,269 75	4	276 70	2	....	657 79	657 79	....	34
	6	28	1,118 17	6	295 78	2	29 95	717 17	746 92	....	26
	7	57	2,307 07	10	463 86	8	29 00	1,606 39	1,617 89	17 50	53
	8	59	2,137 54	9	504 65	16	25 25	1,676 01	1,479 14	196 87	68
	10	79	2,314 48	5	340 97	5	172 40	613 18	659 86	125 72	76
	11	81	3,796 78	7	367 18	6	117 89	1,700 18	1,681 64	136 43	70
Wentworth	1	1,154	40,586 65	32	1,649 95	103	343 74	9,910 94	9.863 32	391 36	1,084
	2	93	3,215 90	12	541 07	2	....	1,368 34	1,368 34	... .	87
	3	24	1,175 86	11	584 75	1	....	1,135 57	1,113 57	22 00	19
	4	42	1,430 95	4	132 69	1	2 00	646 75	648 75	....	40
	5	30	1,228 96	2	206 06	1	....	445 47	445 47	....	32
	7	3	89 00	1	46 48	......	....	50 00	50 00	....	3
	8	2	17 75	. ....	... .	......	....	2 00	2 00	....	....
	9	1,197	35.242 91	20	1,236 36	54	216 02	14,983 32	15,023 63	175 71	1,163
York............	1	3,623	169,626 51	106	5,755 97	515	740 83	35,386 14	33,277 22	2,108 92	3,327
	2	130	5,274 28	8	608 73	4	....	4,184 52	4,180 33	4 19	117
	3	48	2,014 16	5	428 39	1	134 00	1,065 63	1,149 32	52 31	53
	4	116	5,986 06	24	1,803 09	7	127 25	3,357 78	3,367 62	117 41	154
	5	77	3,249 84	11	746 12	1	15 30	2,175 89	2,181 70	9 49	55
	6	87	3.443 41	14	170 50	1	....	1,826 97	1,826 97	....	82
	7	31	1,438 10	5	394 19	2	61 00	716 40	768 40	9 00	29
	8	484	19,622 05	33	1,851 55	72	163 69	6.254 18	6,341 47	76 40	444
	9	47	2,541 21	5	173 93	2	75 50	976 64	1,052 14	....	41
	10	3,822	182,378 70	79	4,933 02	420	1,967 68	40,668 37	40,409 09	2,226 96	3,420
Totals		65,373	2.046,148 87	2,913	167.771 88	6,292	31,708 53	809,672 03	784.476 30	32,733 08	49,645

A.—Concluded.

to the 31st day of December, A.D. 1911, inclusive, etc.—Concluded.

Number of suits entered where claim does not exceed $200.	Number of actions for tort, where the amount claimed does not exceed $60.	Number of personal actions, where the parties consent thereto in writing and the amount claimed does not exceed $100.	Number of actions of replevin, where the value of the goods or other property or effects distrained, taken or detained, does not exceed the sum of $60.	Number of suits entered for claims not exceeding $10.	Number of jury trials by juries summoned.	Amount paid to jurors summoned.	Number of jury trials by jurors called in pursuance of section 142, D.C.A.	Amount payable to County Treasurer for "Division Court Jury Fee Fund."	Amount of fees and emoluments payable to the Honourable the Treasurer for the use of the Province.	Number of instances in which the Judge has allowed costs to be taxed for Counsel, Attorney or Agents' fees.	The amount of costs so taxed.	Return of judgment debtors ordered to be committed.	The number of such debtors actually committed.	Clerk's returns of emoluments.	Bailiff's returns of emoluments.	Unclaimed moneys in pursuance of Section 43, D.C.A.
						$ c.		$ c.			$ c			$ c.	$ c.	
3								1 20		2	19 00			54 16	53 96	
4	1			6				2 08		2	15 00			97 06	102 85	
4				19				2 11						128 75	99 22	
								33						24 10	10 67	
20	2			69				9 57		3	15 00	5	1	730 85	316 92	
1	1			2				69						74 40	33 58	
1	1			12				36						61 68		
16	3		1	127				13 57				12	2	1,103 63	516 00	
5	1			66	1	11 00		3 11				2		335 35	203 45	
23				175	1	11 00		10 16		1	10 00	7		801 25	266 33	
10		1	1	11				2 72				1		169 42	96 38	
1	1	1	1	1				79				1		57 85	87 90	
1				16				73				1		96 90	87 48	
1				3				37						24 16	8 93	
20				131				11 66				9		1,005 35	490 89	
				7				40				1		38 30	54 62	
7				34				4 75		1	5 00	4		341 25	351 26	
21	3			102				11 60				4		881 80		8 32
				12				69				1		203 80	68 83	
2				16				1 43						91 20	37 91	
23	2		1	243				14 17		1	8 00	33	2	1,522 60	515 97	
															231 83	
1					1	12 00		68						28 82	7 40	
2					1	12 00		77						21 65	17 20	
4				16	1	12 00		2 11						152 18	82 64	
1				9				1 00						69 28	49 82	
2	2			7				1 16						59 00	39 58	
4				9	1	11 00		2 17				3		166 65	128 74	
6				12	3	36 00		1 93		2	13 00	2		187 90	138 54	5 50
2			1	20	1	12 00		1 19				1		84 40	*	
11	1			14				4 04		4	26 00			225 80	158 29	
70	12			313	2	24 00		36 67	167 18	9	53 00	24	1	2,835 59	1,050 40	
6	1		1	20				2 94						250 95	204 54	
1				2				88						62 95		
2				12				1 28						89 75	114 04	
2				5				1 19						77 10	65 85	
								6						10 83	7 33	
				1										6 80	12 00	
31	6		1	363	1	10 00		28 36	130 14	1	5 00	12		2,650 70	* 263 81	
246	53		11	488	7	24 00		138 54	821 76	39	195 00	170	1	6,108 81	4,070 08	4 42
11	1			28				6 22		1	5 00	2		298 90	256 16	
3				8				1 45						117 42	73 72	
12	2			36	1	12 00		5 88				3		362 75	368 75	
5	1			3	13			2 99						187 45	117 32	
6				15				3 24						172 55		
2	1			6				1 28						72 45	46 22	
35	13		2	83	1	12 00		18 35				10	1	1,030 65	723 79	
5				3				2 67						71 55	70 82	
372	10		11	646	3	31 00		182 36	904 26	31	155 00			6,521 30	4,357 00	3 00
3,690	621	132	67	14,544	114	1,000 50	5	1,541 75	3,150 11	231	1,384 00	1,286	42			171 84

* Part of year only.

TABLE B.

LIST of Division Court clerks, their post office address, their county or district and number of division in which their Courts are situated, for the Province of Ontario, up to the 31st December, 1911, inclusive. (Lists corrected up to date of printing.)

County and District.	No. of Division.	Clerk.	Post office address.
Algoma	1	F. A. King	Saulte St. Marie
	2	T. Sullivan	Bruce Mines
	3	Thos. Dodds	Thessalon
	6	W. F. Adams	Richard's Landing
	7	J. A. Hawkins	Blind River
Brant	1	James C. Spence	Brantford
	2	Jas. Smiley	Paris
	3	S. B. Laurason	St. George
	4	W. F. Miles	Burford
	5	Walter E. Hooker	Scotland
Bruce	1	N. Crawford	Walkerton
	2	John K. McLean	Teeswater
	3	Joseph Barker	Kincardine
	4	J. C. Gibson	Paisley
	5	J. A Chapman	Port Elgin
	6	A. Nelson	Tiverton
	7	J. R. Vandusen	Tara
	8	J. H. Fielding	Wiarton
	9	Angus Martyn	Ripley
	10	Jonn Pettigrew	Lion's Head
	11	W. J. Little	Lucknow
	12	C. E. Biehn	Chesley
Carleton	1	J. R. Armstrong	Ottawa
	2	Wm. McElroy	Richmond
	3	Jas. H. Wilson, Jr.	Carp
	4	Matthew Riddell	Galetta
	5	John Kerr	North Gower
	6	W. C. Cameron	Metcalf
	7	W. A. Mason	Hintonburg
Dufferin	1	Joseph Pattulo	Orangeville
	2	D. J. Reburn	Shelburne
	3	A. Ferris	Stanton
	4	Robt. Orr	Mono Mills
	5	M. G. Varcoe	Grand Valley
Elgin	1	E. C. Monteith	Aylmer
	2	John McIntyre	St. Thomas
	3	John McIntyre	St. Thomas
	4	Samuel Maccoll	Dutton
Essex	1	C. F. Pequegnot	Sandwich
	2	G. E. Pulford	Amherstburg
	3	Geo. Pearce	Kingsville
	4	C. Bell	Oxley
	5	Geo. A. Morse	Leamington
	6	H. Taylor	Belle River
	7	Joseph D. A. Deziel	Windsor
	8	Wm. Laing	Essex
	9	A. J. Brown	Comber
	10	Jno. Watt	Scudder

List of Division Court Clerks.—Continued.

County and District.	No. of Division.	Clerk.	Post office address.
Frontenac	1	W. H. Carson	Kingston
	2	J. F. Latherland	Cataraqui
	3	J. W. Davis	Sydenham
	4	H. McMullen	Verona
	5	H. Kieler	Battersea
	6	A. W. Buell	Sharbot Lake
	7	W. McGregor	Arden
Grey	1	Benjamin Allen	Owen Sound
	2	Archibald Davidson	Durham
	3	H. P. Heming	Meaford
	4	W. L. Tyson	Clarksburg
	5	W. J. Bellamy	Flesherton
	6	Wm. J. Winter	Chatsworth
	7	John Taylor	Hanover
	8	Richard L. Stephen	Markdale
Haldimand	1	James McGregor	Caledonia
	2	B. Humphrey	Cayuga
	3	T. Armour	Dunnville
	4	C. E. Bourne	Jarvis
	5	Robert E. Johnson	Canboro'.
Haliburton	1	Geo. A. Rogers	Minden
	2	G. Bemister	Haliburton
	3	Stephen Kettle	Ursa
	4	Ed. B. Speers	Dorset
Halton	1	Wm. Panton	Milton
	2	A. Hillmer	Oakville
	3	C. C. Roe	Georgetown
	4	R. J. McNabb	Acton
	5	Wm. Fraser	Campbellville
	6	J. A. McArthur	Burlington
Hastings	1	F. M. Clark	Belleville
	2	W. Greer	St. Ola
	3	L. E. Mills	Shannonville
	4	F. A. Bartlett	Tweed
	5	Thomas G. Clute	Stirling
	6	Dennis Gillen	Madoc
	7	Thos. Donnelly	Deseronto
	9	G. J. Chadd	Trenton
	10	J. C. Bowen	Marmora
	11	James Haryatt	Maynooth
	12	W. N. Simmons	Bancroft
Huron	1	James Yates	Goderich
	2	J. C. Greig	Seaforth
	3	H. T. Rance	Clinton
	4	S. Wilson	Brussels
	5	R. N. Creech	Exeter
	6	James Whyard	Dungannon
	7	Jno. Tippett	Bayfield
	8	Alex. Ross	Wingham
	9	Thomas Brown	Wroxeter
	10	A. F. Hess	Zurich
	11	Wm. Lewis	Crediton
	12	Thos. Code	Blyth

List of Division Court Clerks.—Continued.

County and District.	No. of Division.	Clerk.	Post office address.
Kenora	1	O. Partington	Kenora
	2	Fred Deacon	Wabigoon
	3	A. L. Orvis	Dryden
Kent	1	W. B. Wells	Chatham
	2	Arthur McKinlay	Ridgetown
	3	James T. Smith	Dresden
	4	J. W. Gibson	Blenheim
	5	Charles B. Jackson	Wallaceburg
	6	Jos. Dillon	Bothwell
	7	Arthur A. Wilson	Tilbury
Lambton	1	A. F. Wade	Sarnia
	2	Wm. McLeay	Watford
	3	Jas. McIntyre	Florence
	4	Wm. W. Stover	Sombra
	5	Thomas L. Jones	Forest
	6	W. C. Tudor	Thedford
	7	John McCrea	Mooretown
	8	W. G. Fraser	Petrolea
	9	Richard Code	Alviston
Lanark	1	R. Jamieson	Perth
	2	W. A. Field	Lanark
	3	A. R. G. Peden	Carleton Place
	4	James H. Ross	Smith's Falls
	5	P. C. Dowdall	Almonte
Leeds and Grenville	1	I. J. Mansell	Brockville
	2	Jno. F. Graham	Prescott
	3	S. McCammon	Gananoque
	4	S. J. Law	Kemptville
	5	W. H. McCrea	Merrickville
	6	N. L. Phelps	Delta
	7	Jas. Edgar	Toledo
	8	Ed. Wright	Newboro'
	9	E. J. Purcell	Athens
	10	M. Maguire	Spencerville
	11	John Haley	North Augusta
	12	Charles Tennant	Mallorytown
Lennox and Addington	1	A. Knight	Napanee
	2	Fred W. Armstrong	Bath
	3	Joseph B. Allison	Adolphustown
	4	Jno. H. Patterson	Newburgh
	5	Robert Cox	Enterprise
	6	J. A. Timmerman	Odessa
	7	James Aylesworth	Tamworth
	8	J. M. Dafoe	Flinton
	9	W. J. Slater	Denbigh
Lincoln	1	Samuel Shearer	Niagara-on-the-Lake
	2	A. H. Trapnell	St. Catharines
	3	Thos. Pearson	Smithsville
	4	C. E. Riggins	Beamsville
	5	W. W. Kidd	Grimsby
Manitoulin	1	A. Hall	Gore Bay
	2	David McGilvery	Little Current
	3	F. P. Denison	Manitowaning
	4		

List of Division Court Clerks.—Continued.

County or District.	No. of Division.	Clerk.	Post office address.
Middlesex	1	J. W. McIntosh	London
	2	Wm. J. McRoberts	Parkhill
	3	R. H. Collins	Lucan
	4	J. H. Matthews	Delaware
	5	G. Wilson	Glencoe
	6	John H. McIntosh	Strathroy
	7	Edward Thomas Shaw	Dorchester Station
	8	Walter R. Westlake	Arva
	9	F. H. Whetter	London
Muskoka	1	Charles Bard	Bracebridge
	2	W. N. Moody	Gravenhurst
	3	A. R. Corbett	Huntsville
	4	Fred D. Stubbs	Port Carling
Nipissing	1	A. W. Smith	Sturgeon Falls
	2	John McMeekin	Mattawa
	3	M. W. Flannery	North Bay
	4	A. M. Daniels	Elk Lake
	5	J. A. Levesque	Bonfield
	6	Saml. Errett	Englehart
	7	Paul A. Cobbald	Haileybury
	8	S. L. Bradley	Cochrane
	9	F. W. Ferguson	Liskeard
Norfolk	1	E. E. Collins	Simcoe
	2	Abraham A. Tobin	Waterford
	3	Hy. McKnight	Teeterville
	4	Arthur Gerhard	Delhi
	5	M. J. McColl	Vittoria
	6	Arthur P. Barrett	Port Rowan
	7	Watson Park	Fairground
	8	W. Francis Tibbetts	Port Dover
Northumberland and Durham	1	John Moorecraft	Bowmanville
	2	L. B. Davidson	Newcastle
	3	Thos. A. Thompson	Port Hope
	4	W. S. Givens	Millbrook
	5	J. C. Rosevear	Cobourg
	6	E. H. Pratt	Grafton
	7	H. S. Keyes	Colborne
	8	B. C. H. Becker	Brighton
	9	P. S. Ewing	Warkworth
	10	Wm. Little	Wooler
	11	S. J. Fisher	Campbellford
Ontario	1	E. L. McDonell, pro tem.	Whitby
	2	M. Gleeson	Greenwood
	3	J. W. Burnham	Port Perry
	4	R. J. Moore	Uxbridge
	5		Cannington
	6	James Gordon	Beaverton
	7	D. Leonard	Atherly
Oxford	1	V. L. Francis	Woodstock
	2	Chas. K. Curry	Drumbo
	3	A. S. Herd	Embro
	4	M. L. Bushell	Norwich
	5	Neil G. Gunn	Ingersoll
	6	John C. Ross	Tillsonburg
	7	W. S. Russell	Tavistock

List of Division Court Clerks.—Continued.

County or District.	No. of Division.	Clerk.	Post office address.
Parry Sound	1	W. J. Jones	Parry Sound
	2	John Fletcher	McKellar
	3	J. A. Hall	Rosseau
	4	J. N. Dodds	Burk's Falls
	5	Harry Snuggs	Magnetawan
	6	T. J. Williams	Powassan
	7	John Harper	Sundridge
Peel	1	John Clarke	Brampton
	2	H. H. Shaver	Cooksville
	3	M. C. Hillock	Caledon
	4	John McDonald	Bolton
Perth	1	D. B. Burritt	Stratford
	2	J. Dougherty	Mitchell
	3	Richard Shepherd	St, Mary's
	4	Jos. Thompson	Shakespeare
	5	Wm. Zimmerman	Milverton
	6	Wm. Bright	Listowel
Peterborough	1	J. W. Miller	Peterborough
	2	J. L. Squires	Norwood
	3	W. Sherin	Lakefield
	4	Wm. Gallon	Apsley
	5	W. A. McMaster	Havelock
	6	Jno. Drummond	Keene
Prescott and Russell	1	E. A. Johnson	L'Orignal
	2	P. S. Paquet	Vankleek Hill
	3	Napoleon Labrosse	St. Eugene
	4	D. Viau	Plantagenet
	5	J. S. Cameron	Cumberland
	6	A. Carson	Russell
	7	J. A. D. Landriault	Hawkesbury
	8	R. L. Downing	Routhier
	9	F. W. Langrell	Alfred
	10	Moise Rochon	Clarence Creek
	11	Peter Stewart	South Indian
Prince Edward	1	Fred Slavin	Picton
	2	J. McQuoid	Milford
	3	Charles H. Wright	Demorestville
	4	William H. C. Robin	Ameliasburg
	5	H. A. Jolley	Wellington
	6	C. H. Saylor	Bloomfield
	7	A. S. Burr	Consecon
	8	B. E. Harrison	Waupoos
Rainy River	1	W. H. Elliott	Fort Frances
	2	B. L. Phillips	Emo
	3	D. K. McGregor	Rainy River
Renfrew	1	J. H. Leach	Pembroke
	2	Hugh S. Miller	Beachburg
	3	George Eady, Jr.	Renfrew
	4	John R. Tierney	Arnprior
	5	C. Blackburn	Eganville
	6	J. R. Warren	Cobden
	7	P. J. Harrington	Killaloe Station

List of Division Court Clerks.—Continued.

County or District.	No. of Division	Clerk.	Post office address.
Simcoe	1	W. C. McLean	Barrie
	2	R. E. Stevenson	Bradford
	3	Jos. Wright	Beeton
	4	D. C. Barr	Collingwood
	5	T. C. Craig	Craighurst
	6	F. Webber	Orillia
	7	Angus Bell	New Lowell
	8	D. A. Lee	Alliston
	9	W. J. Martin	Penetanguishene
	10	J. R. Russell	Coldwater
Stormont, Dundas and Glengarry	1	G. H. Macgillivray	Williamstown
	2	Hugh R. Macdonald	Alexandria
	3	G. A. Milden	Cornwall
	4	Geo. Sampson	Aultsville
	5	Jas. N. Eastman	Morrisburg
	6	Jas. Collison	Iroquois
	7	M. J. Cleland	South Mountain
	8	D. G. McMillan	Finch
	9	A. A. McLennan	Lancaster
	10	W. G. Bolster	Chesterville
	11	D. McIntosh	Strathmore
	12	John D. McIntosh	Dominionville
Sudbury	1	J. K. McLennan	Sudbury
	2	J. A. Bastien	Chelmsford
	3	J. C. McMillan	Webbwood
	4	S. Soufrine	Warren
	5	G. A. D. Murray	South Porcupine
Thunder Bay	1	R. E. Mitchell	Port Arthur
	3	G. H. Coo	Fort William
Victoria	1	Arch. Campbell	Woodville
	2	Edward D. Hand	Fenelon Falls
	3	G. W. Taylor	Bobcaygeon
	4	W. H. Kennedy	Omemee
	5	Elias Bowes	Lindsay
	6	J. F. Cunnings	Oakwood
	7	A. C. Graham	Victoria Road
Waterloo	1	Fred. Rohleder	Berlin
	2	James D. Webster	Preston
	3	Edward D. Wilkins	Galt
	4	F. H. McCallum	New Hamburg
	5	C. W. Parsill	Linwood
	6	Wm. H. Winkler	St. Jacob's
	7	A. E. Watson	Ayr
Welland	1	John M. Livingston	Welland
	2	Joseph Henderson	Marshville
	3	Jos. Clark	Ridgeway
	4	Jos. G. Cadham	Niagara Falls Sth
	5	D. J. C. Munro	Thorold
	6	Jas. E. Neff	Port Colborne

List of Division Court Clerks.—Concluded.

County or District.	No. of Division.	Clerk.	Post office address.
Wellington	1	Thos. J. Day	Guelph
	2	Wm. Nicoll	Morriston
	3	Robt. Scott	Eramosa
	4	John Brownridge	Fergus
	5	Thomas Young	Erin
	6	Henry Clark	Elora
	7	John Lunz	Drayton
	8	R. T. Smith	Arthur
	10	J. L. Eady	Harriston
	11	J. C. Wilkes	Mount Forest
Wentworth	1	H. T. Bunbury	Hamilton
	2	F. D. Suter	Dundas
	3	Hugh Thompson	Waterdown
	4	H. M. McPherson	Orkney
	5	J. C. Moore	Stoney Creek
	7	G. T. Neale	Glanford
	8	Thomas Murphy	Binbrook
	9	C. H. Peebles	Hamilton
York	1	A. McL. Howard	Toronto
	2	Robert J. Corson	Markham
	3	Thos. F. McMahon	Richmond Hill
	4	K. N. Robertson	Newmarket
	5	F. G. Tremayne	Sutton West
	6	A. W. Brodie	Aurora
	7	E. W. Brown	Woodbridge
	8	John Hamshaw	Toronto Junction
	9	J. H. Richardson	West Hill
	10	E. H. Duggan	Toronto

TABLE C.

List of Division Court Bailiffs, their Post Office Address, the County or District and Number of Division in which their Courts are situated, for the Province of Ontario, up to 31st December, 1911, inclusive. (Lists corrected up to date of printing.)

County or District.	No. of Division.	Bailiff.	Post office address.
Algoma	1	....	Sault Ste. Marie
	2	Jno. Leacock	Bruce Mines.
	3	Isaac Leach	Thessalon
	6	A. Kitchen	Carterton, St. Jos. Is.
	7	Robt. George	Blind River
Brant	1	Jno. M. Dyckman	Brantford
	2	Horace Huston	Paris
	3	J. H. Cornell	St. George
	4	Robt. Balkwill	Burford
	5	A. M. Malcolm	Scotland
Bruce	1	Ezra Briggs	Walkerton
	2	John Farquharson	Teeswater
	3	George G. Collins	Kincardine
	4	Alex. Fraser	Paisley
	5	Wm. McFadden	Port Elgin
	6	Gore Leggett	Tiverton
	7	G. L. Briggs	Tara
	8	H. G. Trout	Wiarton
	9	....	Bervie
	10	A. C. Bridge	Lion's Head
	11	R. J. Cameron	Lucknow
	12	Jno. Beatty	Chesley
Carleton	1	E. Lavoie	Ottawa
		E. T. Van Nierop	Ottawa
	2	Jos. Binnington	Stapleton
	3	Wm. Falls	Carp
	4	George Owens	Antrim
	5	Wesley Hicks	Kars
	6	Ed. J. Murphy	Metcalfe
	7	A. Wilson	Hintonburg
Dufferin	1	....	Orangeville
	2	John Reburn	Whitfield
	3	Jno. Armstrong	Earnscliffe
	4	Wm. Irwin	Mono Mills
	5	J. I. Buchanan	Grand Valley
Elgin	1	W. W. White	Aylmer
	2	Geo. Smiley	St. Thomas
	3	Geo. Smiley	St. Thomas
	4	A. McKellar	Dutton

List of Division Court Bailiffs, etc.—Continued.

County or District.	No. of Division.	Bailiff.	Post office address.
Essex	1	Alois Master	Sandwich
	2	John Pettypiece	Amherstburg
	3	Horace Wigle	Kingsville
	4	Arthur T. Munger	Harrow
	5	Wm. Roach	Leamington
	6		Belle River
	7	F. St. Louis	Windsor
		Clement Reaume	Windsor
	8	James Johnston	Essex
	9	Leon Souchereau	Stoney Point
	10		Pelee
Frontenac	1	Hiram Davis	Wolfe Island
		Chas. G. Clarke	Kingston
	2		Cataraqui
	3	P. Trousdale	Sydenham
	4	E. A. Tallen	Verona
	5	E. F. Dennee	Inverary
	6	D. McDonald	Ardoch
		W. Thomlison	Sharbot Lake
	7	John E. Hays	Arden
Grey	1	Robt. Taylor	Owen Sound
	2	Wm. Sharp	Durham
	3	W. H. Arthur	Meaford
	4	Geo. Mitchell	Clarksburg
	5	John Wright, Jr	Flesherton
	6	James Dudgeon	Chatsworth
	7	Henry Prast	Hanover
	8	W. J. Pickell	Markdale
Haldimand	1	James Thorburn	Caledonia
	2	Robert Walker	Cayuga
	3	Wm. McIndoe	Dunnville
	4	W. E. Armstrong	Jarvis
	5	Harvey Ricker	Canboro
Haliburton	1	R. C. Garrett	Minden
	2		Haliburton
	3		Ursa
	4	Angus McKay	Dorset
Halton	1	J. A. Fraser	Milton
	2	Alex. McCleary	Oakville
	3	W. R. Brown	Georgetown
	4	John Lawson	Acton
	5	Ephraim Chapman	Campbellville
	6	Hiram Laud	Burlington
Hastings	1	Joshua Duffin	Belleville
	2	R. Casement	St. Ola
	3	W. E. Pearsall	Shannonville
	4	W. H. Davis	Tweed
	5	A. McCutcheon	Stirling
	6	C. St. Charles	Madoc
	7	A. P. Brown	Deseronto
	9	H. Mumford	Trenton
	10	O. R. Jones	Marmora
	11	Jno. Perry	Maynooth
	12	James McCaw	Bancroft

List of Division Court Bailiffs, etc,—Continued.

County or District.	No. of Division.	Bailiff.	Post office address.
Huron	1	G. C. Black	Goderich.
	2	Fred Welsh	Seaforth.
	3	Robt. Welsh	Clinton.
	4	E. Crich	Brussels.
	5	Alex. Davitt	Exeter.
	6	James Mallough	Dungannon.
	7	Thomas W. Cameron	Bayfield.
	8	G. A. Phippen	Wingham.
	9	John Brethauer	Wroxeter.
	10	C. Eilber	Zurich.
	11	J. Beanes	Crediton.
	12	Richard Somers	Blyth.
Kenora	1	R. B. Donkin	Kenora.
	2	Thomas Hatch	Dryden.
	3	" "	"
Kent	1	Charles J. Moore	Chatham.
		A. Wells	Chatham.
	2	J. N. Wilson	Ridgetown.
	3	Alex. Cuthbert	Dresden.
	4	H. B. Marshall	Blenheim.
	5	Nelson Sced	Wallaceburg.
	6	John Eachran	Thamesville.
	7	M. Dillon	Merlin.
Lambton	1	Rich. Macdonald	Sarnia.
	2	J. F. Elliott	Watford
	3	T. J. Elliott	Florence.
	4	N. Cornwall	Sombra.
	5	Joseph Burney	Forest.
	6	W. E. Molloy	Thedford.
	7	Ed. Harkness	Mooretown.
	8	Geo. Pearce	Petrolea.
	9	Jno. A. Cummings	Alvinston.
Lanark	1	P. J. Lee	Perth.
		Robt. Burns	Perth.
	2	Jas. Doran	Lanark.
	3	H. Wilson	Carleton Place.
	4	J. E. Burns	Smith's Falls.
		J. R. Polk	Smith's Falls.
	5	John Slattery	Almonte.
Leeds and Grenville	1	Ed. Young	Brockville.
		Matthew White	Brockville.
	2	Charles H. Row	Prescott.
	3	Thos. Baker	Gananoque.
	4	Michael Sweeney	Kemptville.
	5	Jno. Wilson	Merrickville.
	6	J. W. Russell	Delta.
	7	R. Richards	Frankville.
	8	E. J. Leech	Newboro.
		H. R. Derbyshire	Westport.
	9	H. C. Phillips	Athens.
	10	Jas. P. Lawrence	Spencerville
	11	W. H. Love	North Augusta
	12	W. J. Mallory	Mallorytown.

List of Division Court Bailiffs, etc.—Continued.

County or District.	No. of Division.	Bailiff.	Post office address.
Lennox and Addington	1	Z. Ham	Napanee
		Geo. Greer	Napanee
	2	....	Bath
	3	R. H. Hawley	Dorland
	4	S. E. Sagar	Newburgh
	5	....	Enterprise
	6	Geo. Watts	Odessa
	7	P. F. Carscallen	Tamworth
	8	F. Bleeker	Flinton
	9	Chas. P. Stein	Denbigh
Lincoln	1	Robert Chapman	Niagara-on-the-Lake
	2	Richard E. Boyle	St. Catharines
	3	A. D. Lacey	Smithville
	4	Jos. Grobb	Beamsville
	5	D. E. Swayzie	Grimsby
Manitoulin	1	Thos. Griffith	Gore Bay
	2	John Ramesbottom	Little Current
	3	Robert Russell	Tehkummah.
	4		
Middlesex	1	Jas. W. Hevey	London
	2	J. Hall	Parkill
	3	N. Ryan	Lucan
	4	Henry Eldidge	Delaware
	5	James Poole	Glencoe
	6	T. F. Hawkin	Strathroy
	7	W. H. Shaw	Dorchester Station
	8	Thos. A. Shoebotham	Arva
	9	C. H. James	London
Muskoka	1	Thos. Little	Bracebridge
	2	Chas. Richardson	Gravenhurst
	3	H. G. Harper	Huntsville
	4	....	Port Carling
Nipissing	1	H. Kinch	Sturgeon Falls
	2	Aime Jodouin	Mattawa
		Jas. Ruddy	Whitney
	3	D. McIntyre	North Bay
	4	C. M. McCarthy	Elk Lake
	5	....	Bonfield
	6	E. D. Ellis	Englehart
	7	F. K. Ebbitt	Haileybury
	8	L. Boutin	Cochrane
	9	J. Latchford	Liskeard
Norfolk	1	John Allgeo	Simcoe
	2	Orlando H. Duncombe	Waterford
	3	J. H. Boyce	Windham
	4	W. Cameron	Courtland
	5	Chas. A. Dunkin	Vittoria
	6	Plewis Pierce	Port Rowan
	7	Robt. N. Smith	Fair Ground
	8	G. F. Holden	Port Dover
Northumberland and Durham	1	M. Munday	Bowmanville
	2	Jas. Coleman	Newcastle
	3	Geo. Garbutt	Port Hope
	4	Jas. Francey	Millbrook
	5	A. R. Eagleson	Coldsprings
	6	T. B. Finley	Grafton
	7	W. H. Smith	Colborne
	8	Jno. A. Marshall	Brighton
	9	William Love	Warkworth
	10	F. Ellis	Wooler
	11	Jas. Shillinglaw	Campbellford

List of Division Court Bailiffs, etc.—Continued.

County or District.	No. of Division.	Bailiff.	Post office address.
Ontario	1	B. F. Campbell	Brooklyn
	2	S. H. Stevenson	Brougham
	3	Jos. Baird	Manchester
	4	J. Steiner	Uxbridge
	5	Lachlin McBain	Cannington
	6	W. S. Glassford	Beaverton
	7	Geo. Elliott	Brechin
Oxford	1	Benj. Hobson	Woodstock
	2	L. S. Kennedy	Richwood
	3	J. A. McKay	Embro
	4	Arthur Catton	Norwich
	5	Wm. Dundas	Ingersoll
	6	E. A. Ellis	Tillsonburg
	7	C. Strahm	Tavistock
Parry Sound	1	Jas. Manson	Parry Sound
	2	R. S. Jackson	McKellar
	3	Wm. Atkinson	Rosseau
	4	H. Stewart	Burk's Falls
	5	S. Walton	Magnetawan
	6	Jno. Lang	Powassan
	7	W. H. Johnston	Sundridge
Peel	1	Robt. Taylor	Brampton
	2	Wm. Henry Rutledge	Cooksville
	3	D. McArthur	Caledon
	4	Thos. Barons	Bolton
Perth	1	D. W. Forbes	Stratford
	2	John Coppin	Mitchell
	3	Wm. Box	St. Mary's
	4	Jno. S. Gabel	Shakespeare
	5	F. W. Guenther	Milverton
	6	R. Woods	Listowel
Peterborough	1	Thomas Laplante	Peterborough
	2	F. J. Stewart	Norwood
	3	Robt. Webster	Lakefield
	4	Robt. Webster	Lasswade
	5	A. Waller	Havelock
	6	Thos. McIntyre	Keene
Prescott and Russell	1	S. W. Wright	L'Orignal
	2	I. Labrosse	Vankleek
	3	Michael Kelly	St. Eugene
	4	John A. Peltier	Plantagenet
	5	Jos. Clarke	Navan
	6	Thos. Yonge	Russell
	7	D. Millette	Hawkesbury.
	8	L. McGregor	Routhier
	9	H. Larocque	Alfred
	10	John A. Dent	Rockland
		Moise Laviolette	Clarence Creek
	11	A. L. Macdonald	South Indian

List of Division Court Bailiffs, etc.—Continued.

County or District.	No. of Division.	Bailiff.	Post office address.
Prince Edward	1	S. A. Ruttan	Picton
	2	G. N. Ostrander	Milford
	3	George Farrell.	Demorestville
	4	A. Harvey	Ameliasburg
	5	R. L. Smith	Wellington
	6	J. W. Branscombe	Bloomfield
	7	Herman W. Weeks	Consecon
	8	E. A. Williams	Waupoos
Rainy River	1	J. B. Masher	Fort Frances
	2	T. A. Boucher	Emo
	3	George Simpson	Rainy River
Renfrew	1	Geo. McDonald	Pembroke
	2	John Beaupre	Beachburg
		Jas. Thrasher	Beachburg
	3	John Devine	Renfrew
	4	John Warnock, jr.	Arnprior
	5	Wm. Luloff	Eganville
	6	Jno. Jardine.	Cobden
	7	Jno. Roche.	Killaloe Sta.
Simcoe	1	John Weymouth	Barrie
	2	W. Simpkin	Bradford
	3	M. J. Casserly	Tottenham
	4	A. W. S. Cunningham	Collingwood
	5	Ed. Corlett	Hillsdale
	6	George Reeve	Orillia
	7	Wm. Switzer	New Lowell
	8	John R. Arnold	Alliston
	9	Ed. E. J. Hewson	Penetanguishene
	10	G. A. Abbott	Coldwater
Stormont, Dundas and Glengarry	1	John Burgess	Williamstown
	2	J. J. Kennedy	Alexandria
	3	W. S. Smith	Cornwall
	4	J. P. Ferguson	Osnabruck Centre
	5	Jacob Hopper	Morrisburg
	6		Iroquois
	7	J. Anderson	South Mountain
	8	A. Ouderkirk	Finch
	9	K. A. McDonell	North Lancaster
	10	E. Merkley	Chesterville
	11	Chas. W. Kahala	Avonmore
	12	Donald J. Robertson	Maxville
Sudbury	1	C. Gravelle	Sudbury
	2	H. Gratton	Chelmsford
		W. Lyness	Chapleau
	3	H. Hodgins	Webbwood
	4	J H. Boyd	Warren
	5	Herbert Warren	South Porcupine
Thunder Bay	1	A. Clavet	Port Arthur
	3	A. Inman	Fort William

List of Division Court Bailiffs, etc.—Concluded.

County and District.	No. of Division.	Bailiff.	Post office address.
Victoria	1	S. Dumond	Woodville
	2	E. Mark	Fenelon Falls
	3	W. Mitchell	Bobcaygeon
	4	Geo. Griffin	Omemee
	5	Peter Mitchell	Lindsay
	6	Wm. J. McCullough	Oakwood
	7		Kirkfield
Waterloo	1		Berlin
	2	W. A. Bolduc	Preston
	3	Levi Bawtinheimer	Galt
	4	Henry Gerth	New Hamburg
	5	Benj. J. Ballard	Hawkesville
	6	Benj. J. Ballard	Hawkesville
	7	Jas. G. Watson	Ayr
Welland	1	J. C. Nixon	Welland
	2	Jno. Haymes	Marshville
	3	Jno. R. Huffman	Ridgeway
	4	W. Peterson	Niagara Falls South
	5	R. C. Higgins	Thorold
	6	Hy. Leslie	Port Colborne
Wellington	1	Jno. Ogg	Guelph
		Wm. Young	Guelph
	2	Jno. Ogg	Guelph
	3		Rockwood
	4	Wm. M. Frank	Fergus
	5	Peter McGill	Erin
	6	J. W. Love	Elora
	7	Wm. Richards	Drayton
	8	O. D. White	Arthur
	10	Henry Torrance	Clifford
	11	Thos. Ryan	Mount Forest
Wentworth	1	Jas. Bryers	Hamilton
	2	Alex. Misener	Dundas
	3		Rockwood.
	4	Alex. Misener	Troy
	5	J. F. Felker	Stoney Creek
	7	Jas. Thompson	Binbrook
	8	Jas. Thompson	Binbrook
	9	J. A. Atkinson	Hamilton
York	1	Chas. Synge	Toronto
	2	M. C. Selby	Locust Hill
	3	Ed. Dixon	Headford
	4	A. E. Widdifield	Newmarket
	5	Peter Grant	Sutton
	6	Ed. Kennedy	Aurora
	7	Wm. Elliston	Woodbridge
	8	A. Kaake	Weston
	9	Jos. Skelton	Scarboro
	10	Frank Woods	Toronto

TABLE D.

DIVISION COURTS, LIMITS OF THE RESPECTIVE DIVISIONS IN THE PROVINCE OF ONTARIO, AND JUDICIAL OFFICERS.

ALGOMA.

F. Stone, Judge, Sault Ste. Marie.

Edward O'Connor, J. J., Sault Ste. Marie.

M. McFadden, Crown Attorney and Clerk P., Sault Ste. Marie.

1.—Bounded west by Thunder Bay District, 85th parallel of west longitude and east by Bar River, including all the islands in front.

2.—Bounded west by Bar River and east by the westerly boundary of the Townships of Thessalon, Kirkwood, Bridgeland, Houghton and Otter, and by said boundary line of the last five named townships produced northerly.

3.—Bounded west by the westerly boundary of the Townships of Thessalon, Kirkwood, Bridgeland, Houghton and Otter, and the boundary line of the last named five townships produced northerly to the northern boundary of the District, and on the east by a line produced northerly between the Townships of Bright and Thompson to the northern boundary of the District of Algoma.

6.—Consisting of St. Joseph's Island.

7.—All the Territory of the District of Algoma lying east of the eastern boundary of the Third Division including the Village of Cutler and Johns Island.

BRANT.

A. D. Hardy, Judge, Brantford.

A. J. Wilkes, C.C.A. and C.P., Brantford.

1.—The City of Brantford and that part of the Township of Brantford not included in the other divisions hereinafter described. The Townships of Onondaga and Tuscarora and that part of the Township of Brantford lying south of the main road from Brantford to Hamilton and east of Fairchild's Creek.

2.—The Town of Paris and that part of South Dumfries west of the line between lots 18 and 19, and that part of the first concession of the Township of Brantford lying west of a continuation of the last-mentioned line.

3.—The remainder of the Township of South Dumfries and of the first concession of the Township of Brantford.

4.—The ten northern concessions of the Township of Burford, and all that part of the 2nd, 3rd, 4th and 5th concessions of the Township of Brantford, west of the line between lots numbers 10 and 11, and that portion of the Kerr tract west of the continuation of the last-mentioned line.

5.—The Township of Oakland, the four southern concessions of the Township of Burford and lots numbers 1 to 5, inclusive, in the ranges east and west of the Mount Pleasant Road, in the Township of Brantford, adjoining the Township of Oakland.

BRUCE.

Wm. Barrett, Judge, Walkerton.

A. B. Klien, J.J., Walkerton.

Thomas Dixon, C.C.A. and C.P., Walkerton.

1.—The Town of Walkerton and the Township of Carrick and the Township of Brant, south of the 12th concession, in the lots up to No. 26, and south of the 10th concession, in lots 26 to 34, inclusive.

2.—The Village of Teeswater, the Townships of Culross and Greenock south of the 12th concession.

3.—The Town of Kincardine, the Township of Kincardine, lying south of the 10th concession.

4.—The Village of Paisley, and that part of the Township of Brant lying north of 11th concession and west of lot 26. That part of Greenock lying north of concession 11; lots 26 to 35, inclusive, in the 8th, 9th, 10th, 11th, 12th, 13th and 14th concessions of the Township of Bruce; and Saugeen, east of a line between lots 28 and 29, and south of the proportion of the town line between Arran and Elderslie to the Saugeen River. All Elderslie lying west of the 25th side line and south of the 12th concession. And also that part lying north of concession 11 and west of lot 17.

5.—All of the Township of Amabel lying north of the 10th concession, Port Elgin and Southampton, and all Saugeen not in No. 4, Arran, west of the line between lots 10 and 11, north of Arran Lake and its outlet, and Amabel, south of concession 11, and west of concession C, and concessions 8, 9 and 10.

6.—The Village of Tiverton and all the Township of Bruce, except that part included in No. 4, and all Kincardine north of the 9th concession.

7.—Tara and all Arran, not in No. 5, and all Elderslie, not in Nos. 4 and 12, and Amabel, south of the 8th concession and east of concession lettered C.

8.—The Town of Wiarton, the Township of Albemarle and that part of Amabel not in Nos. 5 and 7.

9—The Township of Huron.

10.—The Townships of Eastnor, Lindsay, and St. Edmunds.

11.—Lucknow and the Township of Kinloss.

12.—Chesley and those parts of Brant and Elderslie not included in Nos. 1, 4 and 7.

CARLETON.

D. B. McTavish, Judge, Ottawa.

R. D. Gunn, J.J., Ottawa.

J. A. Ritchie, C.C.A. and C.P., Ottawa.

1.—Comprising all the City of Ottawa and the Township of Gloucester, to lot 15, inclusive, Rideau Front, and concessions 1 and 6, inclusive, Ottawa Front and the islands in the Ottawa River opposite thereto.

2.—The Township of Goulbourne, the 8th, 9th and 10th concessions of the Township of Marlborough, all the Township of Nepean south of the River Goodwood, and the 4th, 5th and 6th concessions thereof north of the same river to the boundary line between lots 20 and 21 in the last-mentioned concession.

3.—The Township of Huntley and the Township of March, except lots 1 to 5, inclusive, in concessions 1, 2, 3 and 4 thereof.

4.—The Townships of Fitzroy and Torbolton.

5.—The Township of North Gower, Long Island in the Rideau River, and 1st, 2nd, 3rd, 4th, 5th, 6th and 7th concessions of Marlborough.

6.—The Township of Osgoode, the 6th, 7th and 8th concessions Ottawa Front, and from lots 16 to 30, inclusive, of Rideau Front of the Township of Gloucester.

7.—The Township of Nepean, except the City of Ottawa, and part of the said Township lying south of the River Goodwood and concessions 4, 5 and 6, north of the River Goodwood to the boundary between lots 20 and 21 in the said last-mentioned concessions, and, including also lots 1 to 5, inclusive, in concession 1, 2, 3 and 4, in the Township of March.

DUFFERIN.

T. A. M. McCarthy, Judge, Orangeville.

W. J. L. McKay, C.C.A. and C.P., Orangeville.

1.—The Town of Orangeville, the Township of East Garafraxa and all that portion of the Township of Amaranth lying south of the southern boundary of lot No. 26, in each concession in the Township of Amaranth.

2.—The Village of Shelburne, the Township of Melancthon, and all that portion of the Township of Amaranth lying north of the southern boundary of lot number 26, in each concession of the Township of Amaranth.

3.—The Township of Mulmur.

4.—The Township of Mono.

5.—The Township of East Luther.

ELGIN.

C. W. Colter, Judge, St. Thomas.

C. O. Z. Ermatinger, J.J., St. Thomas.

A. McCrimmon, C.C.A. and C.P., St. Thomas.

1.—The Townships of Bayham, Malahide and South Dorchester.

2.—The Townships of Southwold and Yarmouth (except the City of St. Thomas).

3.—The City of St. Thomas.

4.—The Townships of Aldborough and Dunwich.

ESSEX.

M. A. McHugh, Judge, Sandwich.

G. Smith, J.J., Sandwich.

J. H. Rodd, C.C.A. and C.P., Windsor.

1.—Town of Sandwich and Township of Sandwich East.

2.—Town of Amherstburg and the Townships of Alden and Anderdon.

3.—The Village of Kingsville, and all that part of the Township of Gosfield not included in Division No. 8.

4.—The Township of Colchester South, and all Colchester North south of the 9th concession, exclusive of the said concession, and the lots on both sides of Maiden Street.

5.—Township of Mersea and Village of Leamington.

6.—The Township of Rochester, the Village of Belle River, the first concession of the Township of Maidstone, and all north of the Middle Road in the said Township of Maidstone.

7.—Town of Windsor, the Town of Walkerville, and all of Sandwich East north of the Talbot Street range.

8.—The Town of Essex, and all of the Township of Maidstone lying west of the first concession and south of the Middle Road; so much of Sandwich East as is south of Talbot Street, including the lots on both sides of said street to Nos. 306 and 307; all of Colchester north of the 9th concession, including said concession and lots on both sides of Maiden Street, and all that part of Gosfield lying north of concession 6, and extending as far east from the limits between Gosfield and Colchester as lots No. 12, including such lot in each concession north of concession 6, inclusive.

9.—The Townships of Tilbury West and Tilbury North.

10.—The Township of Pelee.

FRONTENAC.

C. V. Price, Judge, Kingston.

J. L. Whiting, C.C.A. and C.P., Kingston.

1.—City of Kingston, Township of Garden Island, Wolfe Island, Howe Island, and part of the Township of Pittsburg.

2.—Cataraqui, the Township of Kingston and the Village of Portsmouth.

3.—Loughboro', the Townships of Loughboro' and Bedford.

4.—Verona, Townships of Portland and Hinchinbrooke.

5.—Sudbury, the Township of Storrington and part of the Township of Pittsburg.

6.—The Townships of Olden, Oso, Barrie, Clarendon, Palmerston, Miller, Canonto, and South Canonto.

7.—The Township of Kennebec.

GREY.

C. T. Sutherland, Judge, Owen Sound.

C. H. Widdifield, J. J., Owen Sound.

J. Armstrong, C.C.A. and C.P., Owen Sound.

1.—The Town of Owen Sound, the Village of Brooke and the Townships of Derby, Keppel, Sarawak and Sydenham.

2.—The Town of Durham, the Township of Egremont, and those portions of the Townships of Bentinck, Normanby and Glenelg as follows:—That part of the Township of Bentinck lying east of the line between lots 30 and 31 in the 1st, 2nd and 3rd concessions south of the Durham Road, and in concessions 1, 2 and 3 north of the Durham Road, and east of the line between lots 15 and 16 in concessions 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 thereof. That part of the Township of Normanby lying east of the line between lots 20 and 21, in the 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th and 18th concessions, and all of the Township of Glenelg, excepting that portion lying east of the line between lots 10 and 11 in the 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th and 15th concessions thereof.

3.—The Town of Meaford, the Township of St. Vincent, and that part of the Township of Euphrasia, lying west of the line between the 6th and 7th concessions and north of the line between lots 15 and 16.

4.—The Township of Collingwood and the east half of the Township of Euphrasia, excepting that part thereof lying between the 4th and 5th concessions and south of the lots between 12 and 13, and east half of the Township of Osprey.

5.—The Township of Proton, the west half of the Township of Osprey, and those parts of the Township of Artemesia consisting of the ranges of lots lying parallel to the Toronto and Sydenham Road, and south of the line between lots 130 and 131, and concessions 1, 2 and 3, south of the Durham Road, and 1, 2, 3, 4, 5 and 6 north of the said Durham Road, and those portions of concessions 7, 8 and 9 lying east of the ranges of lots parallel with the Toronto and Sydenham Road, and those portions of concessions 10, 11, 12, 13 and 14 lying east of the line between lots 30 and 31.

6.—The Township of Sullivan and the Township of Holland, excepting those portions of concessions 9, 10, 11 and 12 lying south of the line between lots 15 and 16, and those portions of concessions 7 and 8 west of the ranges of lots lying parallel with the Toronto and Sydenham Road, and the ranges of lots lying parallel with the Toronto and Sydenham Road and south of the line between lots 50 and 51.

7.—All the lots from 1 to 30, inclusive, in the three concessions south and the three concessions north of the Durham Road in the said Township of Bentinck, and all the lots from 1 to 15, inclusive, in the 12th concession, from the 4th to the 15th concessions, inclusive, of the said Township of Bentinck, and all the lots from 1 to 20, inclusive, in all the concessions from 4 to 18, inclusive, in the Township of Normanby aforesaid.

8.—All the lots from 51 to 130, inclusive, in all the concessions parallel to and being northeast and southwest of the Toronto and Sydenham Road, in the Townships of Artemesia, Glenelg and Holland aforesaid; all lots to the westward of the dividing line between lots 30 and 31, in all the concessions from 10 to 14, inclusive, and all the lots from 1 to 5 in the 7th, 8th and 9th concessions, inclusive, which lie to the southwest of the third concession, southwest of the said Toronto and Sydenham Road, in the said Township of Artemesia; all the lots from 1 to 15, inclusive, in concessions 5 and 6, and all the lots from 1 to 15, inclusive, in the concessions from 7 to 12, inclusive, in the Township of Euphrasia; all lots south of the allowance for road between lots 15 and 16, in the 9th, 10th, 11th, and 12th concessions, and from lots 25 to 30, inclusive, on the 7th concession, and lots 28, 29 and 30 in the 8th concession of the said Township of Holland; and all the lots lying east of allowance for road between lots 10 and 11 in all the concessions from 7 to 15, inclusive, in the Township of Glenelg.

HALDIMAND.

G. B. Douglas, Judge, Cayuga.

J. A. Murphy, C.C.A. and C.P., Cayuga.

1.—Comprising the Township of Seneca except the first and second concessions, the Young Tract, and the property of the late Richard Martin and the late Robert Weir; all of the Township of Oneida, except the first range north of the Cayuga line, the Dennis Tract, and the lots southerly of the said tract, and the Village of Caledonia.

2.—Comprising the Township of North Cayuga, except that portion thereof lying northeast of the side line between lots 12 and 13, and 1st and 2nd concessions of the Township of Seneca, except that portion thereof lying northeast of the side line between lots 12 and 13, the Young Tract, and the lands of the late Robert Weir and Richard Martin, Esquires, in the said Township of Seneca, the first range of Oneida north of the Cayuga line, also the Dennis Tract and river lots lying south, and the Townships of Rainham and South Cayuga.

3.—Comprising the Townships of Moulton, Sherbrooke and Dunn, and the Town of Dunnville.

4.—Comprising the Township of Walpole, and the Village of Hagersville.

5.—Comprising the Township of Canboro', that portion of North Cayuga lying east of the side line between lots 12 and 13, and those parts of the 1st and 2nd concessions of the Township of Seneca lying northeast of the side line between lots 12 and 13.

COUNTY OF HALIBURTON.

(Annexed to Victoria for Judicial Purposes.)

J. E. Harding, Judge, Lindsay.
H. McMillan, J.J.
A. P. Devlin, C.P. and C.C.A., Lindsay.

1.—The Townships of Glamorgan and Snowden, except that portion of both included in the third division, and all of the Townships of Snowden, Lutterworth, Minden, Anson, Stanhope, Hindon.

2.—The Townships of Dysart, Guilford, Harburn, Dudley, Harcourt and Bruton, and that portion of Monmouth not included in the third division.

3.—All the rest of the territory comprising Township of Monmouth (except lots 1 and 19, inclusive) in 13th, 14th, 15th, 16th and 17th concessions; the south 12 concessions of the Township of Glamorgan, and from lot 21, inclusive, to the eastern boundary in the south six concessions of Snowden.

4.—The Townships of Shelbourne, McClintock, Livingstone, Lawrence, Nightingale, Havelock, Eyre and Clyde.

HALTON.

T. A. Gorham, Judge, Milton.
W. I. Dick, C.C.A. and C.P., Milton.

1.—All the territory comprised in the new survey of the Township of Trafalgar, and the first ten lots in concessions 1, 2, 3, 4, 5 and 6 in the Township of Esquesing, and the first five lots in concessions 7, 8, 9, 10 and 11 in the said township.

2.—That part of the Township of Trafalgar known as the Old Survey.

3.—All the rest of the territory comprised in concessions 8, 9, 10 and 11 in the Township of Esquesing not comprised in the first division.

4.—All the rest of the territory comprised in concessions 1, 2, 3, 4, 5 and 6, Township of Esquesing.

5.—The Township of Nassegaweya.

6.—The Township of Nelson.

HASTINGS.

G. E. Deroche, Judge, Belleville.
E. B. Fralick, J.J., Belleville.
P. J. M. Anderson, C.C.A. and C.P., Belleville.

1.—To comprise the City of Belleville and the Township of Thurlow; also all that portion of the Township of Sidney lying south of the 8th concession and east of the line between lots 18 and 19.

2.—Comprising the Townships of Wollaston, Limerick and Cashel, and the six northerly concessions of the Townships of Tudor and Grimsthorpe, and all those parts of the Township of Lake, in all the concessions thereof lying north of lots 21 in said concessions, all in the County of Hastings.

3.—The Township of Tyendinaga, except that part called Deseronto.

4.—The Township of Hungerford.

5.—All that part of the Township of Sidney which lies to the north of the 8th concession, and to the east of lot No. 6, in each concession north of the 8th concession, and all that part of the Township of Rawdon which lies to the south of the 9th concession, and that part of the Township of Huntingdon south of the 5th concession; also Block A and lots 1, 2, 3, 4, 5 and 6, in the 8th and 9th concessions of the Township of Sydney heretofore forming part of the 2nd division, together with all that portion of the Township of Sidney lying north of the 7th concession, and east of the line between lots 6 and 7.

6.—The Township and Village of Madoc, all that part of the Township of Huntingdon north of the 6th concession of said township, and all of the Townships of Tudor and Grimsthorpe, except the northerly six concessions of each of the said townships.

7.—The Village of Deseronto.

9.—The Town of Trenton, and all that part of the Township of Sidney which lies to the west of lot 7 in each of the concessions of the township, including Mill Island. Also, all of said Township of Sidney lying south of the 8th concession and west of the line between 18 and 19, and east of the line between lots 6 and 7.

10.—The Township of Marmora, that part of the Township of Lake lying south of lots 22 in all the concessions thereof, and all that part of the Township of Rawdon which lies north of the 8th concession thereof.

11.—The Townships of Herschell, Monteagle, Carlow, Bangor, Wicklow and McClure.

12.—The Townships of Faraday, Dungannon and Mayo, and the Village of Bancroft.

HURON.

B. L. Boyle, Judge, Goderich.

Philip Holt, J.J., Goderich.

Chas. Seager, C.C.A. and C.P., Goderich.

1.—Comprising the Town of Goderich, that part of the Township of Goderich to the north of the Cut Line and the Huron Road until the same meets the road allowance between the 13th and 14th concessions, then back along the Huron Road to its junction with the Cut Line, then west by the road allowance between concessions 11 and 12 to the River Maitland, then along the River Maitland to Goderich, together with the Township of Colborne.

2.—Comprising the Township of McKillop, the Town of Seaforth, and all that portion of the Township of Tuckersmith not included in the third division.

3.—Comprising all that portion of the Township of Hullett south of the blind line between the 7th and 8th concessions, of the Township of Hullett, that part of the Township of Goderich not included in Nos. 1 and 7, 1st, 2nd, 3rd and 4th concessions, Township of Stanley 1st and 2nd concessions, Township of Tuckersmith, L.R.S., north of lot 15, and that portion west of side road between lots 25 and 26, H.R.S., and Town of Clinton.

4.—Comprising the Township of Grey, all of the Township of Morris east of side road between lots Nos. 10 and 11 (which is not included in No. 12), and the Village of Brussels.

5.—Comprising the Townships of Usborne and the Village of Exeter.

6.—Comprising the Townships of Ashfield and all West Wawanosh, except that portion east of Maitland River.

7.—Comprising the Township of Goderich, south of Cut Line and Huron Road until the same joins the road between the 12th and 14th concessions of the Township of Goderich; thence along the said concessions until the same joins the River Bayfield, all Stanley not included in No. 3 and the Village of Bayfield.

8.—Comprising the Village of Wingham, the Township of Turnbury, all that part of East Wawanosh not included in No. 12, and all of the Township of Morris not included in Nos. 4 and 12.

9.—Comprising the Township of Howick and the Village of Wroxeter.

10.—Comprising the Township of Hay.

11.—Comprising the Township of Stephen.

12.—Commencing at the northeast angle of the Township of Hullett, thence southerly along the easterly boundary of the said Township of Hullett to the blind line between the 7th and 8th concessions of said township, thence westerly along said line to the western boundary of the township, thence northerly along the westerly boundary of the township to the Maitland River at the southeastern corner of the Maitland Block, thence along the said river northerly till the western boundary of East Wawanosh is reached, thence northerly along said westerly boundary to the road running between the 6th and 7th concessions of said Township of East Wawanosh, thence easterly along said road to the easterly limit of said township, thence northerly along the gravel road to the road running between the 5th and 6th concessions of the Township of Morris, thence easterly along said road to the line between lots 10 and 11, thence southerly along said line between the 6th and 7th concessions, thence easterly along said line to the line between lots 15 and 19, thence southerly to the boundary line between the Townships of Morris and Hullett, thence easterly to the place of beginning, including the Village of Blyth.

DISTRICT OF KENORA.

T. W. Chapple, Judge, Kenora.

J. F. MacGillivray, C. Atty. and C.P., Kenora.

1.—Comprising all that portion of the said District of Kenora lying west of the Seventh Meridian Line, including the Towns of Kenora and Keewatin.

2.—Comprising all that portion of the said District lying east of the eastern boundary of the said Third Division, including the Municipality of Ignace.

3.—Comprising all that portion of the said District lying between the said Seventh Meridian Line and a line drawn parallel with the western boundary of lot 10 in the Township of Zealand and extending northward to the northern boundary of the said District and southward to the southern boundary thereof—including the Town of Dryden.

KENT.

Archibald Bell, Judge, Chatham.

John L. Dowlin, J.J., Chatham.

H. D. Smith, C.C.A. and C.P., Chatham.

1.—The First Division to consist of the Town of Chatham and that part of the Townships of Dover East and West to the south of the 12th and 13th concession line of the Township of Dover East, and that part of the Township of Chatham south of the 12th and 13th concession line, and west of the side roads between lots 12 and 13, from the first mentioned 12th and 13th concession line to the 5th and 6th concession line, and all south of the said 5th and 6th concession line of said township; that part of the Township of Harwich north of 5th and 6th concession line, by the easterly boundary; that part of the Township of Raleigh north of the 16th concession to the west side road between lots 12 and 13 north to the 6th and 7th concession line, and all of the said township north of the said last-mentioned line, and that part of the Township of Tilbury East north of the 4th concession.

2.—The Second Division to consist of that portion of Township of Howard south of the 2nd and 3rd concession line by the eastern boundary (known as the

Botany Road), and that part of the Township of Orford south of the 10th and 11th concession line of said township.

3.—The Third Division to consist of all that part of the Gore of Camden lying west of the 10th and 11th concession line, and that part of the Township of Camden lying west of the side line between lots 6 and 1; the Village of Dresden, and that part of the Township of Chatham north of the 5th and 6th concession line and east of the side roads between lots 12 and 13.

4.—The Fourth Division to consist of that part of the Township of Harwich south of the 5th concession of the eastern boundary, and south of the 3rd concession by the western boundary, and that part of Raleigh south of the 15th concession and east of the side road between lots 12 and 13 and the road to the shore through lot 146 on the Talbot Road.

5.—The Fifth Division to consist of the Village of Wallaceburg, the Gore of Chatham and that part of the Township of Chatham northwest of the 12th and 13th concession line, and west of the said roads between lots 12 and 13, and that part of Dover East lying north of the 12th and 13th concession side road.

6.—The Sixth Division to consist of that part of the Township of Howard north of the Botany Road aforesaid, and that part of the Township of Oxford north of the 10th and 11th concession line, the Township of Rone, the Township of Bothwell, the Village of Thamesville, and that part of the Gore of Camden east of the 10th and 11th concession line, and that part of the Township of Camden east of the side line between lots 6 and 7.

7.—The Seventh Division to consist of that part of Tilbury East south of the 3rd concession, the Township of Romney, and that part of the Township of Raleigh south of the 6th and 7th concession line, and west of the side road between lots 12 and 13, in the said township, and the road through lot 147 on Talbot Road.

LAMBTON.

D. F. McWatt, Judge, Sarnia.

A. E. Taylor, J.J., Sarnia.

J. P. Bucke, C.C.A. and C.P., Sarnia.

1.—The external boundaries of the Township of Sarnia and the Town of Sarnia.

2.—The external boundaries of the Township of Warwick, including that portion of the Village of Arkona south of the township line.

3.—The external boundaries of the Townships of Euphemia and Dawn.

4.—The external boundaries of the Township of Sombra.

5.—The external boundaires of the Township of Plympton.

6.—The external boundaries of the Township of Bosanquet, including that portion of the Village of Arkona north of the township line.

7.—The external boundaries of the Township of Moore.

8.—The external boundaries of the Township of Enniskillen.

9.—The external boundaries of the Township of Brock.

LANARK.

W. S. Senkler, Judge, Perth.

E. G. Malloch, C.C.A. and C.P., Perth.

1.—The Town of Perth, and the Townships of Drummond, Bathurst, South Sherbrooke, Burgess North, and that part of the Township of Elmsley North, north of the Rideau River, within the County of Lanark, and west of lot No. 12 in each concession. The sittings of said court to be held in the Town of Perth.

2.—The Second Division to consist of the Village of Lanark, and the Townships of Lanark, Dalhousie, Darling, Lavant and North Sherbrooke. The sittings of said court to be held at the Village of Lanark.

3.—The Third Division to consist of the Town of Carleton Place and the Township of Beckwith, and the first six lots in the first seven concessions of Township of Ramsay. The sittings of said court to be held in the Town of Carleton Place.

4.—The Township of Montague, the Town of Smith's Falls, and that part of the Township of North Elmsley, from lot No. 1 to lot No. 12, in each concession, both inclusive, not within the limits of the Town of Smith's Falls. Sittings at Smith's Falls.

5.—The Township of Pakenham, the Town of Almonte, and the Township of Ramsay, with the exception of the first six lots in the first seven concessions of the said township. Sittings at Almonte.

LEEDS AND GRENVILLE.

H. S. McDonald, Judge, Brockville.
E. J. Reynolds, J.J., Brockville.
M. M. Brown, C.C.A. and C.P., Brockville.

1.—To consist of the 1st, 2nd, 3rd, 4th, 5th, 6th and 7th concessions and broken front of the Township of Elizabethtown, and the concession roads between them.

2.—To consist of the 1st, 2nd, 3rd, 4th and 5th concession, and broken front and that part of the 6th, 7th and 8th concessions from the town line of Edwardsburg to lot No. 18, inclusive, of the Township of Augusta, and the concession roads between them.

3.—To consist of the 1st, 2nd, 3rd, 4th and 5th concessions and broken front of the Townships of Leeds and Lansdowne, respectively, and the concession roads between them.

4.—To consist of the Township of South Gower, the Township of Oxford from the west side line of lots No. 11 in all the concessions of the eastern boundary of the township, and the gore of land between South Gower, Oxford and Edwardsburg.

5.—To consist of the Township of Wolford (except the 7th and 8th concessions and the allowances of roads within and between them); lots Nos. 1 to 10, inclusive, in the 2nd, 3rd, 4th, 5th, 6th, 7th and 8th concessions of the Township of Oxford, and allowances of roads within and between them.

6.—To consist of the Townships of Bastard and Burgess, and those parts of the Townships of Leeds and Lansdowne, on the north side of the rear of the 5th concession in each respectively.

7.—To consist of the Townships of Kitley and Elmsley.

8.—To consist of the Townships of North Crosby and South Crosby.

9.—To consist of that part of the Townships of Escott and Yonge, in rear of the 4th concession of Yonge, and in rear of the 6th concession of Escott; that part of the Township of Elizabethtown, in rear of the 7th concession of and west of lot No. 18 in the 8th, 9th, 10th and 11th concessions, and the allowances for roads embraced therein.

10.—To consist of the Township of Edwardsburg.

11.—To consist of that part of the Township of Augusta in rear of the 5th concession and west of lot No. 18 in the 6th, 7th and 8th concessions; the whole of the 9th and 10th concessions of the Township of Augusta; the Gore between the

Townships of Oxford, Wolford and Augusta; that part of the Township of Elizabethtown in rear of the 7th concession, and east of the commons, between lots No. 18 and 19 in the 8th, 9th and 10th concession; the 7th and 8th concessions of the Township of Wolford; lots No. 1 to 10, inclusive, in the 9th and 10th concessions of the Township of Oxford; and the allowance for roads embraced therein.

12.—To consist of the 1st, 2nd, 3rd and 4th concessions and broken front of the Township of Yonge; the 1st, 2nd, 3rd, 4th, 5th and 6th concessions and broken front of the Township of Escott, and the allowances for roads embraced therein.

The said 1st, 2nd and 12th divisions shall respectively embrace and comprehend within their lines those portions of the River St. Lawrence and islands therein, within the exterior lines of which such portions of said river and islands would lie and be, if such exterior side lines were produced and extended in that direction to the utmost limits of the Province.

LENNOX AND ADDINGTON.

Jas. H. Madden, Judge, Napanee.

H. M. Deroche, C.C.A. and C.P., Napanee.

1.—The Town of Napanee, Township of Richmond, all that part of North Fredericksburg and Adolphustown lying north of Hay Bay, and all that part of North Fredericksburg lying north of Big Creek.

2.—Comprises 1st concession of Ernestown, the Village of Bath, the Township of Amherst Island, and the 2nd, 3rd and 4th concessions of the said Township of Ernestown, from the west limits thereof to the west limit of lot No. 21 in each concession.

3.—Township of South Fredericksburg and all that part of North Fredericksburg and Adolphustown not included in Division No. 1.

4.—1st, 2nd and 3rd concessions of the Township of Camden and the Village of Newburg.

5.—All that part of the Township of Camden not included in Division No. 4.

6.—All that portion of the Township of Ernestown not included in the limits of Division No. 2.

7.—Township of Sheffield.

8.—Townships of Kaladar, Anglesea and Effingham.

9.—Townships of Abinger, Ashby and Denbigh.

LINCOLN.

R. B. Carman, Judge, St. Catharines.

M. Brennan, C.C.A. and C.P., St. Catharines.

1.—The Town and Township of Niagara.

2.—The Township of Grantham (including the City of St. Catharines), the Villages of Merritton and Port Dalhousie and the Township of Louth.

3.—The Townships of Caistor and Gainsborough and the 9th concession of the Township of Grimsby, including the 1st and 2nd ranges as part of the said concession.

4.—The Village of Beamsville and the Township of Clinton.

5.—The Village of Grimsby, the Township of North Grimsby, and the Township of South Grimsby, except that portion included in the Third Division.

DISTRICT OF MANITOULIN.

C. E. Hewson, Judge, Gore Bay.

A. G. Murray. C.A., and C.P., Gore Bay.

1.—The Town of Gore Bay, the Townships of Gordon, Allan, Campbell, Mills, Burpee, Robinson, Dawson, The Islands, Barrie, Clapperton and the Duck Islands, and that part of the Township of Billings lying west of the road allowance between lots 15 and 16 in the several concessions thereof, and so much of the Township of Carnarvon as lies west of Lake Mindemoya and north of the line between the 6th and 7th concessions thereof.

2.—The Town of Little Current, the Township of Howland and those parts of the Townships of Sheguindah and Bidwell lying north of the line between the 6th and 7th concessions of Sheguindah and the 4th and 7th concessions of the Township of Bidwell, and the 6th and 7th concessions of the line between lots 17 and 18 in the Township of Billings, and the adjacent islands lying north and east of the said Townships, except the Clapperton Island.

3.—Manitowaning, the Townships of Assiginack, Tehkummah and Sandfield, and those parts of the Township of Sheguindah lying south of the line between the 4th and 5th concessions of the Township of Bidwell and the 6th and 7th concessions of the Township of Billings to the line between lots 17 and 18 of said township, and the Township of Carnarvon, except so much of the same as lies west of Mindemoya Lake, and all the part of Manitoulin lying east of the Township of Assiginack, Manitowaning and South Bays and the islands adjacent thereto.

4.—Cockburn Island.

MIDDLESEX.

Talbot Macbeth, Judge, London.

Edward Elliott, J.J., London.

J. B. McKillop, C.C.A., and C.P., London.

1.—That part of the City of London lying to the west of Maitland street with that portion of the Township of London lying south of the line between the 4th and 5th concessions and west of the said street, produced northerly on a line in the same direction to the line between the said 4th and 5th concessions, and with that portion of the Township of Westminster lying west of the main road leading south from Clark's Bridge, across the Thames, south to the line between the 1st and 2nd concessions, and westerly to the line between lots 42 and 43, and extending northerly to the River Thames, and also including the Village of London West.

2.—The Villages of Parkhill and Ailsa Craig, the Townships of East Williams and West Williams, and that portion of the Township of Lobo lying north of the line between the 11th and 12th concessions, and east of the lines between lots Nos 12 and 13.

3.—The Townships of McGillivray and Biddulph and the Village of Lucan.

4.—The Township of Delaware, with that portion of the Township of Westminster west of the line between lots 30 and 31 in the 2nd concession, then southerly on the line between lots 20 and 21 to the southerly limit of the township, including all west of said line, and also including all that portion of the front of said Township of Westminster lying west of the line between lots Nos. 42 and 43, not included in the first division, with that portion of the Township of Caradoc lying south of the line between the 5th and 6th concessions to the River Thames, and with that portion of the Township of Lobo lying south of the line between the 6th and 7th concessions, to the River Thames.

5.—The Township of Ekfrid and Mosa, including the Villages of Wardsville, Newbury and Glencoe.

6.—Townships of Adelaide and Metcalfe, the Town of Strathroy, with that portion of the Township of Caradoc lying north of the line between the 3rd and 4th concessions, with that portion of the Township of Lobo which lies north of the 6th concession and west of the line between lots 12 and 13 of the said township.

7.—The Township of North Dorchester, north and south of the River Thames, that portion of the Township of West Nissouri which lies south of the line between lots 14 and 15, and with that portion of the Township of Westminster lying south of the line between the 1st and 2nd concessions and east of the line between lots 30 and 31 in the 2nd concession and thence east of the line between lots 20 and 21, continued south to the southerly limit of the said Township of Westminster.

8.—All that portion of the Township of London which lies north of the line between the 4th and 5th concessions, that portion of the Township of Lobo which lies north of the line between the 6th and 7th concessions, and east of the line between lots 12 and 13 to the line between the 11th and 12th concessions and with all that portion of the Township of West Nissouri which lies north of the line between lots 14 and 15.

9.—All that part of the City of London lying east of Maitland Street; that part of the Township of London, lying north of the line between the 4th and 5th concessions and east to the said street, produced northerly or in a line in the same direction to the line between the said 4th and 5th concessions and that part of the Township of Westminster lying north of the line between the 1st and 2nd concessions, and east of the main road leading south from Clarke's Bridge across the Thames.

DISTRICT OF MUSKOKA.

W. C. Mahaffy, Judge, Bracebridge.

Thomas Johnson, C.A., and C.P., Bracebridge.

1.—The Town of Bracebridge and the Townships of Macauley, McLean, Ridout, Monck and Cardwell, concessions 1, 2, 3, 4, 5, 6, 7, 8 and 9 in the Townships of Stephenson, Brunel and Franklin and that part of the Township of Watt situated east of lot 21, in the several concessions thereof and concessions 7, 8, 9, 10, 11, 12 and 13 in the Townships of Muskoka and Draper.

2.—The Town of Gravenhurst, the Townships of Morrison, Ryde, Wood, Oakley and Baxter, and concessions 1, 2, 3, 4, 5 and 6 of the Townships of Muskoka and Draper.

3.—The Town of Huntsville, the Townships of Stisted, Chaffey and Sinclair, and concessions 10, 11, 12, 13 and 14 in the Townships of Stephenson, Brunel and Franklin.

4.—The Village of Port Carling and the Townships of Freeman, Gibson and Medora and that part of the Township of Watt situated on the west of lot 21 in in the several concessions thereof.

DISTRICT OF NIPISSING.

Jos. A. Valin, Judge, North Bay.

H. D. Leask, J.J., North Bay.

T. E. McKee, C.A., and C.P., North Bay.

1.—To be composed of the Townships of Springer, Field, Badgerow, Caldwell, and all that part of the District of Nipissing which is situated west of the line between the Indian Reserve and the Township of Widdifield, produced south to the boundary of the said District, and north to the north-east boundary of the Township of Gooderham, and south of the said line marking the northern boundary of the said Township of Gooderham and its production to the North-western boundary of the Township of Pardo.

Sittings of the Court, Sturgeon Falls.

2.—To be composed of the Townships of Mattawan, Olrig, Calvin, Papineau, Lauder, Pentland, Boyd, Osler, McLaughlin, Canisby, Sabine, Lyell, Airy, Murchison, and Robinson, and all that part of the District of Nipissing situated east of the line between the Townships of Bonfield and Calvin, produced south to the provisional County of Haliburton and east of the line between the Townships of Phelps and Olrig, produced north to the Ottawa River.

Sittings of the Court, Mattawa.

3.—To be composed of the Townships of Widdifield, Merrick, Mulock, Phelps, Ferris, Chisholm, Ballantyne, Wilkes, Biggar, Paxton, Butt, Devine, Hunter, McCraney, Finlayson, Peck, and all that part of the District of Nipissing situated west of the line between the Townships of Phelps and Olrig, produced north to the Ottawa River, thence along the Ottawa River to the north-east angle of the Township of Wyse, thence along the line marking the northern boundary of the said Township of Wyse, produced westerly to the eastern boundary of the First Division, thence south along the eastern boundary of the First Division to the southern boundary of the District.

Sittings of the Court, North Bay.

4.—To be composed of so much of the District as lies south of the southern boundary of the Townships of Langmuir, Blackstock, and Timmins, produced easterly to a point which shall meet the line between the Townships of Eby and Otto, produced northerly and west of the line between the Townships of Eby and Otto, produced north to a point where the line of production of the south boundary of the Townships of Langmuir, Blackstock and Timmins, and produced southerly to the northern boundary of the Township of Hobbs.

Sittings of the Court, Elk Lake City.

5.—To be composed of the Townships of Bonfield and Boulter.

Sittings of the Court, Town of Bonfield.

6.—To be composed of that part of the District that lies north of the northern boundary of the Townships of Cane, Henwood, Kerns, Harley, and Casey, and east of the boundary line between the Townships of Tudhope and Bryce, produced northerly to the production easterly of the southerly boundary of the Township of Timmins.

Sittings of Court, Englehart.

7.—To be composed of that portion of the District lying south of the northerly boundary of the Townships of Klock, Barr, Firstbrook, and Bucke, and east of the line between the Townships of Van Nostrand and Klock, produced southerly to the northern boundary of the Township of Hobbs.

Sittings of the Court, Haileybury and Cobalt, alternately.

8.—To be composed of that portion of the District lying north of the southerly boundary of the Townships of Langmuir, Blackstock, and Timmins and produced easterly to the eastern boundary of the District.

Sittings of the Court, Cochrane.

9.—To be composed of the Townships of Cane, Henwood, Kerns, Harley, Casey, Auld, Lundy, Hudson, Dymond, Harris and the Town of New Liskeard.

Sittings of the Court, New Liskeard.

NORFOLK.

James Robb, Judge, Simcoe.

T. R. Slaght, C.C.A. and C.P., Simcoe.

1.—The Town of Simcoe, the Gore of the Township of Woodhouse and all that part of said Township lying west of the side line between lots 5 and 6, together with that part of the 4th, 5th and 6th concessions lying west of the said line between lots 12 and 13.

2.—The Township of Townsend and the Village of Waterford.

3.—The Township of Windham.

4.—The Township of Middleton and the Village of Delhi.

5.—The Township of Charlotteville.

6.—The Townships of North Walsingham, South Walsingham and the Village of Port Rowan.

7.—The Township of Houghton.

8.—The Village of Port Dover, and that part of the Township of Woodhouse not included in Division 1, viz.: all that part of the 1st, 2nd and 3rd concession lying east of the side line between lots 5 and 6, and that part of the 4th, 5th and 6th concessions lying east of the said line, between lots 12 and 13 in said township.

NORTHUMBERLAND AND DURHAM.

T. M. Benson, Judge, Cobourg.

G. M. Roger, J.J., Cobourg.

W. F. Kerr, C.C.A. and C.P., Cobourg.

1.—Townships of Cartwright and Darlington and the Town of Bowmanville.

2.—Township of Clarke and Village of Newcastle.

3.—Township of Hope and Town of Port Hope.

4.—Townships of Cavan, Manvers, South Monaghan and Village of Millbrook.

5.—Township of Hamilton and Town of Cobourg.

6.—Townships of Haldimand and Alnwick.

7.—Township of Cramahe and Village of Colborne.

8.—Township of Brighton and Village of Brighton.

9.—Township of Percy and Village of Hastings.

10.—Township of Murray.

11.—Township of Seymour and Village of Campbellford.

ONTARIO.

————, Judge, Whitby.

D. J. McIntyre, J.J., Whitby.

J. E. Farewell, C.C.A. and C.P., Whitby.

1.—Including the Townships of Whitby and East Whitby and the Towns of Whitby and Oshawa.

2.—The Township of Pickering.

3.—The Townships of Reach and Scugog and the Village of Port Perry.

4.—The Townships of Uxbridge and Scott and the Town of Uxbridge.

5.—The Township of Brock and the Village of Cannington.

6.—The Township of Thorah and all that part of the Township of Mara lying south of the line between the 4th and 5th concessions.

7.—All that part of the Township of Mara lying north of the line between the 4th and 5th concessions thereof, and the Township of Rama.

OXFORD.

Alex. Finkle, Judge, Woodstock.
F. R. Ball, C.P., Woodstock.
R. N. Ball, C.C.A., Woodstock.

1.—Comprising the City of Woodstock, the Township of East Oxford, and that part of the Township of East Zorra, lying south of the line between lots number twenty-five and twenty-six of the Township of Blandford, and that part of the Township of North Oxford lying east and north of the road between lots 16 and 17 to the boundary of the Township line between North and West Oxford, and that part of the Township of West Oxford lying east of the road between lots 6 and 7 to the boundary of the Township of East Oxford, and that part of the Township of Blandford lying south of the 10th concession.

2.—Comprises the Township of Blenheim.

3.—Comprises the Township of East Nissouri and West Zorra and the Village of Embro.

4.—Comprises the Townships of North Norwich and South Norwich and the Village of Norwich.

5.—Comprises the Town of Ingersoll and that part of the Township of North Oxford lying west and south of the road between lots No. 16 and 17 of the Township of West Oxford, and that part of the Township of West Oxford lying south of the road between lots 6 and 7 to the line between West Oxford and East Oxford, and those portions of the Township of Dereham being part of the 1st concession of the said Township of Dereham, west of the Middle Town Line.

6.—Comprises the Town of Tillsonburg and that part of the Township of Dereham not included in the Fifth Division.

7.—Comprising the Village of Tavistock and that part of the Township of East Zorra, north of the road between lots 25 and 26, and that part of the Township of Blandford lying north of the 10th concession of the said township.

DISTRICT OF PARRY SOUND.

P. McCurry, Judge, Parry Sound.
W. L. Haight, C.A. and C.P., Parry Sound.

1.—The Town of Parry Sound and the Townships of Foley, McDougall, Cowper and Carling, and all that portion of the district lying to the west of the east boundary of Carling, produced to the French River.

2.—The Townships of McKellar, Ferguson, Hagerman, Croft, and all that portion of the district lying between the east boundary of Ferrie and the west boundary of Ferguson, produced to the French River.

3.—The Townships of Humphrey, Christie, Monteith and Conger.

4.—Townships of McMurrich, Perry, Armour, Proudfoot and Bethune.

5.—Townships of Spence, Chapman, Ryerson and Lount.

6.—That territory bounded on the west by the western boundaries of the Townships of Pringle and Patterson, and the western boundary of the Township of Patterson, produced to the French River and Lake Nipissing; on the east by the boundary of the District of Parry Sound, and on the south by the southern boundaries of the Townships of Himsworth, Gurd and Pringle.

7.—The Townships of Machar, Laurier, Strong and Joly.

PEEL.

D. McGibbon, Judge, Brampton.

W. H. McFadden, C.C.A., and C.P., Brampton.

1.—Township of Brampton, Township of Chinguacousy and northern division of the Township of Toronto Gore.

2.—Village of Streetsville, Township of Toronto and southern division of the Township of Toronto Gore.

3.—Township of Caledon.

4.—Village of Bolton, Township of Albion.

PERTH.

J. A. Barron, Judge, Stratford.

G. G. McPherson, C.C.A., and C.P., Stratford.

1.—To consist of all that part of the Township of North Easthope west of the line between lots 25 and 26, and south of the road between the 8th and 9th concessions, and all that part of the Township of South Easthope west of the side line between lots 25 and 26; all that part of the Townships of Downie and Gore north and east of the concession line between the 10th and 11th concessions and the Oxford Road; and all the Township of Ellice from the 1st to 13th concession, inclusive.

2.—To consist of all that part of the Township of Fullarton not included in Division No. 3, and the Townships of Hibbert and Logan.

3.—To consist of that portion of the Township of Downie west of the Oxford Road, and south of the concession line between the 10th and 11th concessions; the Township of Blanshard; all that part of the Township of Fullarton comprising the 13th and 14th concessions, and south of a road leading from Mitchell Road, between lots 24 and 25, east of lot 3 in the 10th concession; thence east along the line between the 10th and 11th concessions to the town line.

4.—To consist of that part of the Township of North Easthope east of the line between lots 25 and 26, and the north of the 8th concession, inclusive, with the 9th and 10th concessions; all that part of the Township of South Easthope not included in Division 1.

5.—To consist of the Township of Mornington, and all that part of the Township of Elma from lots 13 to 72, both numbers inclusive, of the 1st concession, and from lots 27 to 16, both numbers inclusive, in and from the 2nd to the 18th concession, both concessions inclusive, of the said Township of Elma; and concessions 14, 15 and 16 of the Township of Ellice; and concessions 11, 12, 13 and 14 of the Township of North Easthope.

6.—To consist of the Township of Wallace and all that part of the Township of Elma from the 1st concession to the 18th concession, both concessions inclusive, and comprising lots Nos. 1 to 52, both inclusive, of the 1st concession, and lots Nos. 1 to 26 inclusive from the 2nd to the 18th concession, both concessions inclusive.

PETERBOROUGH.

E. C. Huycke, Judge, Peterborough.

R. E. Wood, C.C.A., and C.P., Peterborough.

1.—Shall comprise the City of Peterborough, the Townships of North Monaghan and Ennismore, all the Township of Smith lying south of the 7th concession, all that part of the Township of Otonabee lying west of the 8th concession and north of lots Nos. 21 and all that part of the Township of Douro lying south of lots numbered 11.

Court to be held at the Court House in the City of Peterborough.

2.—Shall comprise the Village of Norwood, the Township of Asphodel, and all that part of the Township of Dummer lying east of the 5th concession and that part of the said Township of Dummer lying west of the 6th concession and south of lots numbered 11. Court to be held in the Town Hall in the Village of Norwood.

3.—Shall comprise that part of the Township of Smith lying north of the 6th concession, all that part of the Township of Douro lying north of lots numbered 10, that part of the Township of Dummer lying west of the 6th concession and north of lots numbered 10, the Township of Galway, the Township of Harvey and the Village of Lakefield. Court to be held in the Town Hall in the Village of Lakefield.

4.—Shall comprise the Townships of Anstruther, Burleigh, Cavendish and Chandos. Court to be held in the Town Hall at Apsley.

5.—Shall comprise the Townships of Belmont and Methuen and the Village of Havelock. Court to be held in the Town Hall in the Village of Havelock.

6.—Shall comprise the Township of Otonabee, except that part thereof lying west of the 8th concession and north of lots numbered 21. Court to be held in the Town Hall, at Keene, in said township.

PRESCOTT AND RUSSELL.

A. Constantineau, Judge, L'Orignal.

A. Johnston, J.J., L'Orignal.

J. Maxwell, C.C.A., and C.P., L'Orignal.

1.—Comprises the whole of the Township of Longeuil, the municipality of the Village of L'Orignal, and the 1st concession of the Township of Caledonia.

2.—Comprising all that part of the Township of West Hawkesbury, extending from front of 3rd concession to the rear of the said township.

3.—Comprises the whole of the Township of East Hawkesbury.

4.—Comprising the Township of North Plantagenet, and that part of the Township of South Plantagenet lying north of the Nation River.

5.—Comprising the whole of the Township of Cumberland.

6.—Comprising the whole of the Township of Russell.

7.—Comprising the two front concessions of the Township of West Hawkesbury, and the Municipality of Hawkesbury Village, within the same.

8.—Comprising the Township of Caledonia (excepting the 1st concession of the said township), and also that portion of the Township of South Plantagenet lying south and east of the Nation River.

9.—Comprising the whole of the Township of Alfred.

10.—Comprising the whole of the Township of Clarence.

11.—Comprising the whole of the Township of Cambridge.

PRINCE EDWARD.

D. Morrison, Judge, Picton.

Jas. R. Brown, C.C.A., and C.P., Picton.

1.—The Town of Picton, the 2nd and 3rd concessions of "Military Tract" from the west line of No. 13 eastward; Gore "G"; 1st and 2nd concessions north of the Carrying Place, 1st concession southeast of the Carrying Place, and 2nd concession north of Black River, including Gores "K" and "L" and McCan Gores, all in the Township of Hallowell; Block "I" in the concession north and east of East Lake, and Gore "B" in the Township of Athol, and 1st and 2nd concessions south of the Bay of Quinte, and Gore "A" in the Township of North Marysburg, and 1st concession southwest of Green Point to the end of Carman's Point in Sophiasburg.

2.—The Township of South Marysburg, and the Southern part of Athol, commencing at the outlet of East Lake, thence down to the head of the Lake, thence down to the base line between the 1st concession south and the 1st concession north of East Lake, till it strikes the township line of Hallowell, thence down said township line till it strikes South Marysburg.

3.—The Township of Sophiasburg, together with Big Island, excepting the 1st concession southwest of Green Point to the end of Carman's Point.

4.—All that part of the Township of Ameliasburg lying east of the line between lots 86 and 87, in the 1st, 2nd, 3rd and 4th concessions of said township, including Huff's Island.

5.—That part of the Township of Hillier not included in the 7th division, also the first and 2nd concessions north of West Lake, and west of lot No. 7 in the said concession, and that part of Irwin Gore lying north and west of lot No. 7 in the 2nd concession and the west part of the 2nd concession produced west of lot No. 74 in that concession in the Township of Hallowell.

6.—Block (IV.) four, concession south side of West Lake, 1st concession "Military Tract," 2nd and 3rd concessions of said tract west of Lots No. 13, in those concessions, Gore "E," 1st and 2nd concessions north of West Lake, and east of lot No. 6 in those concessions; the Gerrow Gore and that part of Irwin Gore not included in Division No. 8, and all that part of the 2nd concession produced east of lot No. 75 in the Township of Hallowell.

7.—All that part of the Township of Ameliasburg lying west of the line between lots No. 86 and 87, in the 1st, 2nd, 3rd and 4th concessions of said township; all that part of the 4th and 5th concessions of the Township of Hillier west of the line between lots 86 and 87 and the 3rd concession west of the line between lots No. 22 and 23, with that part of the 2nd concession lying North of Pleasant Bay in the said Township of Hillier.

8.—All the point lying east of the west line of Marshland's Gore, the concession lying North of Smith's Bay and Waupoos Island in the Township of North Marysburg.

DISTRICT OF RAINY RIVER.

R. Fitch, Judge, Fort Frances.

A. D. George, C.A., and C.P., Fort Frances.

1.—To comprise all that part of the said District lying east of the east boundaries of the Townships of Aylesworth, Lash, Carpenter, Kingsford and Fleming, and east of the east boundary of the said Township of Fleming produced north to the north boundary of the said District, to be styled "The First Division Court in the District of Rainy River."

2.—To comprise all that part of the said District lying west of Division No. 1 and east of the east boundaries of the Townships of Morley, Morley Additional, Pattullo, Sifton and Dewart, and east of a line drawn north astronomically from the northeast angle of the said Township of Dewart to the north boundary of the said District, to be styled "The Second Division Court in the District of Rainy River."

3.—To comprise all that part of the said District lying west of Division No. 2, to be styled "The Third Division Court in the District of Rainy River."

RENFREW.

D. J. Donahue, Judge, Pembroke.

J. H. Barritt, C.C.A., and C.P., Pembroke.

1.—Comprising the Town of Pembroke, the Townships of Pembroke, Stafford, Alice, Petawawa, Buchan, Rolph, Wylie, McKay, Fraser, Herd, Clara and Maria, and all that part of the Township of Wilberforce from the 18th to the 25th concessions, both inclusive, and also those parts of the 14th, 15th, 16th and 17th concessions of the same Township of Wilberforce lying north of Snake River and east of Lake Dore.

2.—Comprising all that part of the Township of Westmeath lying east and north of the Muskrat Lake and River, and all those parts of the Township of Ross, from the 5th to the 9th concessions, both inclusive, east of Muskrat Lake, and from the 7th to the 13th (of the other) concessions, both inclusive, of the said Township of Ross.

3.—Comprising the Town of Renfrew and the Townships of Horton, Admaston, Bagot, Blythfield, Brougham and Matawachan, in the said County of Renfrew.

4.—Comprising the Village of Arnprior and the Township of McNab.

5.—Comprising the Townships of Grattan, Sebastopol, South Algoma, North Algoma, and all that part of the Township of Wilberforce, from the 1st to the 17th concessions, both inclusive, excepting those parts of the 14th, 15th, 16th and 17th concessions of said Township of Wilberforce lying north of Snake River and east of Lake Dore.

6.—Comprising the Township of Bromley, and all that part of the Township of Westmeath west of Muskrat Lake, and all those parts of the Township of Ross, from the 1st to the 14th concessions, both inclusive, of the said Township of Ross.

7.—Comprising the Townships of Brudenell, Radcliffe, Raglan, Lynedoch, Griffith, Hagarty, Sherwood, Jones, Richards and Burns.

SIMCOE.

J. A. Ardagh, Judge, Barrie.

E. A. Wismer, J.J., Barrie.

J. R. Cotter, C.C.A., and C.P., Barrie.

1.—Comprising the Town of Barrie, the Township of Vespra, except that portion lying west of the Nottawasaga River, and excepting also lots Nos. 38, 39 and 40, in the 1st and 2nd concessions, and lots Nos. 1, 2 and 3 in the 3rd, 4th, 5th, 6th and 7th concessions respectively. That portion of the Township of Oro lying south of lots Nos. 21 in the 1st and 2nd concessions (including the ranges), and south of lots Nos. 13 in the 3rd, 4th, 5th, 6th, 7th and 8th concessions respectively; that portion of the Township of Innisfil lying east of lots Nos. 5 in the 6th, 7th and 8th concessions, and that portion lying north of the 8th concession; that portion of the Township of Essa lying north of lots Nos. 19 in the 7th, 8th, 9th, 10th and 11th concessions.

2.—The Village of Bradford, the Township of West Gwillimbury, excepting thereout lots Nos. 1, 2, 3, 4 and 5 in the 14th and 15th concessions; the Township of Innisfil, excepting that portion lying north of the 5th concession, and excepting also lots Nos. 1, 2, 3, 4, and 5 in the 1st, 2nd, 3rd, 4th and 5th concessions thereof.

3.—The Township of Tecumseh, excepting concessions 12, 13, 14 and 15; the Township of Adjala, excepting that portion lying north of lot No. 25 in the 8th concession thereof.

4.—The Town of Collingwood, the Village of Stayner, that portion of the Township of Nottawasaga lying north of lot No. 18 in the 12th concession thereof; that portion of the Township of Sunnidale lying north of the 8th concession; that portion of the Township of Floss lying west of the Nottawasaga River; the islands in Lake Huron contiguous to the Township of Nottawasaga.

5.—The Township of Floss, except that portion lying west of the Nottawasaga River; the Township of Medonte, except that portion lying east of the 10th concession and north of lots Nos. 10 in the 9th and 10th concessions respectively; that portion of the Township of Oro lying north of the southern boundaries of lots Nos. 21 in the 1st and 2nd concessions, and north of the southern boundaries of lots Nos. 13 in the 3rd, 4th, 5th, 6th, 7th and 8th concessions respectively; lots 38, 39 and 40 in the 1st and 3rd concessions, and lots Nos. 1, 2 and 3 in the 3rd, 4th, 5th, 6th and 7th concessions of the Township of Vespra.

6.—The Town of Orillia, the Township of Orillia, southern division, the Township of Orillia, northern division, except that portion lying north of lots Nos. 15 in the first seven concessions thereof; that portion of the Township of Oro lying east of the 8th concession; that portion of the Township of Medonte, being composed of lots Nos. 1 to 6 (both inclusive) in the 11th, 12th, 13th, and 14th concessions; the islands in Lake Simcoe contiguous to the townships and portions of townships above described lying wholly or for the most part opposite thereto.

7.—The Township of Nottawasaga, except that portion lying north of lot No. 18 in the 12th concession thereof; the Township of Sunnidale, except that portion lying north of the 8th concession; that portion of the Township of Vespra lying west of the Nottawasaga River; that portion of the Township of Essa lying north of lots 19 in the 1st, 2nd, 3rd, 4th, 5th and 6th concessions; that portion of the Township of Tossorontio lying north of lots Nos. 20 in each of the seven concessions thereof.

8.—The Township of Essa, except that portion lying north of lots Nos. 19 in each of the eleven concessions thereof; the Township of Tossorontio, except that portion lying north of lots No. 20 in each of the seven concessions thereof; that portion of the ownship of Innisfil, being composed of lots Nos. 1, 2, 3, 4 and 5 in the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th concessions; the 12th, 13th, 14th and 15th concessions of the Township of Tecumseh; lots Nos. 1, 2, 3, 4 and 5 in the 14th and 15th concessions of the Township of West Gwillimbury; that portion of the Township of Adjala lying north of lots Nos. 25 in the eight concessions thereof.

9.—The Town of Penetanguishene and the Village of Midland, the Township of Tiny; that portion of the Township of Tay lying west of the 8th concession; the islands in Lake Huron contiguous to the Township of Tiny, and to that part of the Township of Tay, forming part of the 9th division, and lying wholly and for the most part opposite thereto.

10.—The Township of Matchedash, that portion of the Township of Orillia, northern division, lying north of lots Nos. 15, in the first seven concessions thereof; that portion of the Township of Medonte lying north of lots Nos. 6, in the 11th, 12th, 13th and 14th concessions, and that portion lying north of lots Nos. 10, in the 9th and 10th concessions thereof; the Township of Tay, except that portion lying west of the 8th concession; the island in Lake Huron, contiguous to that portion of the Township of Tay, forming part of the 10th division, and lying wholly or for the most part opposite thereto.

Note.—Each of the said several divisions shall include all allowances for roads embraced within its external limits, and shall also extend to the centre of every allowance for road lying external and adjacent to every such division, excepting always where any such last-mentioned allowance is hereinbefore declared to belong to or form part of any particular division.

STORMONT, DUNDAS AND GLENGARRY.

J. R. O'Reilly, Judge, Cornwall.
J. W. Liddell, J.J., Cornwall.
Jas. Dingwall, C.C.A., and C.P. Cornwall.
1.—Township of Charlottenburg, in the County of Glengarry.
2.—Township of Lochiel, in the County of Glengarry.
3.—Township of Cornwall, in the County of Stormont.
4.—Township of Osnabruck, in the County of Stormont.
5.—Township of Williamsburg, in the County of Dundas.
6.—Township of Matilda, in the County of Dundas.
7.—Township of Mountain, in the County of Dundas.
8.—Township of Finch, in the County of Stormont.
9.—Township of Lancaster, in the County of Glengarry.
10.—Township of Winchester, in the County of Dundas.
11.—Township of Roxborough, in the County of Stormont.
12.—Township of Kenyon, in the County of Glengarry.

SUDBURY.

J. J. Kehoe, Judge, Sudbury.
J. H. Clary, C.A., and C.P., Sudbury

First Division Court.—That part of the District of Sudbury as follows: Commencing at the southwest angle of the township No. 82; thence on a line produced north to the northwest angle of the Township of Fairbank; thence east to the southeast angle of the Township of Rayside; thence north to the northwest angle of the Township of Creelman; thence east to the northeast angle of the same township; thence south to the southeast angle of the township, thence east to the line between the Townships of Aylmer and Mackelcan, thence south on that line to the southern boundary.

Second Division Court.—So much of the district as lies north of a line produced westerly from the southeast angle of the Township of Rayside to the west boundary of the said district, and south of the limits of the Fifth Division and including all the territory westerly to the line known as O.L.S. Speight's Meridian line.

Third Division Court.—So much of the District as lies west of a line produced north from the southwest angle of the Township Number 82, to the northwest angle of the Township of Fairbank. thence west to the boundary of the said District.

Fourth Division Court.—So much of the district as lies east of the line between the Townships of Aylmer and Mackelcan produced to the southern boundary of the said district.

Fifth Division Court.—Commencing at the southeast corner of the Township of Geikie, thence westerly to the southwest corner of the Township of Pharand, thence northerly to the southwest corner of the Township of Massey, thence westerly along P.L.S. Niven's base line to the western boundary of the District of Sudbury and comprising all the territory in the District of Sudbury north of the lines hereinbefore mentioned.

THUNDER BAY DISTRICT.

H. H. O'Leary, Judge, Port Arthur.

Jno. McKay, J.J.

W. F. Langworthy, C.A., and C.P., Port Arthur.

1.—All that part of the district lying west of the meridian of 87 degrees of west longitude, to the meridian of the most easterly part of Hunter's Island, excepting therefrom the Municipality of Neebing.

3.—Comprising the Municipality of Neebing.

VICTORIA.

J. E. Harding, Judge, Lindsay.

H. McMillan, J.J., Lindsay.

A. P. Devlin, C.C.A., and C.P., Lindsay.

1.—The first consists of the following townships and parts of townships, viz.: Of the 15th concession of the Township of Mariposa, and the Township of Eldon, except the ranges north and south of the Portage Road.

2.—All the Township of Fenelon, except that portion lying east of the Scugog River, and south of Sturgeon Lake, and the Township of Somerville.

3.—The Township of Verulam.

4.—The Township of Emily.

5.—The Town of Lindsay, Township of Ops, and that portion of the Township of Fenelon, lying east of the Scugog River, and south of Sturgeon Lake.

6.—The Township of Mariposa, except the 15th concession.

7.—The Townships of Carden and Dalton, Laxton, Digby and Longford, and the Township of Bexley, and that portion of the Township of Eldon north of Portage Road, and the range south of Portage Road.

WATERLOO.

D. Chisholm, Judge, Berlin.

W. H. Bowlby, C.C.A., and C.P., Berlin

1—All that portion of the Township of Waterloo lying north of Blockline on the west side of the Grand River and that part of the upper block of said township lying north of said township lying on the east side of the Grand River, north of lots Nos. 115, 109, 104, 86 and 95, to the Guelph Township line, including the Towns of Berlin and Waterloo.

2.—All that part of the Township of Waterloo lying south of the Blockline on the west side of the Grand River, and that part lying on the east side of the Grand River, south of the northern boundary of lots Nos. 115, 109, 104, 85 and 95, to the Guelph Township line, including the Villages of Preston and Hespeler.

3.—All that portion of the Township of North Dumfries lying east of lot No. 19 in the 7th concession, and running a course with the eastern boundary of the said lot in a northerly direction up to the 12th concession; thence along the eastern boundary of lot No. 23, in the said 12th concession, to the township line, including the Town of Galt.

4.—The Township of Wilmot, including the Village of New Hamburg.

5.—The Township of Wellesley.

6.—The Township of Woolwich.

7.—All that part of the Township of North Dumfries lying west of the eastern boundary of said lot No. 19, in the 7th concession; thence along the eastern limits of the said lot No. 19, the same course thereof, in a northerly direction to the 15th concession; thence along the westerly limit of lot No. 23, in the said 12th concession to the township line, including the Village of Ayr.

WELLAND.

George W. Wells, Judge, Welland.

T. D. Cowper, C.C.A., and C. P., Welland.

1.—The Township of Crowland; that part of the Township of Thorold lying south of the lines between lots 178 and 195, running through to Pelham; that part of Pelham lying south of the 4th concession, and that part of Humberstone lying north of the concession line, between the 4th and 5th concessions, being the whole of the 15th concession and the Town of Welland.

2.—The Township of Wainfleet.

3.—The Township of Bertie, and those parts of the Township of Humberstone not included in Nos. 1 and 6, and the Village of Fort Erie.

4.—The Township of Willoughby, the Village of Chippawa, and that part of the Township of Stamford south of the line between lots 136 and 137; easterly from the westerly limit of the township to the southeast angle of lot No. 133; thence north on the line between lots Nos. 132 and 133, to the northern boundary of the township, including the towns of Clifton and Navy Island.

5.—Those parts of the Township of Stamford, Thorold and Pelham not included in any other division, and the Town of Thorold.

6.—All the Township of Humberstone lying south of the 5th concession, and west of the side lines between lots Nos. 9 and 10, in the several other concessions thereof, and thc Village of Port Colborne.

WELLINGTON.

A. C. Chadwick, Judge, Guelph.

Joseph Jamieson, J.J., Guelph.

H. W. Peterson, C.C.A., and C.P., Guelph.

1.—The Town and Township of Guelph.

2.—The Township of Puslinch.

3.—The Township of Eramosa.

4.—The Township of Nichol, excepting the 11th and 12th concessions; the Municipality of Fergus; the first eight concessions of the Township of Garafraxa; and lots 1 to 18, both inclusive, in concessions A and B of the Township of Peel, lots 13, 14, 15, 16, 17 and 18, in concessions 18 and 19, and lots 19, 20 and 21 in the 17th concession of the Township of Peel.

5.—The Township of Erin.

6.—The Township of Pilkington, and the 11th and 12th concessions of the Township of Nichol; the Municipality of the Village of Elora, and lots Nos. 19 and upwards belonging to the 9th, 10th, 11th, 12th, 13th, 14th, 15th and 16th concessions of Peel.

7.—Concessions 1 to 16, inclusive, of the Township of Maryboro' and concessions 1 to 16, inclusive, of the Township of Peel, except lots 19, 20, 21, 22 and 23 of those concessions in that township.

8.—That part of the Township of Arthur south and southeast of lot 15, on the west side of the Owen Sound Road, in the Township of Arthur; that part of the Township of Luther from 1 to 16, both inclusive; and lots 1 to 12, both inclusive, of the 17th and 18th concessions of the Township of Peel; lots 5 to 11, both inclusive, of the 19th concession of said Township of Peel; and lots 19 to 23, both inclusive, of concessions A and B of said Township of Peel.

9.—The territory formerly comprised in this division is now in the County of Dufferin.

10.—The Township of Minto.

11.—The Town of Mount Forest, and that part of the Township of Arthur north of lot 16, west of the Owen Sound Road; lot 17, on the Owen Sound Road, and lot 13, east of the Owen Sound Road.

WENTWORTH.

C. G. Snider, Judge, Hamilton.

J. F. Monck, J.J., Hamilton.

S. F. Washington, C.C.A., and C.P., Hamilton.

1.—All that part of the Township of Barton lying east of the lines between lots 14 and 15, and all that part of Hamilton City east of Hughson street.

2.—The whole of the Township of Flamboro' West, the Town of Dundas, and the east half of the Township of Ancaster.

3.—The whole of the Township of Flamboro' East.

4.—The whole of the Township of Beverly and the west half of the Township of Ancaster.

5.—The whole of the Township of Saltfleet.

7.—The whole of the Township of Glanford.

8.—The whole of the Township of Binbrook.

9.—All that part of the Township of Barton lying west of the lines between lots 14 and 15, and part of Hamilton City west of Hughson street.

YORK.

John Winchester, Judge, Toronto.

Edward Morgan, J.J., Toronto.

F. M. Morson, J.J., Toronto.

R. H. Greer, C.C.A., Toronto.

H. E. Irwin, C.P., Toronto.

Toronto City.—Crown Attorney, J. W. Seymour Corley.

1.—The City of Toronto east of Yonge street, at date 14th September, 1875 (*i.e.*, Bloor, Sherbourne and Howard streets on the north, the Don on the east, down to Queen street, and south of Queen street as far as Lee avenue).

2.—Concessions 5 to 11, inclusive, of the Township of Markham, and concessions 5 to 10, inclusive, of the Township of Whitchurch, from 1 to 10, inclusive, together with the Villages of Markham and Stouffville.

3.—Concessions 1 to 4, inclusive, of the Township of Markham, and concessions 1 to 4, inclusive, of the Township of Whitchurch, from lots 1 to 10, inclusive, and concessions 1 to 3, inclusive, of the Township of Vaughan.

4.—The Township of Whitchurch, from the line between lots 10 and 11 northward; and the Township of East Gwillimbury.

5.—The Townships of Georgina and North Gwillimbury.

6.—The Townships of King and the incorporated Village of Aurora.

7.—Concessions 4 to 11, inclusive, of the Township of Vaughan.

8.—All that portion of the Township of York lying west of Yonge street, and the Township of Etobicoke.

9.—Township of Scarboro' and all that portion of the Township of York which lies east of Yonge street and the Village of Leslieville.

10.—The City of Toronto, west of Yonge street, at date of 10th September, 1875 (*i.e.*, Bloor street on the north and Dufferin street on the west).

DIVISION COURT TARIFF.

Fees to be received by the several Clerks and Bailiffs of Division Courts from and after 1st of September, 1910.

Form I.

Clerk's Fees.

1. Receiving claim, numbering and entering in procedure book $0 15
   (This item to apply to entering in the procedure book a transcript of judgment from another Court, but not an entry made for the issue of a judgment summons.)
2. Issuing summons, with necessary notices and warnings thereon, or judgment summons (as provided in forms) in all
   Where claim exceeds $10 and does not exceed $20 .... $0 40
   Where claim exceeds $20 and does not exceed $60 50
   Where claim exceeds $60 and does not exceed $100 60
   Where claim exceeds $100 .... 1 00
   (N.B.—In replevin and interpleader suits the value of goods to regulate the fee.)
3. Copy of summons, including all notices and warnings thereon 25
4. Copy of claim (including particulars), when not furnished by plaintiff 25
5. Copy of set-off or counterclaim (including particulars), when not furnished by defendant 25
   (Note.—In either of the last two preceding items the fee may be taxed against the party ordered to pay costs.)
6. Receiving and entering bailiff's return to any summons, writ or warrant issued under the seal of the Court (except summons to witness and return to summons or paper from another division) 15
7. Taking confession of judgment 10
   (This does not include affidavit and oath, chargeable under item 8.)
8. Every necessary affidavit if actually prepared by the Clerk, and administering oath to the deponent 25
9. Furnishing duly certified copies of the summons and notices and papers with all proceedings, for purposes of appeal (under section 127), as required by either party, per folio of 100 words 05
10. Certificate therewith 25
11. Certifying under seal of the Court and delivering to a judgment creditor a memorandum of the amount of judgment and costs against a judgment debtor, under The Creditor's Relief Act, or for any other purpose 25
12. Copies of papers, for which no fee is otherwise provided, necessarily required for service or transmission to the Judge, each 10
    If exceeding two folios, per folio 05
13. Every notice of defence or admission entered, or other notice required to be given by the Clerk to any party to a cause or proceeding, including mailing, but not postages 15
14. Entering final judgment by Clerk, on special summons, where claim not disputed 50

15. Entering every judgment rendered at the hearing, or final order made by the Judge 50
(Note.—This fee does not apply to any proceeding on judgment summons.)
(This one fee of 50 cents will include the service of recording at the trial and afterwards entering in the procedure book the judgment, decree and order in its entirety, rendered or made at the trial. If a garnishee proceeding before a judgment, the fee of 50 cents will be allowed for the judgment in respect to the primary debtor, and a like fee of 50 cents for the adjudication, whenever made, in respect to the garnishee.)
16. Subpœna to witness 25
(The subpœna may include any number of names therein, and only one original subpœna shall be taxed, unless the Judge otherwise orders.)
17. For every copy of subpœna required for service.................... 05
18. Summons for jury (including copy for each juryman), when required by parties 1 25
19. Calling and returning jury ordered by the Judge 25
20. Every order of reference, or order for adjournment, made at hearing, and every order requiring the signature of the Judge, and entering the same, including final order of judgment debtor's examination.. 25
(Any warning necessary with order, *e.g.,* the warning in Form 73, forms part of the order.)
21. Transcript of judgment to another Division Court 25
22. (Abolished—Transcript to County Court.)
23. Every writ of execution, warrant of attachment or warrant of commitment and delivering same to bailiff 50
24. Renewal of every writ of execution, when ordered by the judgment creditor, or of warrant of commitment, when ordered by the Judge.. 15
25. Every bond, when necessary, and prepared by the clerk (including affidavits of justification and of execution) 1 00
26. For necessary entries in the debt attachment book, in each case (in all) 20
27. Transmitting transcript of judgment; or transmitting papers for service to another division; or to the Judge, on application to him, including necessary entries and mailing, but not including postage.... 25
28. Receiving papers from another division for service, entering the same, handing to the bailiff, receiving and entering his return and transmitting the same (if return made promptly, not otherwise)........ 30
29. Search by person not party to the suit or proceeding, to be paid by the applicant 10
Search by party to the suit or proceeding, where the suit or proceeding is over one year old 10
(No fee is chargeable for search to a party to the suit or proceeding, if the same is not over one year old.)
30. Taxing costs, in defended suits, after judgment pronounced........... 25
31. Making out statement of costs in detail (including bailiff's fees) at the request of any party, or for the purpose of settlement, or upon entering judgment by default 10
(Neither item 30 nor 31 applies to statement of costs endorsed on summons or copy to be served.)

32. Taxing bailiff's costs, under section 188 of the Division Courts Act (R.S.O.), 1897	25
33. Copying and transmitting to municipal clerk, Judge's decision to appeal	50

2.—BAILIFF'S FEES.

1. Service of summons issued under the seal of the Court, or Judge's summons or order on each person, except summons to witness and summons to juryman:—	
Where claim exceeds $10 and does not exceed $20	$0 30
Where claim exceeds $20 and does not exceed $60	40
Where claim exceeds $60 and does not exceed $100	50
Where claim exceeds $100	75
(In interpleader suits the value of the goods to regulate the fee.)	
2. For every return as to service under item 1; attending at the clerk's office and making the necessary affidavit (as provided by Rule 183)	15
3. Service of summons on witness or juryman, or service of notice	15
4. Taking confession of judgment and attending to prove	10
5. For calling parties and their witnesses at the sitting of the court, in every defended case, and at the hearing of every judgment summons	15
6. Enforcing every writ of execution or summons of replevin, or warrant of attachment or warrant against the body, each:	
Where claim does not exceed $20	50
Where claim exceeds $20 and does not exceed $60	75
Where claim exceeds $60	1 00
(Where goods replevied, the value of the goods to regulate the amount of the fee. This fee does not include service of summons in replevin on defendant.)	
Fees under Creditor's Relief Act (see section 188 of 10 Edw., cap. 32; and section 26 of R.S.O., cap. 48, 9 Edward VII.) shall be taxed according to the tariff.	
7. Every mile necessarily travelled to serve summons, or process, or other necessary papers, or in going to replevy goods, or to seize on attachment, or in going to seize on a writ of execution, where money, paid on demand, or made on execution, or case settled after seizure	12
8. Mileage going to arrest under warrant, when arrest made, per mile	12
9. Mileage carrying delinquent to prison, including all expenses and assistance, per mile	20
10. Every schedule of property seized, attached, or replevied, including affidavit of appraisal, when necessary:	
Exceeding $10 and not exceeding $20	30
Exceeding $20 and not exceeding $60	50
Exceeding $60	75
11. Every bond, when necessary, when prepared by the bailiff, including affidavit of justification and execution	50
12. Every notice of sale, not exceeding three, under execution, or under attachment, each	15
13. Reasonable allowances and disbursements, necessarily incurred in the care and removal of property:	
(a) If a bailiff removes property seized, he is entitled to the necessary disbursements, in addition to the fees for seizure and mileage.	

(*b*) If he takes a bond, then to 50 cents, instead of disbursements for removal of property.

(*c*) If assistance is necessary in the seizure, or securing, or retaining of property, the bailiff is entitled to the disbursements for such assistance.

(*d*) All charges for disbursements are to be submitted to the clerk for taxation, subject to appeal to the Judge.

(*e*) The bailiff must in all cases endorse a memorandum of all his charges on the back of the execution, or state them on a separate slip of paper, so that the clerk may conveniently tax the bailiff's charges for fees and disbursements.

(*f*) The Clerk is in all cases to sign the memorandum of his taxation and preserve it among the papers in the cause, together with the execution, for future reference, and thereby enable the clerk to certify the bailiff's returns properly.

14. If execution or process in attachment in the nature of execution be satisfied in whole or in part, after seizure and before sale, whether by action of the parties or otherwise, the bailiff shall be entitled to charge and receive 3 per cent. on the amount directed to be levied; or on the amount of the value of the property seized, whichever shall be the lesser amount.

15. Poundage on executions, and on attachments in the nature of executions, 5 per cent., exclusive of mileage for going to seize and sell, upon the amount realized from property necessarily sold.

3.—FEES TO WITNESSES AND APPRAISERS.

Allowances to Witnesses.

Attendance, per diem, to witnesses within three miles of the place where the Court is held, if within the county	$0 75
And if without the county	1 00
Attendance, if witness resides over three miles from the place of sittings and within the county, per diem	1 00
Attendance, if witness resides without the county and more than three miles from the place of sittings, per diem	1 25
Barristers and solicitors, physicians and surgeons, engineers and veterinary surgeons, other than parties to the cause, when called upon to give evidence of any professional service rendered by them, or to give professional opinions, per diem	4 00

(Note.—Disbursements to surveyors, architects and professional witnesses, such as are entitled to specific fees, by statute, are to be taxed, as authorized by such statute.

If witnesses attend in one case only, they will be entitled to the full allowance.

If they attend in more than one case, they will be entitled to a proportional part in each cause only.)

The travelling expenses of witnesses, over three miles, shall be allowed according to the sums reasonably and actually paid, but in no case shall exceed 20 cents per mile, one way.

FEES OF APPRAISERS.

Fees to Appraisers of Goods, etc., Seized under Warrant of Attachment.

To each appraiser, $1.00 per day, during the time actually employed in appraising goods—to be paid in the first instance by plaintiff and allowed as costs in the cause.

FEES IN SUITS NOT EXCEEDING $10.

(Section 48 D.C. Act.)

Clerk.

For all services, from entering action, or suing out a judgment or interpleader summons, up to and including the entering of final judgment, or final order on any such judgment or interpleader summons, in case the action proceeds to judgment or final order	$1 25
In case the action does not proceed to judgment or final order, the fees heretofore, or that may hereafter be payable, but not exceeding in the whole the sum.	
For issuing writ of execution, warrant of attachment, or warrant for arrest of delinquent and entering the return thereto	50

Bailiff.

For all services rendered in serving summons and making return, and any other service that may be necessary before the judgment is entered by the clerk or pronounced by the Judge, mileage excepted	50
For enforcing execution, schedule of property seized, or attached bond, where necessary, and all other necessary acts done by him, after seizure, mileage excepted, if money made or case settled, after levy...	1 00
(Necessary disbursements incurred in the care and removal of property shall be allowed to be first taxed by the clerk, subject to the approval of the Judge.)	

REPORT

OF THE

Inspector of Legal Offices

ONTARIO

1911

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1912

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TORONTO.

To His Honour SIR JOHN MORISON GIBSON, K.C.M.G., etc., etc., etc.

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned begs respectfully to present to Your Honour the twenty-ninth annual report of the Inspector of Legal Offices for the year ending 31st day of December, 1911.

J. J. FOY,

Attorney-General.

TORONTO, March 12th, 1912.

REPORT

OF THE

Inspector of Legal Offices, 1911

To His Honour Sir John Morison Gibson, K.C.M.G., etc., etc., etc.

Lieutenant-Governor of the Province of Ontario.

Sir,—I have the honour to present the twenty-ninth annual Report of the Inspector of Legal Offices upon the affairs of the Judicial Offices of the Province for the year ending December 31st, 1911.

A list of the officers appointed during the year, with a reference to the issue of the Ontario Gazette in which each appointment appeared, will be found in Appendix "L" to this Report.

Sheriffs.

The remuneration of the Sheriffs is still inadequate considering the importance of the office and the responsibilities which they are obliged to assume in the discharge of their duties.

Thirteen, whose incomes were less than $1,200.00 are entitled to receive from the Province payments under Section 39 of the Statute 9 Edward VII, chapter 6, to bring their incomes to $1,200.00.

Their duties were generally well performed and their books accurately kept. Three, however, failed to make daily entries in their Fee Books, and in one instance fees were omitted from this book.

Where moneys are received on a Writ of execution, an account in respect of such Writ should at once be opened in the "Fi. Fa." (or as it is sometimes called the "Suitors'") cash book. This account should show all moneys received by the Sheriff, and also all moneys by him paid over to the parties entitled to them, and when all proceedings are completed the account should be balanced; separate accounts being kept for each writ.

The Fee Book, on the other hand, should contain daily entries of all fees and emoluments earned, as well as received, for all services in connection with the office; and also the several sums disbursed for carrying on the work of the office.

Separate Ledgers should be kept for a record showing fines received and to whom paid over. Receipts for such fines may conveniently be pasted in this book.

Notwithstanding the reference in my last annual Report to the change in the form of Notice to be made in the book kept by Sheriffs under the Creditors' Relief Act, a few continued to use the obsolete form.

A summary of the business of the year should be entered in the Fee Book, after the last entry for the year. This summary should be in form as nearly as may be to the following:

RE-CAPITULATION FOR YEAR 1910.

Date.	In what book entered.	Folio.	Amount Earned.	Amount received for Present year.	Amount received for Previous years.	Disbursements.
			$ c.	$ c.	$ c.	$ c.
January	F.B.	282	64 20	34 49	10 10	13 25
February	"	283	37 90	29 10	6 20	....
March	"	284	45 69	38 54	7 95	1 75
April	"	285	42 16	33 99	2 10	7 80
May	"	286	45 61	43 07	9 90	8 55
June	"	287	50 50	30 41	6 30	14 00
July	"	288	58 23	50 07	....	17 65
August	"	289	45 80	42 90	....	....
September	"	290	51 05	38 68	....	5 40
October	"	291	50 79	29 42	3 30	2 10
November	"	292	47 36	35 20	....	2 75
December	"	293	38 10	45 60	....	....
			577 39	451 48	45 85	73 25
Admin. Cr. Justice, Dec. Qr. 1909			....	....	308 10	....
" " " Mar. " 1910			250 10	250 10	....	15 80
" " " June " "			340 81	340 81	....	59 02
" " " Sept. " "			232 17	232 17	....	12 43
" " " Dec. " "			328 20	....	....	35 20
			1,728 67	1,274 56	353 95	195 70
Salary received by Sheriff,			1,000 00	1,000 00	....	....
" paid Deputy Sheriff,			....	....	....	900 00
Paid Premium on Guarantee Bond,			....	....	....	9 00
" Postage, telephones, etc.			....	....	....	20 00
			2,728 67	2,274 56	353 95	1,124 70

Appendix "A" sets out in tabulated form the Statistical returns of the Sheriffs for the year 1911.

LOCAL MASTERS.

All but ten of the Local Masters are the Judges of the County, District, or Surrogate Courts. Their duties are generally well performed.

In one office in which the fees have been commuted $16.10 in law stamps were missing from papers.

In Appendix "B" is set out in Tabulated form the Statistical returns of the Local Masters for the year 1911; from which it will been seen the business of these offices is not heavy.

LOCAL REGISTRARS, DEPUTY REGISTRARS, DEPUTY CLERKS OF THE CROWN, COUNTY AND DISTRICT COURT CLERKS.

An examination of the suit papers showed a want of care on the part of some officers. In a few instances fylings were put away unstamped, and the *Præcipe* for entering actions did not always contain stamps for the Shorthand Reporters' Fund: $18.40 was missing in law stamps.

In four offices stamps were not cancelled in respect of the searches made for the Mercantile Agencies.

Jury Fees to the amount of $331.50 had not been paid over until my visits of inspection. In one office these fees were collected in law stamps. Jury Fees must be collected in cash and paid to the County Treasurer at the close of every sitting of the High and County Courts. In the Provisional Judicial Districts they are paid the Provincial Treasurer.

In two offices entries were not made of the moneys paid into Court under Con. Rules 1221 to 1223.

In some offices the writs of summons were not numbered. They should be numbered to correspond with the number of the entry in the Process Book. Officers were not always careful to keep their various books of office properly indexed.

Frequent complaints have been received from the Registrar of the Court of Appeal, that papers are sent to him instead of to the Central Office.

The Clerk of the Crown and Pleas also has had to complain of the neglect of some of these officers to promptly return Judgments.

When a motion is served by posting up under Con. Rule 330 it must be posted in the office in which the proceedings were commenced. that is, in the office from which the writ issued, or in which the initiating paper was filed—See Con. Rule 15. This practice has not always been followed.

Officers must bear in mind that the fee of $1.00 for passing the Record in a High Court Action, must be collected in law stamps, which stamps are to be affixed to the Record, and that the $2.00 payable in law stamps for the Shorthand Reporters' Fund must be affixed to the *Præcipe* for entry.

On the issuing of a writ of summons the copy fyled should contain the certificate of the person issuing the writ that the same is a true copy. This has not always been done.

Appendix "C" is a return of the business of the High Court of Justice in the offices of the Local Registrars, Deputy Registrars and Deputy Clerks of the Crown, while appendix "D" is a return of the business in the offices of the Clerks of the County and District Courts, for the year 1911.

Surrogate Court Registrars.

In twelve offices law stamps were missing from Surrogate papers. The sum due the Province as represented by these stamps was $559.95. There were also uncancelled law stamps affixed to papers amounting to $12.50.

In the Provisional Judicial Districts and in those Counties in which the Surrogate Judge's fees have been commuted, Registrars must see that the Judge's fees for passing accounts are collected in law stamps. These stamps should be affixed to the Order on Passing Accounts fyled with the officer. In two cases this was not attended to.

All surplus Surrogate Judge's fees must be remitted monthly to the Hon. the Provincial Treasurer and a statement furnished the Inspector of Legal Offices showing how the amount furnished is made up.

A minute of the Passing of all Accounts should appear in the Collateral Proceedings column of their Non-Contentious Business books.

In six offices the copying of the wills and bonds was not promptly done. In one office 23 Grants were not entered, and in one instance the office Index Books were not written up.

Notwithstanding the reference in my last annual Report to the Statute which provides for an additional fee of $1.00 for the Judge on Grants of Probate and Letters of Administration. this fee was not collected in three offices.

Registrars must not forget to affix a fifty cent law stamp for the seal on certificates required under Sec. 56 (4) of the Registry Act, 10 Edward VII., Chapter 60.

In my annual Report for the year 1909, I set out the necessary papers to be fyled on applications for Letters Probate, Administration, Guardianship, Ancilliary Probates and on the Passing of Accounts. The following are the papers to be fyled on applications for Letters of Administration *ad Litem*:

1. Petition.
2. Renunciations.
3. Oath of Administrator.
4. Affidavit of death and place of abode.
5. Affidavit of search for a will.
6. Affidavit of value of the present property devolving, if any.
7. Bond.
8. Duplicate affidavits required by the Succession Duties Act.
9. Undertaking to file Inventories when amounts ascertained and to pay the additional fees.

Appendix "E" gives in Tabulated form the business of the Surrogate Registrars for the year 1911.

County and District Crown Attorneys and Clerks of the Peace.

In five offices the Returns of Convictions made quarterly to these officers by Justices of the Peace, had not all been entered. Crown Attorneys have supervision of the collection of fines under an Order in Council of October 9th, 1885, and they should insist that all Justices show in these returns the disposition made by them, of all fines imposed, and that such fines as are payable to the Province have been remitted to the Honourable the Provincial Treasurer. Fines in cases within Dominion or Provincial Statutes are often paid the Municipalities instead of the Province.

In some instances the headings of the Jury Books did not closely conform to the requirements of the Statute, and several did not fyle a copy of this book with the Local Registrar.

As a general rule the work of these offices was well performed.

General Remarks.

Some Police Magistrates continue to disregard instructions in not showing in detail in their returns the costs as follows:

(*a*) Magistrate's Fees.
(*b*) Constable's Fees.
(*c*) Witness' Fees.

A want of proper vault accommodation still maintains in many of the offices; in one I found the vault full, and papers piled on the floor.

The sums payable to the Province under the Statute 10 Edward VII, chapter 5, amounted to $7,061.67 as follows:

Local Registrars and Deputy Clerk of the Crown	$4,747.92
Crown Attorneys and Clerks of the Peace	2,313.75

Appendix " F " is a statement of the fees and emoluments of the several officers for the year 1911, and of the sources from which they derive their incomes. In appendix " F " to my report for 1910 at pages 40 and 41, the figures shewn in the 3rd, 4th, 6th, 7th, 8th and 9th columns in respect to the income of the Sheriff of Rainy River, are $750.00 more than they should have been, as the Sheriff's net income for that year was $1,630.02.

In Appendix " G " is set out the more important business of the High Court of Justice at Toronto during 1911, compiled from statements received from the officers in Osgoode Hall.

Appendix " H " shows the number of actions tried, or otherwise disposed of by the Justices of the High Court, and of the Court of Appeal, and the dispositions thereof, during the year 1911.

Appendix " I " is a statement of the business transacted in the office of the Surrogate Clerk at Osgoode Hall, for the year 1911.

Appendix " J " shows the Criminal business of the High Court of Justice at its Sittings throughout the Province during the year, while Appendix " K " gives in tabulated form the business of the Courts of General Sessions of the Peace and of the County and District Court Judge's Criminal Courts of the Province for the same period.

I have the honour to be,

Sir,

Your obedient Servant,

JAS. W. MALLON,

Inspector.

OSGOODE HALL, March 11th, 1912.

APPENDIX A.—Containing in tabulated form Statistics as returned

Counties or Districts.	Number of writs of summons received for service		Number of subpœnas received for service in— Criminal Cases.		Civil Cases.		Number of orders for arrest.		Number of other process.		Total process received.	
	H.C.	C.C.	H.C.	C.C.	H.C.	C.C.	H.C.	C.C.	H C.	C.C.	H.C.	C.C.
Algoma	8	37	8	20	1	3	1	.....	5	17	23	77
Brant	20	20	6	144	.....	.....	.....	.....	.....	.....	26	20
Bruce	9	8	.....	18	.....	.....	.....	1	5	6	14	33
Carleton	76	159	9	18	16	6	.....	.....	26	15	127	198
Dufferin	3	7	1	2	.....	.....	.....	.....	2	.....	6	9
Elgin	11	12	2	8	.....	.....	.....	.....	9	1	22	21
Essex	20	30	2	28	4	2	.....	.....	1	9	27	69
Frontenac	20	27	3	7	4	2	.....	.....	5	2	32	38
Grey	7	13	1	14	1	.....	.....	.....	4	.....	13	27
Haldimand	5	14	.....	28	.....	.....	.....	.....	.....	.....	5	42
Halton	13	13	2	7	1	.....	.....	.....	2	2	18	22
Hastings	19	28	3	40	2	1	.....	.....	3	5	27	74
Huron	11	27	8	15	.....	.....	1	1	3	1	23	44
Kenora	3	14	2	2	2	1	.....	.....	1	8	8	25
Kent	17	33	2	34	4	.....	.....	.....	15	2	38	69
Lambton	9	11	4	12	2	3	.....	.....	5	8	20	34
Lanark	14	25	.....	6	.....	2	.....	1	2	2	16	36
Leeds and Grenville	16	22	1	20	1	2	.....	1	7	8	25	53
Lennox and Addington	9	8	1	.....	2	1	.....	.....	3	.....	15	9
Lincoln	16	22	3	20	3	.....	.....	.....	8	.....	30	42
Manitoulin	.....	4	.....	9	.....	.....	.....	.....	.....	.....	.....	13
Middlesex	39	37	10	36	5	4	.....	2	9	9	63	88
Muskoka	6	5	11	28	1	1	.....	.....	.....	.....	18	34
Nipissing	9	32	11	17	.....	2	.....	.....	.....	.....	20	51
Norfolk	4	11	.....	13	1	.....	.....	.....	.....	.....	5	24
Northumberland and Durham	8	17	6	25	10	.....	1	.....	5	2	30	44
Ontario	12	23	2	6	1	.....	.....	.....	3	.....	18	29
Oxford	20	27	45	45	7	.....	.....	.....	13	17	85	89
Parry Sound	8	16	3	22	1	.....	.....	.....	3	9	15	47
Peel	6	10	.....	4	5	.....	.....	.....	.....	5	11	19
Perth	13	21	.....	16	1	2	.....	.....	.....	2	14	41
Peterborough	18	30	3	10	17	4	.....	.....	11	1	49	45
Prescott and Russell	6	35	1	1	.....	1	.....	2	1	1	8	40
Prince Edward	3	11	.....	.....	.....	.....	.....	.....	4	1	7	12
Rainy River	11	43	3	5	2	3	.....	.....	.....	.....	16	51
Renfrew	9	20	.....	5	1	.....	.....	.....	6	.....	16	25
Simcoe	17	26	6	13	.....	.....	.....	.....	5	6	28	45
Stormont, Dundas and Glengarry	16	31	7	3	4	1	.....	.....	6	2	33	37
Sudbury	28	65	16	54	7	2	.....	.....	5	5	56	126
Thunder Bay	24	47	1	15	2	1	.....	.....	9	19	36	82
Victoria	5	16	.....	2	2	.....	.....	.....	.....	1	7	19
Waterloo	13	28	5	.....	1	1	.....	.....	.....	.....	19	29
Welland	17	24	5	15	.....	.....	.....	1	2	1	24	41
Wellington	8	25	2	17	3	.....	.....	.....	3	5	16	47
Wentworth	54	91	4	80	11	8	1	.....	16	7	86	186
York	7	37	.....	275	6	3	.....	18	5	9	18	342
Toronto	318	530	21	37	58	35	6	4	92	49	495	655
Totals	985	1,792	220	1,196	189	91	10	31	204	137	1,708	3,203

by the different Sheriffs for the year ending 31st December, 1911.

Number of persons served.		Estreats received.		Number of jurors summoned.		Number of writs of execution received.			Number of renewals of writs of execution against— Goods and Lands.		
H C.	C.C.	H.C.	C.C.	H.C.	C.C.	H.C.	C.C.	D.C.	H.C.	C C.	D.C.
50	116	....	....	113	77	11	34	14	11	28	....
26	162	....	....	122	122	7	9	6	1	3	....
14	68	....	....	122	122	3	14	13	6	4	....
199	374	....	....	219	122	31	67	17	6	7	....
14	21	....	....	122	121	1	5	4	6	4	....
29	54	....	....	136	122	6	17	13	3	2	....
29	152	....	....	122	122	18	24	9	3	3	....
42	65	....	....	122	98	13	17	6	10	1	....
17	64	....	....	122	122	9	19	23	....	....	....
6	58	....	....	122	218	5	14	....	2	....	....
39	44	....	....	122	98	3	12	8	....	....	....
40	152	....	....	122	122	7	14	11	10	6	....
109	118	....	....	146	122	14	15	9	....	....	....
30	37	....	....	116	111	6	20	1	1	2	....
80	207	....	....	122	122	13	24	22	7	7	....
60	65	....	....	122	122	7	16	10	6	5	....
23	45	....	....	121	117	6	9	1	....	....	....
50	157	....	....	120	218	9	19	7	....	2	....
35	21	....	....	122	98	5	3	2	....	....	....
47	103	....	....	122	98	3	10	10	....	1	....
....	6	....	....	61	98	....	9	2	....	2	....
82	197	....	....	183	122	17	19	25	1	....	....
18	34	....	....	122	122	5	12	3	....	....	....
47	92	....	....	116	97	48	139	7	....	1	....
5	79	....	....	122	122	2	3	11	....	....	....
84	142	....	....	122	122	12	18	15	5	4	....
33	51	....	....	124	124	8	27	2	4	6	....
57	137	....	....	138	118	8	12	11	1	....	....
36	111	....	....	128	105	7	17	11	4	2	....
36	26	....	....	122	122	8	9	4	4	2	1
20	81	....	....	61	61	36	36	13	4	5	....
221	97	....	....	122	122	6	14	6	5	....	....
11	48	....	....	122	122	3	20	13	....	....	....
8	16	....	....	122	122	1	4	1	....	....	....
30	72	....	....	122	122	3	15	....	....	1	....
19	47	....	....	122	122	5	16	11	....	....	1
98	65	....	....	106	106	15	33	35	2	3	....
63	54	....	....	183	98	12	23	15	4	1	....
53	112	....	....	126	96	22	39	8	....	....	....
46	146	....	....	129	131	20	117	48	5	42	....
8	35	....	....	98	98	3	14	8	4	1	....
17	39	....	....	119	118	5	22	10	9	4	....
28	91	....	....	122	122	13	18	20	....	....	....
12	159	....	....	122	122	8	15	4	....	....	1
147	490	....	....	183	122	12	45	34	15	7	....
15	1.540	....	11	....	292	39	32	15	15	20	....
982	718	....	....	339	....	185	430	82	100	83	....
3,115	6,770	....	11	5,993	5,602	580	1,420	600	254	259	3

APPENDIX A.—Containing in tabulated form Statistics as returned by the

Counties or Districts.	Number of renewals of writs of execution against—					Number of writs of possession received		Number of writs Ca. Sa.	
	Lands only.			Goods only.					
	H.C.	C.C.	D.C.	H.C.	C.C.	H.C.	C.C.	H.C.	C.C.
Algoma	......	1	8	......	......	1	1	......	......
Brant	......	......	2	......	......	......	......	......	......
Bruce	......	......	4	......	......	......	2	......	......
Carleton	......	......	7	......	......	2	1	......	......
Dufferin	1	1	......	......	1	......	......	......	......
Elgin	......	......	2	......	......	......	1	......	......
Essex	......	......	2	......	......	......	2	......	......
Frontenac	......	......	1	......	......	......	......	......	......
Grey	......	1	3	......	......	......	......	......	......
Haldimand	......	......	......	......	......	1	......	......	......
Halton	......	......	......	......	......	......	1	......	......
Hastings	1	1	3	......	......	......	3	......	......
Huron	2	5	......	......	......	3	......	......	......
Kenora	......	......	......	......	......	1	......	......	......
Kent	2	......	......	......	......	......	......	......	......
Lambton	1	......	5	......	......	......	2	......	......
Lanark	......	......	2	......	......	......	......	......	......
Leeds and Grenville	......	......	3	......	......	......	......	1	1
Lennox and Addington	......	......	......	......	......	1	......	......	......
Lincoln	......	......	......	......	......	......	......	......	......
Manitoulin	......	......	......	......	......	......	......	......	......
Middlesex	......	......	3	......	......	......	......	......	......
Muskoka	......	......	......	......	......	......	......	......	......
Nipissing	......	......	......	......	......	3	......	......	......
Norfolk	......	......	1	......	......	......	......	......	......
Northumberland and Durham	......	......	3	......	......	1	......	......	......
Ontario	......	......	5	......	......	1	......	......	......
Oxford	......	......	1	......	......	......	......	......	......
Parry Sound	......	......	2	......	......	......	1	......	......
Peel	1	......	......	1	......	......	1	......	......
Perth	......	......	......	......	......	1	1	......	......
Peterborough	......	......	1	......	......	......	......	......	......
Prescott and Russell	......	......	......	......	......	......	......	......	......
Prince Edward	......	......	......	......	......	......	......	......	......
Rainy River	......	......	......	......	......	......	2	......	2
Renfrew	......	......	......	......	......	......	......	......	......
Simcoe	......	......	11	......	......	1	......	......	1
Stormont, Dundas and Glengarry	......	......	7	......	......	1	1	......	......
Sudbury	......	......	......	......	......	......	......	......	......
Thunder Bay	......	......	4	......	......	......	......	......	......
Victoria	......	......	5	......	......	......	......	......	......
Waterloo	......	1	2	......	......	1	......	......	......
Welland	......	......	......	......	......	......	1	......	......
Wellington	......	......	1	......	......	1	......	......	......
Wentworth	......	......	10	......	......	......	2	1	......
York	......	......	4	......	......	1	2	......	......
Toronto	22	17	9	......	......	14	5	1	......
Totals	30	27	112	1	1	34	29	3	4

different Sheriffs for the year ending 31st December, 1911.—*Continued.*

Number of sales under writs of execution of					Seizures under writs of execution where no subsequent sale.			Number of Attendances to seize where no goods found.		Writs of execution on which money realized.		
Goods.		Lands.										
H.C.	C.C.	H.C.	C.C.	D.C	H.C.	C.C.	D.C.	H.C.	C.C.	H.C.	C C.	D.C.
......	1	......	......	......	......	2	......	2	......	......	1	......
......	......	......	......	......	2	3	......	......	......	3	4	......
1	......	......	1	......	1	4	......	2	1	1	5	......
......	1	......	......	......	4	23	......	2	11	3	15	2
......	......	......	......	1	......	......	......	......	1	......	2	......
......	1	......	1	1	1	3	......	1	1	......	3	1
......	......	......	......	......	4	9	......	......	4	8	16	9
2	6	......	......	......	4	1	......	2	4	4	7	......
......	......	......	......	......	2	3	......	3	7	2	2	......
......	......	......	......	......	......	4	......	......	3	......	3	......
......	......	......	......	......	......	......	......	1	1	......	3	......
......	......	......	......	1	1	7	......	......	......	3	9	3
......	......	......	......	......	......	7	......	......	......	......	7	......
1	2	......	1	......	1	1	......	......	3	2	6	......
3	......	......	......	1	2	2	6	......	......	6	7	2
......	......	......	......	1	3	12	......	......	2	2	6	1
......	......	......	......	......	2	5	......	1	2	1	2	......
......	1	......	......	......	1	8	2	......	......	1	9	2
1	......	......	......	......	1	......	......	......	1	2	1	......
......	......	......	......	......	......	1	......	......	......	......	7	1
......	......	......	......	......	......	1	......	......	......	......	2	......
......	......	......	......	......	8	6	......	3	2	6	4	2
......	......	1	1	......	......	5	......	......	......	1	6	......
4	4	......	......	......	4	8	......	3	4	7	15	......
......	1	......	......	1	......	1	......	2	......	......	......	......
1	......	......	......	......	......	4	......	......	......	2	5	......
......	2	......	......	......	2	15	......	6	7	2	10	......
......	1	......	......	1	......	2	......	......	......	1	4	1
......	......	......	......	......	3	12	......	......	2	3	12	6
......	......	......	......	......	2	3	......	4	2	......	2	1
......	......	......	1	......	5	10	......	12	10	14	7	1
2	......	......	......	......	......	......	......	......	......	2	2	......
......	......	......	......	2	......	4	......	......	......	......	4	2
......	......	......	......	......	......	......	......	......	......	......	2	......
2	4	......	......	......	1	2	......	1	4	3	4	......
......	1	......	......	......	1	4	......	......	......	2	5	1
1	......	......	......	......	1	7	......	2	9	1	7	1
......	2	......	......	1	1	7	......	......	1	2	7	2
2	1	......	......	......	1	1	......	2	......	4	13	......
......	1	1	1	1	5	35	......	2	6	6	37	2
......	......	......	1	......	......	......	......	......	......	1	4	2
......	......	......	......	......	5	7	......	......	8	2	8	2
......	......	......	1	......	1	4	......	1	1	5	2	7
......	......	......	......	......	2	3	......	3	3	......	2	......
1	......	......	......	2	6	12	......	3	7	2	10	2
......	1	......	......	......	1	5	......	2	18	1	5	......
6	7	......	......	......	......	......	......	......	......	42	13	11
27	37	2	8	13	78	253	8	60	125	147	207	64

APPENDIX A.—Containing in tabulated form Statistics as returned by the

Counties or Districts.	Cases under Creditors' Relief Act.	Certificates received under Creditors' Relief Act.	Assignments made to Sheriff under 10 Edw. VII., cap. 64.	Returns received under 9 Edw. VII., cap 89, sec. 37.	Sales of Lands under 9 Edw. VII., cap. 89, sec. 37.	Amount endorsed on Writs of Execution (not renewals). For debt or damages H C.	For debt or damages C.C.	For debt or damages Div. Co.	For costs taxed. H.C.	For costs taxed. C.C.
						$ c.	$ c	$ c.	$ c.	$ c.
Algoma	....	....	....	3	....	18,633 37	12,116 69	1,267 89	591 93	726 67
Brant	....	....	....	....	....	4,267 86	1,648 50	547 14	386 91	180 76
Bruce	4	8	....	....	....	1,591 81	3,437 72	1,365 97	252 45	378 11
Carleton	1	3	....	....	....	85,469 09	20,336 43	2,034 80	1,304 70	1,441 64
Dufferin	....	....	....	....	....	1,088 68	1,117 55	630 70	6 00	187 94
Elgin	2	....	....	....	....	2,218 01	5,324 12	922 09	1,206 78	432 40
Essex	....	....	1	....	....	43,821 08	3,097 87	994 44	1,804 26	395 15
Frontenac	....	....	1	....	....	34,367 45	3,328 25	347 62	366 61	190 77
Grey	....	....	....	....	....	9,896 22	4,526 31	3,342 90	690 00	257 46
Haldimand	....	....	2	....	....	1,453 65	4,104 42	....	344 56	346 02
Halton	....	....	....	....	....	4,761 26	3,406 79	703 38	76 75	166 82
Hastings	3	....	....	....	....	11,128 07	3,773 08	1,163 26	85 02	640 32
Huron	....	....	....	....	....	15,605 17	4,396 84	919 04	630 56	320 43
Kenora	3	....	....	1	....	15,643 39	7,980 37	218 07	566 32	714 73
Kent	2	....	2	....	....	18,688 52	5,429 58	2,148 26	1,312 46	696 23
Lambton	....	....	....	....	....	13,402 08	3,430 70	1,081 61	239 04	580 64
Lanark	1	....	....	....	....	11,871 46	2,250 09	216 00	1,011 09	135 27
Leeds & Grenville	3	1	2	....	....	21,326 04	5,669 10	692 09	251 94	689 68
Lennox & Addington	....	....	2	....	....	1,945 78	938 52	182 70	684 64	248 04
Lincoln	....	....	....	....	....	1,103 07	3,144 38	891 81	304 01	206 67
Manitoulin	....	....	....	....	....	....	1,787 76	121 60	....	119 46
Middlesex	....	....	....	....	....	48,248 11	5,153 54	2,236 83	367 04	460 52
Muskoka	....	....	....	....	....	5,829 29	2,412 38	256 19	170 73	101 54
Nipissing	1	....	....	....	....	204,336 65	138,019 06	1,677 06	2,074 05	9,379 86
Norfolk	....	....	....	....	....	4,914 42	805 53	1,014 75	24 22	45 48
Northumberland and Durham	....	....	2	....	....	11,453 54	4,565 65	1,381 08	124 57	386 24
Ontario	2	....	....	....	....	3,280 88	6,148 03	163 02	254 50	719 44
Oxford	2	....	1	....	....	28,371 42	3,729 40	889 39	316 91	298 17
Parry Sound	1	....	3	12	....	9,774 63	4,084 51	1,708 61	52 63	527 68
Peel	....	....	....	....	....	13,469 81	2,717 77	355 18	178 30	166 41
Perth	2	....	2	....	....	24,496 44	10,648 81	1,737 15	2,205 02	1,020 56
Peterborough	....	....	....	....	....	9,455 00	4,635 40	737 73	746 26	544 80
Prescott & Russell	2	....	1	....	....	1,583 44	5,991 23	1,420 93	445 91	353 06
Prince Edward	....	....	....	....	....	....	176 84	....	....	....
Rainy River	....	....	....	1	....	17,683 77	9,646 86	....	25 30	359 88
Renfrew	....	....	....	....	....	4,827 36	5,138 99	1,115 36	320 56	432 92
Simcoe	1	18	....	....	....	18,296 40	14,212 15	2,675 60	965 15	1,945 60
Stormont, Dundas and Glengarry	....	....	1	....	....	31,340 30	7,746 72	1,338 60	507 74	569 08
Sudbury	....	....	2	1	....	76,547 13	10,156 14	956 61	462 63	852 03
Thunder Bay	5	....	7	2	....	34,187 88	35,454 77	4,175 31	976 06	2,618 22
Victoria	....	....	....	....	....	3,109 07	2,745 78	971 48	401 52	470 66
Waterloo	3	....	....	....	....	2,418 68	5,903 85	1,066 49	207 90	661 97
Welland	1	1	1	....	....	13,910 36	4,980 92	1,527 33	158 65	442 79
Wellington	....	....	....	....	....	10,866 59	5,972 96	578 81	222 64	611 65
Wentworth	2	....	....	....	....	9,278 82	11,258 46	3,063 65	789 18	923 41
York	3	....	....	....	....	50,012 82	16,130 55	1,537 11	616 59	625 70
Toronto	14	31	....	....	....	824,091 39	117,851 38	8,041 88	11,291 49	11,339 01
Totals	58	62	30	20	....	1,780,066 26	537,532 75	60,417 52	36,021 58	47,911 89

different Sheriffs for the year ending 31st December, 1911.—*Concluded.*

	Amounts realized under writs of execution from sales of					Amount received for fines, penalties, etc.	Amount received (not fees) under Fi. Fas. without sale, goods and lands.		
	Goods.		Lands.						
Div. C.	H.C.	C.C.	H.C.	C.C.	Div. C.		H.C.	C.C.	Div. C.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
80 88	....	200 00	....	....	....	....	56 94	220 07	....
32 71	....	....	....	....	....	....	761 43	622 56	....
127 93	922 07	....	....	30 00	....	....	61 40	704 43	....
105 85	....	547 00	....	....	....	....	4,565 49	2,991 63	224 18
32 91	....	....	....	....	20 00	....	....	126 69	....
294 19	....	....	....	218 90	124 32	....	....	1,615 72	....
105 57	....	....	....	....	....	....	2,154 20	1,191 64	365 82
27 84	643 12	316 88	....	....	....	....	256 25	75 25	....
153 48	....	....	....	....	....	....	284 51	523 04	....
....	....	....	....	....	....	260 00	21 60	330 35	....
36 22	....	....	....	....	....	....	2,058 34	106 65	....
38 33	....	....	....	....	59 00	....	219 92	2,379 03	155 52
35 03	....	....	....	....	....	200 00	....	1,004 57	....
8 25	600 00	246 92	....	550 00	....	....	100 00	319 05	....
23 53	1,457 88	....	....	....	108 40	735 00	2,013 21	1,342 23	146 63
63 91	....	....	....	....	....	....	101 04	1,314 27	30 00
3 29	....	....	....	....	....	2 00	880 01	393 07	....
46 41	....	503 25	....	....	431 40	....	788 60	1,427 54	47 15
16 78	137 50	....	....	....	....	....	316 21	361 36	....
175 26	....	....	....	....	....	....	....	1,113 15	45 34
10 42	....	....	....	....	....	....	....	215 39	....
118 80	....	....	....	....	....	....	1,203 94	787 94	319 61
8 99	225 00	....	700 00	....	....	....	....	1,144 00	....
62 87	14,856 89	4,726 34	5,600 00	159 35	....	127 90	12,233 74	1,577 37	....
65 94	....	18 50	....	....	20 00	....	....	....	134 85
84 82	127 15	....	....	....	....	....	....	....	....
101 70	....	395 50	....	....	....	86 88	53 00	1,654 43	....
120 33	....	903 65	....	....	295 00	....	289 42	534 50	....
83 00	....	....	....	....	....	....	134 38	1,614 97	876 55
29 53	....	....	....	....	....	....	....	1,010 41	65 02
44 88	....	....	....	134 00	....	9 75	3,608 33	1,232 50	126 98
32 08	530 55	....	....	....	....	....	....	138 00	31 79
106 09	....	....	....	....	219 00	....	....	1,033 85	....
....	....	....	....	....	....	....	....	129 68	....
....	900 29	618 47	....	....	....	....	295 04	327 50	....
30 78	....	99 11	....	....	....	....	1,254 12	2,593 44	121 49
254 10	....	....	....	....	....	11 00	5,487 50	1,684 95	155 02
67 83	....	389 75	....	....	105 00	....	85 36	266 91	....
41 02	277 25	98 77	....	....	....	....	532 43	1,577 06	74 61
228 23	....	318 00	241 49	275 00	250 00	....	3,844 09	8,185 37	....
92 58	....	....	....	....	372 04	....	408 75	538 89	....
38 13	....	....	....	....	....	....	349 96	1,072 44	267 23
9 75	....	....	....	100 00	....	....	1,699 37	256 00	672 19
24 77	....	....	....	....	....	....	542.60	723 90	87 48
182 60	210 00	....	....	....	144 84	....	150 00	1,700 72	52 56
65 37	....	150 38	....	....	....	1,980 00	1,774 08	863 79	....
447 22	5,789 03	866 78	....	....	....	40 00	6,397 57	8,079 87	1,233 71
3,770 20	26,676 73	10,399 30	6,541 49	1,467 25	2,149 00	3,452 53	54,982 83	57,106 18	5,233 73

APPENDIX B.—Being a return of business transacted by Local Masters through

County or District.	Number of Orders made for the following purposes: For administration of estates.	For partition or sale of property.	Respecting Infants under 1 Geo. V., c. 35, s. 5. (Examination only).	Under Winding-up Acts.	Other Orders made in chambers.	Examinations taken as special examiner or otherwise before trial.
Algoma	....	....	....	3	....	....
Brant	....	....	....	....	....	....
Bruce	....	....	....	....	....	....
Carleton	....	2	....	3	64	38
Dufferin	....	....	....	....	5	....
Elgin	....	1	....	....	....	20
Essex	1	2	....	....	....	6
Frontenac	....	....	....	1	1	3
Grey	2	....	....	....	23	....
Haldimand	....	....	....	....	....	....
Halton	....	....	....	....	....	....
Hastings	....	....	....	2	22	10
Huron	....	1	....	1	....	....
Kenora	....	....	....	1	4	9
Kent	3	....	....	....	....	....
Lambton	....	....	....	....	16	....
Lanark	....	....	....	....	....	....
Leeds and Grenville	....	1	....	....	18	....
Lennox and Addington	1	....	....	....	1	....
Lincoln	....	....	....	....	....	....
Manitoulin	....	....	....	....	....	....
Middlesex	....	2	....	2	....	....
Muskoka	....	....	....	....	....	....
Nipissing	....	....	....	2	2	....
Norfolk	....	....	....	....	....	....
Northumberland and Durham	....	....	....	....	1	....
Ontario	1	1	....	....	2	....
Oxford	....	....	....	....	....	8
Parry Sound	....	....	....	....	....	....
Peel	....	....	....	....	9	....
Perth	....	....	....	....	9	....
Peterborough	....	....	....	13	30	....
Prescott and Russell	....	....	....	....	....	....
Prince Edward	....	1	....	....	8	....
Rainy River	....	....	....	....	....	7
Renfrew	....	....	....	....	....	1
Simcoe	....	....	....	....	....	....
Stormont, Dundas and Glengarry	....	1	....	18	23	....
Sudbury	....	....	....	....	....	....
Thunder Bay	....	....	....	....	....	....
Victoria	....	1	....	....	6	....
Waterloo	....	....	....	....	....	1
Welland	....	1	....	....	....	....
Wellington	....	....	....	....	7	4
Wentworth	....	2	....	....	2	....
Totals	8	16	....	46	253	107

out the Province of Ontario during the year ending 31st December, 1911.

Number of Judgments or Orders brought into the Master's Office for taking the following accounts, etc.

Administration of estates.	Executors, trustees or committees' accounts and compensation.	Foreclosure of mortgage or bond.	Redemption of mortgage or bond.	Sale under mortgage or agreement.	Account on any charge or liens on lands other than mechanics' liens.	Account under Mechanics' Lien Act.	Specific performance.	Partnership accounts.	Alimony.	Partition or sale.	Damages for breach of contract or covenant.
		1									
						2					
1											
2		10		3	1	32		1		1	
1											
								1			
		1				4					1
1	1				2						
	2								1		
						1					
1										1	
		1									
					1	1				1	
1										1	
1										1	
		1									
1		3		1						1	
1	2										
1					3						
	2	1									
		5									
	2										
1	3									1	
		1		1							
4		1	1	3	2		1				
1		1									
		1									
		2								1	
					1						
1		2								1	
		1									
1											
		2								1	
		1		1							
					1	5				1	
										1	
1	1	3				6		1		2	
20	13	38	1	9	11	51	1	3	1	14	1

APPENDIX B.—Being a return of business transacted by Local Masters through

County or District.	Number of Judgments or Orders.—*Con*						
	Work and labor done.	Money received, paid, advanced, or lent.	Goods sold and delivered.	Promissory notes and bills of exchange.	Bonds, life and fire insurance.	Infants' estates.	Quieting Title matters.
Algoma							
Brant							
Bruce							
Carleton	1		1		1		
Dufferin							
Elgin							1
Essex							1
Frontenac							
Grey							1
Haldimand							
Halton							
Hastings							
Huron							
Kenora	1						
Kent							1
Lambton							
Lanark							
Leeds and Grenville							
Lennox and Addington							
Lincoln							
Manitoulin							
Middlesex		1					
Muskoka							
Nipissing							
Norfolk							
Northumberland and Durham							
Ontario							
Oxford							
Parry Sound							
Peel							
Perth							
Peterborough							
Prescott and Russell							
Prince Edward							
Rainy River							
Renfrew							
Simcoe							1
Stormont, Dundas & Glengarry							
Sudbury							
Thunder Bay							
Victoria							
Waterloo							
Welland							
Wellington							
Wentworth							
Totals	2	1	1		1		5

out the Province of Ontario during the year ending 31st December, 1911.

tinued.								
Lunacy.	Miscellaneous.	Number of advertisements of sale issued.	Number of reports issued.	Number of references pending at date of return.	Number of bills of cost taxed by Master.	Amount realized by sales held under direction of Master.	Amount of costs of reference, etc., taxed by Master or under his direction.	Amount of commission allowed in administration and partition matters.
						$ c.	$ c.	$ c.
			1	2	1		66 85	
1		2	4		2	200 00	46 12	
1	1	6	22	8	19	26,570 00	2,375 12	426 00
				1				
1			3	3	1			
3		2	6			3,380 00	20 90	
2		2	4	3	3		810 00	861 00
1			4	2	8	4,450 00	623 19	544 00
1	3	3	3	8	3	1,610 00	278 20	
						8,190 57	295 78	699 35
		4	15	1	7	10,715 93	555 00	
1		1	2	1		7,913 76		633 63
		2	2	2				
			1		1		83 53	
1	1	3	11	7	4	11,820 00	515 81	
		1	1	2	1		67 49	
				2	3		80 50	
1	2	2	5	10	2	4,966 76	223 67	
	1		1	1				
			3	2				
2			3	2	1		66 40	
2		1	4		2	2,500 00	93 60	190 00
3	3			3	1	6,550 00	247 72	
		1						
		5	11	12		7,257 16	6,717 09	224 55
			2	3	7	38,000 00		
					3		77 32	322 81
		1	2	1	3	825 00	100 12	116 25
	2		1	1	3			
1			2		1		91 61	
	1			3	1		105 42	
1	1	4	9	8	4	17,595 00	1,317 96	366 95
					2			
	2	4	3	5		76,400 00		
			3	2	8		731 75	
		1	3	2	2	3,400 00	28 60	
	2	1	1	6				
1	2	1	1	2				
1			5					
24	21	47	138	105	93	232,344 18	15,619 75	4,384 54

APPENDIX C.—A return of all business transacted by Local Registrars, 31st Dec

County or District.	Writs of summons issued.	Orders for arrest issued.	Actions entered in Procedure Book. Writs issued during year.	Writs issued during previous years.	Otherwise than by Writ.	*Præcipe* orders issued.	Orders issued and signed by Local Judge.	Examination of parties returned.	Records passed.	Actions entered for Trial. With Jury.	Without Jury.	Actions tried. With Jury.	Without Jury.	Remanets standing for Trial. With Jury.	Without Jury.
Algoma	36	....	28	2	4	21	49	9	10	3	8	6	5	....	....
Brant	53	....	39	1	5	10	15	21	13	7	10	6	7	....	2
Bruce	15	....	10	....	1	4	3	9	2	....	2	....	1	....	....
Carl3ton	179	....	151	3	49	58	28	14	34	6	32	3	18	1	4
Dufferin	13	....	12	....	4	6	2	2	1	5	1	1	1	2	....
Elgin	45	....	37	2	11	47	11	10	7	4	8	2	6	....	1
Essex	83	....	64	2	26	45	37	49	25	11	16	9	14	....	2
Frontenac	46	....	30	....	....	28	11	8	14	6	7	1	4	2	1
Grey	64	....	54	2	3	24	3	20	18	8	9	6	10	3	1
Haldimand	10	....	7	1	3	2	7	7	4	2	3	....	3	....	....
Halton	10	....	4	....	2	4	1	....	3	1	2	1	1	....	....
Hastings	50	....	42	....	....	23	8	11	14	8	9	4	8	1	1
Huron	49	....	39	2	4	17	16	11	26	13	14	2	8	1	....
Kenora	10	....	12	....	13	13	18	2	4	....	3	....	5	....	....
Kent	55	....	39	2	3	15	30	14	13	3	10	1	10	2	....
Lambton	45	....	38	3	5	19	22	17	16	13	5	4	6	2	1
Lanark	25	....	16	3	....	1	11	7	....	....	....	....	....	....	....
Leeds and Grenville	46	....	32	....	1	8	2	14	6	4	2	4	2	....	....
Lennox and Addington	18	....	14	....	3	16	5	12	8	....	8	....	7	....	1
Lincoln	39	....	32	....	2	21	14	14	20	3	17	2	11	....	....
Manitoulin	4	....	2	....	....	....	1	....	....	....	....	....	....	....	....
Middlesex	154	....	135	6	6	80	75	77	31	11	29	8	22	3	7
Muskoka	11	....	9	....	....	2	5	1	2	1	3	1	....	....	1
Nipissing	122	....	100	9	54	85	84	35	48	23	30	8	14	4	....
Norfolk	19	....	16	....	....	8	3	8	3	1	2	1	2	....	....
Northumberland and Durham	25	....	15	....	....	8	12	5	1	2	3	....	4	....	....
Ontario	17	....	12	2	3	6	....	3	....	1	2	....	2	1	....
Oxford	40	....	30	....	1	14	9	11	6	2	5	4	2	....	....
Parry Sound	8	....	8	....	....	4	4	....	4	1	3	1	3	....	....
Peel	23	....	19	3	1	14	5	8	6	3	3	3	2	....	1
Perth	67	....	52	2	2	43	40	38	24	10	23	5	13	1	1
Peterborough	31	....	25	....	3	11	4	9	4	3	1	2	2	....	....
Prescott and Russell	11	....	5	3	1	7	6	3	4	4	1	4	1	1	....
Prince Edward	8	....	8	....	....	5	....	4	3	....	5	....	4	....	....
Rainy River	13	....	12	....	3	4	12	....	3	1	2	....	3	....	....
Renfrew	24	....	19	....	1	14	5	7	6	5	3	5	3	....	....
Simcoe	62	....	52	11	2	40	16	2	21	8	13	6	5	....	....
Stormont, Dundas and Glengarry	52	....	44	5	9	21	2	1	11	1	12	....	15	....	....
Sudbury	35	....	26	9	12	13	16	....	16	4	16	1	7	....	1
Thunder Bay	117	....	119	2	47	32	150	31	37	17	19	9	14	1	1
Victoria	13	....	10	1	2	6	6	17	3	2	3	1	3	....	1
Waterloo	31	....	31	2	3	16	22	22	9	4	6	2	3	....	....
Welland	42	....	37	2	12	12	10	8	9	2	7	1	7	....	1
Wellington	32	8	25	....	....	9	3	2	5	7	4	3	3	....	1
Wentworth	215	....	185	3	23	133	64	29	70	47	25	21	15	1	....
Totals	2067	98	166	83	324	969	847	572	564	257	386	138	276	26	29

Deputy Registrars and Deputy Clerks of the Crown for the year ending
ember, 1911.

Judgments entered without trial.	Amount of such judgments, without costs.	Amount of costs taxed thereunder (exclusive of Disbursements).	Amount of disbursements allowed.	Judgments entered after trial.	Amount of such judgments, without costs.	Amount of costs taxed thereunder (exclusive of Disbursements).	Amount of disbursements allowed.	Number of Judgments for over $10,000.	Number of Judgments for $10,000 and above $5,000.	Number of Judgments for $5,000 and above $2,000.	Number of Judgments for $2,000 and above $1,000.
	$ c.	$ c.	$ c.		$ c.	$ c.	$ c.				
5	5,896 61	131 75	52 49	6	3,289 62	314 65	183 97	....	....	1	3
4	6,933 25	187 48	31 41	9	12,145 68	312 15	239 17	....	....	4	2
3	800 00	100 20	127 04	1	510 42	84 00	80 72	....	....	....	....
59	140,015 00	1,539 52	435 92	27	13,768 08	2,708 82	965 70	2	5	19	18
1	1,498 00	41 90	11 06	....	....	....	....	....	....	....	1
3	4,500 00	1,154 80	310 29	5	2,554 13	348 30	55 53	....	....	....	4
11	9,062 05	338 40	81 32	26	58,868 80	3,784 36	2,273 37	1	2	5	3
10	17,525 41	194 08	62 10	6	2,434 00	743 37	398 62	....	3	2	4
7	15,819 43	136 00	67 44	10	7,750 72	573 26	447 58	....	....	4	4
4	1,402 27	24 50	5 28	2	....	124 43	214 13	....	....	....	1
1	1,332 53	20 40	12 79	1	2,274 12	....	....	....	....	1	1
5	18,949 44	247 47	36 38	11	3,117 00	1,144 62	640 41	....	1	2	2
9	10,659 42	259 06	69 89	10	10,842 63	1,074 76	553 77	....	....	4	7
4	18,626 29	142 05	81 50	6	20,083 07	497 75	552 13	2	....	1	2
7	11,338 91	183 74	77 66	1	470 40	142 30	280 60	....	....	1	6
8	14,505 80	143 70	39 57	6	13,936 17	399 87	997 73	....	1	4	7
6	10,970 94	141 28	67 35	....	....	....	....	....	1	1	1
9	11,389 49	156 70	60 72	3	2,100 00	....	....	....	1	....	4
3	1,715 16	61 34	26 60	3	1,046 43	291 39	197 02	....	....	....	1
7	7,261 48	397 28	29 43	7	3,947 91	869 66	....	....	....	2	2
....	....	....	....	....	....	....	....	....	....	....	....
36	34,487 81	447 42	185 31	16	30,869 09	279 95	44 46	1	2	4	16
2	2,754 06	39 60	9 44	....	....	....	....	....	....	....	2
34	52,211 46	879 20	161 32	29	14,452 41	1,329 10	720 29	....	....	13	16
2	538 44	26 61	13 61	1	1,350 00	....	....	....	....	....	....
4	5,130 55	106 38	48 78	1	....	....	....	....	2	....	....
5	79,930 81	48 30	12 22	1	337 07	75 00	....	1	....	....	4
10	19,470 51	163 75	57 57	5	4,736 00	187 53	184 61	....	1	4	3
4	5,220 94	50 90	14 55	1	585 00	75 00	....	....	....	1	....
5	2,663 47	43 74	10 24	1	1,050 00	....	....	....	....	....	3
18	28,491 47	388 90	96 29	11	8,094 19	439 04	522 05	....	1	4	9
7	9,657 03	118 78	43 94	3	7,655 20	70 26	52 45	....	2	....	3
4	980 12	268 06	30 19	1	1,360 99	....	....	....	....	....	1
3	2,916 83	42 30	23 82	3	....	99 30	76 80	....	....	....	2
1	....	....	....	2	3,032 00	150 00	....	....	....	1	....
....	....	....	....	3	6,805 57	57 50	31 58	....	....	2	1
3	12,269 15	129 04	50 24	12	17,413 00	262 04	197 00	2	....	1	2
15	47,759 80	295 38	160 96	10	1,246 61	1,484 63	347 19	1	1	2	4
4	4,477 75	32 60	8 24	6	3,400 00	....	....	....	....	....	7
15	33,161 61	343 25	118 81	22	20,200 84	511 20	589 39	....	1	5	6
4	2,935 63	96 00	....	1	4,800 00	750 00	....	....	....	2	....
4	14,548 33	81 47	37 01	9	358 50	801 48	513 71	....	....	1	1
7	6,948 93	416 97	147 52	6	2,161 96	507 38	122 83	....	....	....	5
14	9,023 29	152 62	15 38	1	....	....	....	....	....	2	2
27	27,092 86	689 74	129 84	21	10,963 23	1,418 45	523 45	....	1	1	17
394	712,872 33	10,462 84	3,061 52	306	290,010 84	21,911 55	12,006 26	10	25	94	177

APPENDIX C.—A return of all business transacted by Local Registrars. 31st Dec

County or District.	Number of Judgments for $1,000 and above $400.	Number of Judgments for $400 and under.	Number of Judgments dismissing actions.	Number of Judgments in default of appearance or pleading.	Number of Judgments under Con. Rule 603.	Number of Judgments for reference to Master.	Number of Writs of Execution issued.	Number of Writs of Execution renewed.	No. of Writs of *Ca. Sa.* issued.	Number of Certificates issued under Creditors' Relief Act.	Amount for which issued, without costs.	Amount of Costs allowed thereunder (including Disbursements).
											$ c.	$ c.
Algoma	3	4	....	5	2	....	3	5	....	....	....	....
Brant	3	1	5	3	....	....	5	2	....	....	....	....
Bruce	2	....	....	....	....	....	1	4	....	....	....	....
Carleton	8	3	13	30	12	10	37	5	....	....	....	....
Dufferin	....	....	....	1	....	....	2	2	....	....	....	....
Elgin	....	4	3	....	2	2	4	5	....	....	....	....
Essex	8	2	6	7	2	3	12	....	....	....	....	....
Frontenac	3	1	1	1	1	1	18	4	....	....	....	....
Grey	2	3	2	7	....	2	4	7	....	....	....	....
Haldimand	....	....	1	3	....	....	2	....	....	....	....	....
Halton	....	....	....	....	....	....	2	....	....	....	....	....
Hastings	1	3	3	2	....	1	5	11	....	.	....	....
Huron	4	4	1	9	....	2	9	2	....	....	....	....
Kenora	4	....	....	4	....	1	9	....	....	....	....	....
Kent	1	....	4	6	1	3	7	3	....	....	....	....
Lambton	....	2	....	8	1	....	7	6	....	....	....	....
Lanark	2	1	....	1	1	1	4	....	....	....	....	....
Leeds and Grenville	2	....	4	6	1	1	6	1	....	....	....	....
Lennox and Addington	2	3	1	2	....	1	4	3	....	....	....	....
Lincoln	5	4	1	....	2	1	4	1	....	....	....	....
Manitoulin	....	....	....	....	....	....	....	....	....	....	....	....
Middlesex	9	4	4	22	7	4	26	3	....	....	....	....
Muskoka	....	....	....	....	....	1	2	....	....	....	....	....
Nipissing	8	10	13	21	11	3	15	1	....	....	....	....
Norfolk	1	....	....	....	2	....	....	....	....	....	....	....
Northumberland and Durham	1	1	1	1	....	....	2	5	....	....	....	....
Ontario	1	....	....	3	....	....	7	1	....	....	....	....
Oxford	3	2	1	5	....	....	7	2	....	....	....	....
Parry Sound	4	....	....	4	....	2	4	2	....	....	....	....
Peel	....	....	....	5	....	....	2	4	....	1	385 90	4 00
Perth	5	4	1	11	....	1	13	....	....	....	....	....
Peterborough	3	1	....	4	1	1	10	2	....	....	....	....
Prescott and Russell	1	....	....	3	....	2	1	....	....	....	....	....
Prince Edward	....	....	....	....	....	3	....	....	....	....	....	....
Rainy River	1	....	....	....	....	1	....	....	....	....	....	....
Renfrew	....	1	1	4	....	....	3	....	....	....	....	....
Simcoe	1	3	3	3	....	1	4	1	....	....	....	....
Stormont, Dundas and Glengarry	4	13	3	14	1	....	6	3	....	....	....	....
Sudbury	1	....	2	....	....	1	3	....	....	....	....	....
Thunder Bay	9	2	5	8	6	3	14	2	....	....	....	....
Victoria	1	....	....	1	....	3	1	....	....	....	....	....
Waterloo	1	....	4	4	....	1	6	2	....	....	....	....
Welland	1	7	2	5	....	....	2	....	....	....	....	....
Wellington	....	....	....	2	1	1	3	1	....	. .	....	....
Wentworth	6	23	5	6	10	6	13	16	....	....	....	....
Totals	111	106	90	221	64	63	289	106	....	1	385 90	4 00

Deputy Registrars and Deputy Clerks of the Crown for the year ending
ember, 1911.—Continued.

Number of days of sitting of Judge with Jury, H.C.J.	Number of days of sitting of Judge without Jury, H.C.J.	Number of Estreats ordered to be issued.	Number of Estreats issued.	Amount of Jury fees paid County or Provincial Treasurer.	Amount of money paid into Court with defence.	Amount of money paid out of Court.	Amount of fees collected in law stamps for the Shorthand Reporters' Fund.	Fees collected in law stamps by Deputy Clerks and Local Registrars.	Fees collected in law stamps by Deputy Registrars.
				$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
7	7	......	....	9 00	711 39	....	22 00	218 00	....
7	2	......	....	24 00	1,321 90	....	34 00	232 00	....
4	2	......	....	....	....	....	4 00	64 65	....
3	14	......	....	18 00	2,704 35	....	76 00	314 10	240 90
1	2	......	....	15 00	....	....	12 00	44 60	....
4	4	......	....	12 00	....	....	24 00	226 30	....
9	6	......	....	30 00	1,840 63	....	54 00	571 60	....
6	3	......	....	15 00	....	....	26 00	133 30	....
6	8	......	....	24 00	17,814 38	....	34 00	249 50	....
4	....	......	....	6 00	....	....	10 00	54 30	....
1	1	......	....	3 00	....	....	6 00	34 00	....
6	7	......	....	24 00	....	....	30 00	62 20	210 10
8	5	......	....	39 00	1,879 28	....	30 00	197 30	....
....	5	......	....	....	....	....	6 00	146 45	....
5	3	......	....	9 00	....	....	26 00	247 50	....
10	3	......	....	39 00	380 00	....	36 00	255 90	....
....	2	......	....	....	....	....	....	101 20	....
5	3	......	....	14 00	....	....	12 00	216 65	....
4	4	......	....	....	....	....	16 00	128 40	....
5	5	......	....	9 00	2,692 36	....	40 00	229 60	....
2	....	......	....	....	....	....	....	5 60	....
7	14	......	....	33 00	3,326 31	2,100 00	54 00	146 80	182 50
3	3	......	....	3 00	....	....	8 00	41 80	....
11	6	......	....	69 00	....	....	106 00	737 10	....
2	2	......	....	3 00	....	....	6 00	70 70	....
13	6	......	....	6 00	....	....	10 00	114 40	....
3	....	......	....	3 00	....	....	4 00	76 20	....
6	2	......	....	3 00	....	....	18 00	86 10	41 10
4	....	......	....	3 00	....	....	8 00	55 60	....
4	4	......	....	9 00	....	....	12 00	111 35	....
7	3	......	....	20 00	448 50	....	58 00	382 70	....
4	6	......	....	9 00	....	....	8 00	190 40	....
3	1	......	....	12 00	....	....	10 00	64 90	....
....	7	......	....	....	....	....	10 00	63 50	....
3	....	1	....	3 00	200 00	....	6 00	65 50	....
5	2	......	....	15 00	....	....	16 00	104 00	....
12	8	......	....	24 00	....	....	42 00	271 40	....
15	6	1	....	3 00	1,000 00	....	26 00	290 70	....
4	4	......	....	12 00	....	....	32 00	210 10	....
7	7	......	....	48 00	2,500 00	....	70 00	602 50	....
3	4	......	....	6 00	....	....	10 00	82 00	....
2	5	......	....	12 00	....	....	20 00	217 80	....
2	3	......	....	6 00	1,410 80	....	18 00	242 30	....
3	2	......	....	21 00	....	....	20 00	147 60	....
30	7	......	....	141 00	2,600 48	....	144 00	989 20	10 80
250	188	2	....	754 00	40,830 38	2,100 00	1,214 00	9,097 30	685 40

APPENDIX D.—Being a return of business transacted by County Court Clerks

County or District.	Writs of summons issued.	Orders for arrest issued.	Actions entered in Procedure Book. (a) Writs issued during the year.	(b) Do. previous year.	(c) Otherwise than by Writ.	*Præcipe* orders issued.	Orders issued and signed by Local Judge.	Examination of Parties returned.	Records passed.	Actions entered for Trial with Jury.	Actions entered for Trial without Jury.	Number of actions tried with Jury.	Number of actions tried without Jury.	Number of Remanets standing for Trial with Jury.
Algoma	62	1	41	2	2	6	46	3	2	....	2	....	1	....
Brant	51	..	40	3	2	9	12	8	11	7	4	4	3	....
Bruce	37	..	26	3	11	15	28	8	10	4	6	3	6	....
Carleton	257	..	190	8	18	37	64	40	21	7	36	7	34	....
Dufferin	15	..	11	....	....	12	4	4	3	2	1	1	2	....
Elgin	47	..	40	....	....	26	9	22	10	6	3	2	3	2
Essex	64	..	53	5	25	38	......	29	23	3	21	1	17	....
Frontenac	47	..	32	1	2	19	17	12	8	....	....	....	....	2
Grey	55	..	40	2	....	5	3	6	12	7	6	6	5	1
Haldimand	21	..	13	....	....	1	6	4	4	....	5	....	5	....
Halton	12	..	9	....	....	2	7	....	6	2	4	2	4	....
Hastings	50	..	39	1	3	26	46	18	22	10	15	6	10	....
Huron	69	2	61	4	....	21	20	7	19	9	9	1	2	1
Kenora	41	..	43	2	3	18	44	7	7	....	10	....	8	....
Kent	76	1	62	3	....	38	25	22	17	5	12	2	11	....
Lambton	50	..	43	3	20	26	24	16	12	3	9	1	9	1
Lanark	38	1	29	2	....	10	28	12	8	2	5	2	5	....
Leeds & Grenville	47	..	32	3	....	6	5	23	12	1	12	1	9	....
Lennox & Addington	16	..	13	....	....	7	11	4	5	2	3	1	2	....
Lincoln	39	..	32	....	....	15	18	10	17	5	12	3	10	....
Manitoulin	11	..	7	....	2	....	7	....	....	....	1	....	1	....
Middlesex	170	2	123	4	18	64	53	39	38	18	22	16	20	....
Muskoka	27	1	18	1	....	3	9	....	5	4	2	2	1	1
Nipissing	277	..	194	29	8	80	150	21	69	7	65	1	33	....
Norfolk	18	..	14	1	1	3	8	1	1	1	....	1	....	....
Northumberland and Durham	56	..	33	1	....	17	31	7	8	1	9	1	4	....
Ontario	19	..	17	2	3	3	4	4	....	6	1	6	1	....
Oxford	39	..	28	1	1	7	25	6	7	8	1	5	1	....
Parry Sound	20	..	15	....	4	8	3	3	3	1	2	1	2	....
Peel	19	..	17	....	1	16	2	9	8	5	3	5	1	....
Perth	76	..	59	2	3	32	44	30	30	17	14	6	17	3
Peterborough	45	..	29	4	2	7	24	8	5	1	4	....	5	....
Prescott and Russell	20	..	13	1	....	2	8	2	7	1	1	1	1	....
Prince Edward	15	..	12	....	2	6	5	2	4	2	5	2	5	....
Rainy River	55	..	48	....	....	21	27	....	5	2	3	2	3	....
Renfrew	45	..	29	7	3	12	12	....	2	....	3	....	2	....
Simcoe	86	..	63	1	....	18	4	1	18	9	9	3	3	....
Stormont, Dundas and Glengarry	75	1	48	5	2	17	15	....	9	....	10	....	10	....
Sudbury	123	..	76	47	....	9	42	....	34	2	32	....	14	....
Thunder Bay	186	1	150	4	1	13	158	15	14	1	13	1	12	....
Victoria	37	..	26	....	1	13	14	10	5	4	4	1	4	....
Waterloo	69	..	55	2	1	26	16	23	13	7	6	4	7	....
Welland	35	..	25	2	6	8	13	3	10	4	6	2	7	....
Wellington	45	..	29	....	....	9	11	2	3	2	1	2	1	....
Wentworth	289	..	236	4	17	100	77	10	74	47	27	25	21	3
York	1,708	5	1,276	71	4	497	699	157	329	97	232	92	231	12
Totals	4,659	15	3,489	231	166	1328	1,878	608	930	322	651	222	553	26

throughout the Province of Ontario for the year ending 31st December, 1911.

Number of Remanets standing for Trial without Jury.	Number of Judgments entered without Trial.	Total amount of such Judgments without costs.	Total amount of Costs taxed thereunder (exclusive of Disbursements).	Total amount of Disbursements allowed.	Number of Judgments entered after Trial.	Total amount of such Judgments without costs.	Total amount of Costs taxed thereunder (exclusive of Disbursements).	Total amount of Disbursements allowed.	Number of Judgments $400 and under.	Number of Judgments dismissing actions.	Number of Judgments in default of appearance or pleading.	Number of Judgments under Con. Rule 603.
		$ c.	$ c.	$ c.		$ c.	$ c.	$ c.				
....	26	9,649 07	412 29	179 59	5	216 10	62 40	25 41	31	....	26	4
....	11	3,764 78	106 98	43 36	4	306 50	101 25	48 33	12	2	10	....
....	8	2,082 15	90 11	30 20	6	1,670 35	85 80	76 76	15	1	6	2
3	101	29,858 04	1,720 23	441 28	18	3,205 39	769 19	256 49	111	7	72	21
....	3	1,103 69	32 00	13 86	1	336 50	71 85	20 57	4	....	3	....
1	10	3,052 39	119 74	27 42	3	381 29	142 94	52 51	13	1	9	1
3	16	3,473 83	296 74	70 24	17	2,574 61	1,250 69	670 09	24	3	9	3
1	8	3,177 15	123 32	59 01	4	1,028 00	73 52	80 21	12	....	6	3
1	16	5,241 17	136 21	60 98	2	30 00	41 75	45 31	16	1	13	2
....	5	1,704 34	67 90	16 98	2	539 00	39 83	62 86	7	....	5	....
....	3	476 08	33 80	10 79	....	....	....	....	3	....	....	....
6	9	2,813 85	111 16	30 15	11	1,621 33	966 99	601 75	10	3	6	4
5	23	8,021 57	496 95	150 43	3	1,021 90	397 68	235 74	26	....	18	5
....	12	6,798 18	228 90	52 90	4	1,051 78	139 15	63 50	15	1	9	3
4	22	6,739 55	291 40	112 50	4	348 44	124 00	124 00	26	6	19	3
1	15	3,598 43	246 62	76 69	4	758 92	341 28	293 95	19	....	15	....
....	7	2,763 25	106 81	53 56	3	190 00	201 08	200 13	10	1	7	....
3	15	5,111 33	502 33	401 20	8	413 00	44 25	91 55	20	3	5	5
2	4	1,715 59	47 85	19 07	....	....	....	....	4	....	4	....
....	10	3,493 85	173 18	40 13	4	1,790 00	474 66	312 35	14	....	....	....
....	3	932 83	57 17	8 77	1	....	211 14	55 62	3	....	3	....
2	31	8,924 09	552 43	151 25	19	2,924 17	983 40	388 60	40	10	19	12
....	10	2,784 25	67 57	25 27	3	173 14	233 47	161 86	13	....	....	10
5	141	43,633 25	1,911 24	411 60	23	4,558 92	559 27	1,033 90	156	6	105	32
....	4	1,690 92	53 47	29 21	....	....	....	....	4	....	4	....
5	16	5,621 89	276 09	69 45	1	216 57	....	....	17	....	11	....
....	8	1,964 17	67 08	29 37	3	412 50	374 42	164 16	9	1	6	....
....	15	4,346 49	220 10	129 61	1	203 45	56 00	141 89	15	....	13	2
....	7	2,952 00	106 35	20 48	3	515 50	115 46	50 40	10	....	7	....
2	3	864 89	44 85	15 61	2	240 00	240 85	140 00	2	....	3	....
2	39	15,517 28	813 42	287 98	15	5,542 00	873 41	337 86	42	9	26	....
....	14	4,918 29	227 73	82 57	2	384 00	168 56	79 26	15	1	10	1
....	8	2,562 21	103 58	53 14	....	....	....	....	8	....	7	1
....	4	889 40	113 15	48 35	5	1,352 64	441 21	401 84	6	4	3	....
....	13	4,392 62	185 75	85 76	5	763 43	125 00	....	18	....	13	....
....	....	....	....	....	....	....	....	....	....	....	18	....
1	20	6,383 30	273 90	110 10	3	915 80	190 20	338 50	23	....	22	1
3	29	8,272 79	387 40	145 75	8	796 10	641 40	212 78	37	2	28	1
1	30	9,016 33	395 67	134 73	12	3,814 25	338 80	241 21	31	2	....	....
....	93	29,700 75	1,432 54	481 33	14	4,347 01	343 74	323 57	89	1	23	....
2	9	2,275 57	148 40	63 59	3	150 00	110 35	150 71	9	3	6	....
....	31	10,150 63	463 26	223 18	9	1,663 41	300 38	453 63	37	2	28	3
....	11	3,102 98	147 34	59 16	1	444 74	66 25	78 00	12	1	8	....
1	8	2,109 45	179 09	45 59	4	945 16	428 32	253 47	12	1	6	2
3	67	19,731 39	1,145 10	358 85	24	3,300 00	1,361 64	552 17	91	7	51	13
20	637	191,091 14	8,052 22	2,301 74	185	31,910 31	9,458 67	2,484 70	822	53	489	148
77	1575	488,467 25	22,769 42	7,262 78	449	83,056 21	22,950 25	11,305 64	1913	132	1151	282

APPENDIX D.—Being a return of business transacted by County Court Clerks

County or District.	Number of Judgments for reference to Master.	Writs of Execution issued.	Number of Writs of Execution renewed.	Number of Writs of Ca. Sa. issued.	Number of Certificates issued under Creditors' Relief Act.	Amount for which issued without Costs.	Amount of Costs allowed thereunder (including Disbursements).	Number of days of sittings of County Court.	Amount of Jury Fees paid County or Provincial Treasurers.	Amount of money paid into Court with defence.
						$ c.	$ c.		$ c.	$ c.
Algoma		31	22					3		50 00
Brant	1	10	2					6	10 50	
Bruce		5			4	423 25	16 15	7	6 00	
Carleton	1	71	6		2	410 17	15 95	37	10 50	176 00
Dufferin		4	1					3	3 00	
Elgin		10	1					10	9 00	175 00
Essex		20	2					16	7 50	32 00
Frontenac		11	2					6		
Grey	1	13	3					8	10 50	146 20
Haldimand		3						6		350 00
Halton		3						9	3 00	250 00
Hastings		7	3					27	13 50	18,650 00
Huron		14	2					12	10 50	
Kenora		16	2					6		615 24
Kent		18	8					15	7 50	343 55
Lambton		15	3					10	4 50	381 77
Lanark		8						5	3 00	
Leeds and Grenville		20	1					11	1 50	395 00
Lennox and Addington		3	3					6	3 00	5 00
Lincoln		7	1					12	7 50	264 78
Manitoulin		2						4		250 00
Middlesex		31	2					22	27 00	632 48
Muskoka		7						5	6 00	180 00
Nipissing		97	1		1	321 96	10 55	17	10 50	359 91
Norfolk		2						8	1 50	
Northumberland and Durham		9	4					16	1 50	2,077 34
Ontario		8	2					9	9 00	280 00
Oxford		13						4	10 50	
Parry Sound		6						2	1 50	
Peel		2	1					11	7 50	
Perth		28						16	25 50	
Peterborough		8	1					9	1 50	
Prescott and Russell		6						6	1 50	25 00
Prince Edward		4						10	3 00	
Rainy River		4						6	4 50	1,513 50
Renfrew		7						6		139 00
Simcoe		14	6					25	13 50	250 00
Stormont, Dundas and Glengarry		20						11		580 00
Sudbury		25						7	3 00	2,369 79
Thunder Bay		89	37					17	1 50	9 65
Victoria		11						9	6 00	69 94
Waterloo		31	1					16	10 50	827 64
Welland		9	1					12	6 00	
Wellington		5						6	3 00	196 60
Wentworth	1	63	9					33	70 50	161 45
York	3	603	123	2	30	3,373 50	181 60	207	145 50	3,333 00
Totals	7	1393	250	2	37	4,528 88	224 25	709	481 50	35,089 84

in the Province of Ontario for the year ending 31st December, 1911.—Concluded.

Amount of money paid out of Court.	Number of Partition Matters.	Amount of money paid thereunder.	Amounts paid out.	Amount of moneys in Court in County Court matters, including interest (under Con. Rule 1221).	Number of Chattel Mortgages and Bills of Sale filed.	Total amount secured by such mortgages.	Number of mortgages renewed.	Number of discharges filed.	Number of assignments for benefit of creditors.	Number of Hire Receipts, etc., filed under 1 Geo. V., c. 30.	Total amount secured by such Receipts, etc.	Amount of fees collected in law stamps under Section 42 of the Creditors' Relief Act.
$ c.		$ c.	$ c.	$ c.		$ c.					$ c.	
....	..	..	....	....	164	15,434,773 79	68	14	14	150	82,633 67	......
....	..	....	....	673 58	141	254,505 73	96	10	2	221	27,870 16	......
....	..	....	....	76 87	184	91,819 00	128	15	8	113	36,289 49	1 60
144 00	..	....	....	53,071 00	184	94,551 15	129	10	31	688	186,321 37	......
....	..	..	....	25 00	45	17,317 33	49	2	1	99	12,989 00	......
48 00	..	....	....	695 98	342	300,925 87	130	7	5	126	21,462 25	......
825 00	..	...	....	1,645 84	260	82,275 26	135	16	3	139	29,051 16	......
....	..	..	....	....	270	142,491 15	132	5	5	391	57,113 86	......
65 00	..	....	....	81 20	500	382,198 30	217	9	6	272	53,220 66	......
....	..	....	....	....	74	45,608 98	41	3	4	57	10,432 68	......
250 00	..	....	....	....	40	30,805 13	19	3	....	35	8,945 48	......
8,710 50	..	....	....	10,387 95	554	446,381 76	201	12	1	200	39,830 15	......
....	..	...	....	198 12	107	67,394 22	116	13	9	87	19,125 93	......
505 61	..	....	....	....	47	1,005,805 74	18	4	....	73	28,004 39	0 80
629 87	..	....	....	35 59	362	124,202 02	316	24	6	760	85,301 50	......
560 00	..	....	....	321 77	192	63,644 23	208	3	6	91	40,774 29	......
....	..	....	....	....	64	28,244 93	55	2	5	51	5,280 13	......
....	..	....	....	480 30	165	61,857 56	145	2	4	107	10,665 03	......
5 00	..	....	....	....	80	52,464 92	85	6	7	87	6,950 28	......
230 00	..	....	....	34 78	55	26,833 97	52	2	2	166	44,750 96	......
250 00	..	. .	....	....	84	16,132 49	49	2	1	......	....	......
307 55	..	....	....	324 93	148	260,119 23	137	12	14	263	66,966 93	......
56 86	..	....	....	123 14	167	89,739 56	47	3	1	40	12,335 45	......
637 49	..	.. .	....	494 00	346	369,623 24	89	24	32	289	144,800 72	1 50
....	..	....	....	367 11	136	43,028 72	124	12	1	155	20,166 05	......
6,641 81	..	....	....	24,448 68	207	2,210,612 94	202	12	5	85	17,410 35	......
130 70	..	....	....	326 15	102	44,383 22	100	4	5	74	11,249 22	......
680 00	..	....	....	1,715 44	124	57,720 24	91	9	8	86	2,802 24	......
....	..	....	....	7 00	198	275,669 85	49	3	4	82	24,181 39	......
....	..	....	....	....	60	53,226 25	23	5	6	21	2,034 39	4 00
104 86	..	....	....	....	158	225,354 75	67	7	5	117	35,660 59	......
835 08	.	...	....	....	133	91,411 60	93	9	6	72	14,322 73	......
90 00	..	....	....	....	146	107,732 74	44	6	8	27	6,542 94	......
....	..	....	....	....	62	52,496 92	55	3	1	34	5,709 55	......
1,513 50	..	....	....	....	53	98,319 34	5	2	3	123	24,948 42	......
....	..	....	....	147 40	113	67,043 00	135	7	7	64	14,098 40	......
250 00	..	....	....	1,006 40	320	483,660 95	243	4	9	251	41,330 37	......
147 00	..	....	....	580 00	197	199,633 67	102	14	19	257	15,722 22	......
2,328 39	..	....	....	76 25	213	293,174 30	39	18	9	......	....	3 00
402 57	..	.. .	....	254 49	142	130,800 11	14	1	18	1173	197,384 10	......
....	..	....	....	69 94	124	478,018 90	59	3	....	152	22,862 25	......
78 24	..	....	....	733 01	164	105,781 31	72	12	18	239	68,322 48	......
....	..	....	....	....	286	5,384,989 41	84	12	10	76	55,231 05	......
162 00	..	. .	....	2,244 13	217	147,105 85	97	4	9	94	21,627 75	......
251 45	..	....	....	675 15	321	529,237 78	287	12	9	214	136,103 64	......
58,703 64	..	....	....	6,163 29	889	5,219,778 00	459	81	102	2,159	1,049,152 00	9 20
85,544 12	..	....	....	107,434 49	8,940	35,789,195 41	5106	443	429	10,060	2,817,977 67	20 10

APPENDIX E.—Being a return of business transacted by Surrogate Registrars

County or District.	Total number of Probates issued.	Total number of Letters of Administration issued.	Total number of Letters of Guardianship issued.	Total number of Probates and Letters of Administration issued under 10 Edw. VII., C. 31, s. 73, ss. 1.	Total number of Probates and Letters issued under 10 Edw. VII., C. 31, s. 73, ss. 4.	Number of Wills proved istration or Guardianship alty valued as			
						$100,000, or over.	From $50,000 to $100,000.	From $25,000 to $50,000.	From $10,000 to $25,000.
Algoma	25	25	1	8	13	1	......	1	2
Brant	79	46	1	22	14	......	......	2	2
Bruce	123	50	......	29	18	......	......	2	6
Carleton	179	101	9	17	40	2	......	10	17
Dufferin	49	15	......	3	9	......	......	......	2
Elgin	112	56	......	14	11	......	......	3	8
Essex	98	82	7	25	22	1	......	4	10
Frontenac	65	38	1	12	13	......	......	2	6
Grey	160	64	3	27	20	......	......	2	12
Haldimand	62	27	......	10	8	......	......	......	4
Halton	51	21	......	5	6	......	1	......	4
Hastings	115	64	6	22	16	......	......	1	9
Huron	208	53	......	25	28	1	......	5	14
Kenora	7	14	2	3	4	......	......	1	1
Kent	129	51	3	23	28	......	1	3	6
Lambton	98	61	5	16	17	......	1	......	7
Lanark	72	28	1	6	17	......	1	......	9
Leeds and Grenville	116	59	......	11	15	1	1	2	4
Lennox and Addington	47	13	......	2	7	......	......	1	4
Lincoln	66	41	1	13	12	......	2	1	5
Manitoulin	8	7	......	1	4	......	......	......	......
Middlesex	251	110	6	81	67	2	......	7	15
Muskoka	20	27	......	11	8	......	......	......	......
Nipissing	25	54	1	1	14	......	......	......	3
Norfolk	60	30	3	12	13	......	......	......	4
Northumberland and Durham	162	64	......	23	28	1	......	2	7
Ontario	81	45	2	15	15	......	1	1	7
Oxford	142	70	3	13	31	......	......	3	11
Parry Sound	17	19	......	22	10	......	......	......	......
Peel	89	22	......	23	24	......	......	1	8
Perth	139	43	2	16	16	......	......	6	8
Peterborough	78	46	4	11	16	1	......	1	8
Prescott and Russell	49	22	4	8	5	......	......	1	2
Prince Edward	45	18	1	2	16	......	......	......	2
Rainy River	3	12	2	4	2	......	......	......	......
Renfrew	54	20	......	......	12	2	1	2	4
Simcoe	178	72	4	35	38	1	......	2	8
Stormont, Dundas and Glengarry	81	40	7	12	17	1	......	3	4
Sudbury	11	22	......	......	......	......	......	......	......
Thunder Bay	23	40	1	11	10	......	......	......	5
Victoria	66	27	3	11	24	......	1	1	6
Waterloo	157	42	1	12	32	2	1	5	10
Welland	81	46	1	19	15	......	......	2	3
Wellington	148	59	1	20	40	......	......	......	7
Wentworth	218	102	6	23	48	1	1	9	18
York	712	550	37	250	158	7	15	33	81
Totals	4,759	2,518	129	921	981	24	27	119	353

throughout the Province of Ontario during the year ending 31st December, 1911.

and Letters of Administration issued where personalty follows:				Total amount of personalty devolving.	Total amount of realty to be administered under 10 Edw. VII., C, 56, s. 3.	Amount of moneys in Court in Surrogate matters, including interest, Con. Rule 1,221.	Amount earned for.		
From $5,000 to $10,000.	From $1,000 to $5,000.	From $400 to $1,000.	$400 and under.				Registrar's fees.	Judge's fees.	Fee fund.
				$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1	10	15	21	364,535 50	20,175 00	....	475 40	496 00	242 40
14	43	21	44	321,633 94	278,855 00	....	1,364 50	592 25	352 20
11	92	25	37	463,833 00	393,639 52	....	1,832 28	1,056 00	530 20
24	109	51	76	1,633,054 26	1,306,278 08	....	2,198 65	2,351 55	1,367 85
7	28	13	14	159,873 37	149,245 71	....	778 95	323 00	195 60
21	61	31	44	501,466 47	386,986 47	....	1,867 18	907 50	549 00
10	56	27	79	667,889 61	479,657 68	8 23	1,901 67	1,290 50	665 90
7	41	16	32	360,101 67	366,396 78	....	1,122 75	681 50	351 30
24	92	32	65	645,853 69	393,256 00	....	2,319 69	1,353 50	691 60
8	39	18	20	215,751 72	160,811 00	167 36	1,029 07	477 15	247 50
5	38	9	15	289,957 17	175,760 00	....	797 65	424 25	195 50
21	77	35	42	488,529 00	61,580 00	....	2,196 96	948 65	536 30
22	104	44	71	921,931 26	99,450 00	....	2,790 20	1,516 25	857 70
1	11	5	4	38,634 00	118,768 53	....	212 85	173 50	170 90
14	74	32	53	481,304 00	51,873 00	....	1,341 50	965 00	709 10
13	75	21	47	434,425 63	353,237 16	235 00	1,657 48	911 25	496 90
8	40	22	21	362,441 43	227,268 35	....	1,216 61	647 75	353 20
22	82	40	23	844,523 00	94,150 00	....	2,363 05	1,245 25	706 10
9	26	10	10	236,339 60	205,625 00	....	734 34	483 60	226 40
6	42	23	29	338,778 35	203,098 00	....	1,168 00	714 30	350 70
......	7	4	4	17,034 97	12,509 00	....	150 88	48 50	35 30
28	148	69	98	1,288,457 09	1,027,360 13	....	3,834 80	2,310 70	1,356 20
1	12	10	24	70,276 23	48,499 00	....	418 73	153 00	106 90
2	19	13	42	119,755 63	21,120 00	....	559 75	250 00	166 10
7	34	20	28	199,761 97	158,903 06	451 44	1,162 44	498 25	258 40
21	95	39	61	741,870 30	482,581 43	....	2,459 80	1,390 75	767 30
7	55	19	38	397,405 27	303,021 35	....	1,497 59	802 00	365 70
23	87	37	54	659,983 90	550,671 85	10,269 32	2,843 48	1,553 00	726 00
1	3	10	22	20,514 00	33,265 00	....	225 56	82 00	59 30
5	50	24	23	345,176 00	360,896 00	....	1,476 56	656 00	361 90
23	79	29	39	704,129 64	562,617 08	....	1,950 77	1,106 00	644 75
13	54	23	28	797,568 66	352,250 00	....	1,549 05	1,291 00	623 90
8	28	15	21	193,531 67	132,423 50	....	737 74	333 75	218 50
10	21	12	19	150,999 67	128,478 00	....	751 80	449 50	192 70
......	11	2	4	13,083 63	21,665 00	....	119 47	46 25	38 70
4	37	12	12	615,398 59	133,304 71	....	788 87	797 75	423 50
18	150	37	38	870,726 76	659,280 99	....	2,490 16	1,247 30	790 60
20	58	22	30	733,726 27	61,540 00	....	1,813 35	1,156 25	604 20
......	11	8	4	30,259 73	15,330 00	....	222 91	84 25	61 40
1	9	15	33	105,237 46	36,300 00	....	551 77	522 00	280 00
5	48	24	11	353,558 91	242,359 50	....	1,282 66	644 00	339 20
16	84	33	49	1,024,770 73	425,146 15	....	2,076 04	1,367 50	862 00
11	45	27	40	303,699 21	408,214 42	....	1,036 80	554 75	336 70
11	87	31	72	403,260 00	486,793 00	....	1,963 66	969 25	548 90
24	115	62	96	1,561,480 26	912,604 91	602 70	3,246 65	2,656 00	1,358 00
97	379	105	582	8,433,803 00	3,327,488 00	....	12,980 72	12,435 10	6,207 50
604	2,866	1,192	2,219	29,926,326 22	16,435,733 36	11,734 05	77,560 79	50,963 60	27,520 00

APPENDIX F.—Return of fees and emoluments of County Judicial Officers throughout the officers payable by the Province, the County and the

County and Town.	Office.	Officer	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present year's services.
			$ c.	$ c.	$ c	$ c.
ALGOMA: Sault Ste. Marie ..	Sheriff	W. H. Carney ...	2,172 10	*1,000 00	3,172 10	2,541 25
	Surrogate Judge ..	Judge Stone.....	....	*500 00	540 20	500 00
	Local Master	" ..	40 20	....	....	14 00
	Crown Attorney...	M.McFadden K.C.	1,261 59	400 00	2,274 48	1,329 16
	Clerk of the Peace.	" ..	612 89	....	....	359 42
	Local Registrar...	C. V. Plummer..	83 49	150 00	1,679 99	208 49
	District Court Cl'k	" ..	371 10	600 00	....	871 10
	SurrogateRegistrar	" ..	475 40	....	....	475 40
BRANT: Brantford.	Sheriff	W. W. Ross	2,182 32	....	2,182 32	1,443 50
	Surrogate Judge...	Judge Hardy...	‡Commuted	682 00	688 00	682 00
	Local Master......	" ...	6 00	....	....	....
	Crown Attorney .	A. J. Wilkes, K.C.	1,133 35	....	2,175 25	836 85
	Clerk of the Peace	"	1,041 90	....	....	557 66
	Local Registrar...	J. T. Hewitt.....	248 25	675 00	2,760 00	923 25
	County Court Cl'k.	"	472 25	....	....	472 25
	SurrogateRegistrar	"	1,364 50	....	....	1,364 50
BRUCE: Walkerton	Sheriff	D. M. Jermyn ..	1,836 33	....	1,836 33	1,559 85
	Surrogate Judge...	Judge Barrett...	* 1,000 00	....	1,000 00	....
	Local Master	Judge Klein.....	Commated	400 00	....	....
	Crown Attorney...	Thomas Dixon ..	329 00	....	1,738 89	257 15
	Clerk of the Peace	" ..	1,409 89	....	....	894 02
	Local Registrar. .	Matthew Goetz..	84 74	675 00	3,163 37	759 74
	County Court Cl'k	" ..	571 35	....	....	291 46
	SurrogateRegistrar	" ..	1,832 28	....	....	1,412 45
CARLETON. Ottawa ..	Sheriff	G. C. Richardson.	6,571 32	....	6,571 32	5,525 32
	Surrogate Judge...	Judge McTavish.	1,300 00	....	1,300 00	....
	" ...	Judge Gunn.....	1,000 00	....	1,000 00	....
	Local Master	John Bishop, K.C.	1,414 90	....	1,978 55	1,414 90
	Deputy Registrar..	"	563 65	....	....	563 65
	Crown Attorney...	J. A. Ritchie	735 42	....	1,985 18	473 82
	Clerk of the Peace.	"	1,249 76	....	....	554 01
	Deputy Clerk of the Crown..........	†Horace Pratt ..	210 40	450 00	4,117 25	504 15
	County Court Cl'k.	"	1,258 20	....	....	1,258 20
	SurrogateRegistrar	"	2,198 65	....	....	2,198 65
DUFFERIN: Orangeville	Sheriff	Thomas Bowles.	988 01	....	988 01	600 60
	Surrogate Judge ..	Judge McCarthy.	323 00	....	328 80	323 00
	Local Master	"	5 80	....	....	....
	Crown Attorney...	W. J. L. McKay..	163 45	....	671 30	135 45
	Clerk of the Peace.	"	507 85	....	....	232 80
	Local Registrar...	J. A. V. Preston.	59 80	675 00	1,754 30	734 80
	County Court Cl'k.	"	240 55	....	....	195 20
	SurrogateRegistrar	"	778 95	....	....	768 95
ELGIN. St. Thomas	Sheriff	Dugald McColl .	2,620 79	....	2,620 79	1,870 34
	Surrogate Judge..	Judge Colter....	907 50	....	907 50	907 50
	Local Master	C. F. Maxwell. .	272 05	....	272 05	257 95
	Crown Attorney...	A. McCrimmon..	1,207 35	....	2,474 26	862 55
	Clerk of the Peace.	" ..	1,266 91	....	....	799 33
	Local Registrar...	David McLaws..	151 95	675 00	3,302 93	687 95
	County Court Clerk	"	608 80	....	....	458 90
	SurrogateRegistrar	"	1,867 18	....	....	1,735 88

*By 10 Edw. VII. c. 26, s. 13. †Appointed 7th March. ‡$875 from 1st Oct, 1911–O. in C. Mar. 6th.

Province of Ontario for the year ending 31st December, 1911, and of total earnings of such General Public, respectively, for the same period.

Total received for past years' services	Total receipts by officer from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public respectively. From Province.	From County.	From General Public.	County.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
878 47	3,419 72	1,952 87	1,466 83	....	1,466 85	2,593 29	....	578 81	Algoma.
....	514 00	....	514 00	....	514 00	500 00	....	....	
....	....	....	....	....	....	....	....	40 20	
329 00	2,231 63	150 00	2,081 63	....	2,081 63	1,639 16	....	22 43	
214 05	....	....	....	....	....	497 71	....	115 18	
25 00	1,679 99	289 20	1,390 79	....	1,390 79	150 00	....	83 49	
100 00	....	....	....	....	....	600 00	....	371 10	
....	....	....	....	....	....	....	....	475 40	
689 57	2,133 07	305 85	1,827 22	....	1,827 22	1,149 19	611 28	421 85	Brant.
....	682 00	....	682 00	....	682 00	682 00	....	....	
....	....	....	....	....	....	....	....	6 00	
307 50	2,067 05	489 14	1,577 91	....	1,577 91	862 50	6 00	264 85	
365 04	....	....	....	....	....	186 40	714 37	141 13	
....	2,760 00	410 00	2,350 00	....	2,350 00	675 00	....	248 25	
....	....	....	....	....	....	....	....	472 25	
....	....	....	....	....	....	....	....	1,364 50	
147 92	1,707 77	907 18	800 59	....	800 59	657 17	687 46	491 70	Bruce.
....	1,000 00	....	1,000 00	....	1,000 00	....	....	1,000 00	
....	400 00	....	400 00	....	400 00	400 00	....	....	
42 30	1,561 81	44 74	1,517 07	....	1,517 07	325 00	4 00	....	
368 34	....	....	....	....	....	149 47	1,250 27	10 15	
....	3,281 06	529 20	2,751 86	25 18	2,726 68	675 00	....	84 74	
326 96	....	....	....	....	....	....	....	571 35	
490 45	....	....	....	....	....	....	....	1,832 28	
1,174 28	6,699 60	1,954 92	4,744 68	....	4,744 68	2,182 17	734 04	3,655 11	Carleton.
....	1,300 00	....	1,300 00	....	1,300 00	....	....	1,300 00	
....	1,000 00	....	1,000 00	....	1,000 00	....	....	1,000 00	
....	1,978 55	597 60	1,380 95	....	1,380 95	....	....	1,414 90	
....	....	....	....	....	....	....	....	563 65	
161 00	1,620 68	904 76	715 92	....	715 92	717 42	17 00	1 00	
431 85	....	....	....	....	....	159 70	613 70	476 36	
....	3,961 90	1,130 50	2,830 50	33 05	2,797 45	450 00	....	210 40	
....	....	....	....	....	....	....	....	1,258 20	
....	....	....	....	....	....	....	....	2,198 65	
381 35	981 95	697 21	284 74	....	284 74	457 84	335 79	194 38	Dufferin.
....	330 40	....	330 40	....	330 40	....	....	323 00	
7 40	....	....	....	....	....	....	....	5 80	
27 00	599 25	55 00	544 25	....	544 25	118 45	....	45 00	
204 00	....	....	....	....	....	67 60	384 75	55 50	
....	1,712 65	83 75	1,628 90	....	1,628 90	675 00	....	59 80	
11 40	....	....	....	....	....	....	....	240 55	
2 30	....	....	....	....	....	....	....	778 95	
386 95	2,257 29	1,072 31	1,184 98	....	1,184 98	1,291 43	714 24	615 12	Elgin.
....	907 50	....	907 50	....	907 50	....	....	907 50	
206 30	464 25	....	464 25	....	464 25	....	....	464 25	
455 65	2,508 18	492 43	2,015 75	1 57	2,014 18	1,084 60	67 45	55 30	
390 65	....	....	....	....	....	283 43	891 45	92 03	
181 95	3,293 33	580 80	2,712 53	21 25	2,691 28	675 00	....	151 95	
114 00	....	....	....	....	....	....	....	608 80	
114 65	....	....	....	....	....	....	....	1,867 18	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present year's services.
			$ c.	$ c.	$ c.	$ c.
ESSEX:						
Sandwich.	Sheriff	J. E. D'Avignon	2,936 40		2,936 40	2,244 67
	Surrogate Judge	Judge McHugh	1,000 00		1,000 00	
	Local Master	Henry Clay	140 65		140 65	122 06
	Crown Attorney	J. H. Rodd	1,261 49		2,525 44	1 098 09
	Clerk of the Peace.	"	1,263 95			854 42
	Local Registrar	Francis Cleary	261 14	675 00	3,651 20	936 14
	County Court Clerk	"	813 39			813 39
	SurrogateRegistrar	"	1,901 67			1,901 67
FRONTENAC						
Kingston.	Sheriff	Thomas Dawson	2,135 58		2,135 58	1,760 81
	Surrogate Judge	Judge Price	Commuted	752 00		
	Local Master	J. B. Walkem, KC	137 70		137 70	57 00
	Crown Attorney	J. L. Whiting, K.C.	185 00		1,159 92	148 00
	Clerk of the Peace.	"	972 92			602 32
	Local Registrar	T. M. Asselstine.	113 75	675 00	1,231 90	788 75
	County Court Clerk	"	443 15			443 15
	SurrogateRegistrar	Miss H. Fraser	1,122 75		1,122 75	1,044 00
GREY:						
Owen Sound	Sheriff	C. H. Moore	2,200 69		2,200 69	1,571 47
	Surrogate Judge	*Judge Widdifield	650 00		795 00	650 00
	Local Master	"	145 00			103 40
	Crown Attorney	J. Armstrong	772 50		2,064 08	446 90
	Clerk of the Peace.	"	1,291 58			732 60
	Local Registrar	W. A. Bishop	103 30	750 00	3,764 79	728 30
	County Court Clerk	"	591 80			591 80
	SurrogateRegistrar	"	2,319 69			2,319 69
HALDIMAND						
Cayuga	Sheriff	M. McConnell	1,706 68		1,706 68	1,400 46
	Surrogate Judge	Judge Douglas	477 15		477 85	477 15
	Local Master	"	0 70			0 70
	Crown Attorney	J. A. Murphy	492 40		1,803 54	438 90
	Clerk of the Peace.	"	1,311 14			993 10
	Local Registrar	J. C. Eccles	103 80	600 00	2,003 07	703 80
	County Court Clerk	"	270 20			256 30
	SurrogateRegistrar	"	1,029 07			1,027 12
HALTON:						
Milton	Sheriff	S. Webster	1,505 22		1,505 22	1,014 74
	Surrogate Judge	Judge Gorham	424 25		424 25	424 25
	Local Master	"				
	Crown Attorney	W. I. Dick	432 80		1,578 49	384 85
	Clerk of the Peace.	"	1,145 69			733 91
	Local Registrar	W. A. Lawrence.	13 55	600 00	1,499 96	613 55
	County Court Clerk	"	88 76			88 76
	SurrogateRegistrar	"	797 65			797 65
HASTINGS:						
Belleville	Sheriff	M. B. Morrison	2,953 42		2,953 42	2,139 97
	Surrogate Judge	Judge Fraleck	Commuted	985 00		
	Local Master }	S. S. Lazier }	Commuted	3,000 00		
	Deputy Registrar }	" }				
	Crown Attorney	P. J. M. Anderson	1,577 39		2,928 41	1,341 09
	Clerk of the Peace.	"	1,351 02			1,296 37
	Deputy Cl'k of the Crown	John Williams	92 00	450 00	3,613 43	542 00
	County Court Cl'k.	"	874 47			874 47
	SurrogateRegistrar	"	2,196 96			2,196 96

* O. in C. 21st July.

Officers throughout the Province of Ontario, etc.—Continued.

Total received for past years' services.	Total receipts by officer from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net Income.	Earnings of each officer payable by the Province, the County, and the General Public, respectively. From Province.	From County.	From General Public.	County.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
589 78	2,834 45	709 11	2,125 34	....	2,125 34	1,216 11	585 80	1,134 49	Essex.
....	1,000 00	....	1,000 00	....	1,000 00	....	....	1,000 00	
15 00	137 06	....	137 06	....	137 06	....	....	140 65	
274 55	2,545 27	563 50	1,981 77	....	1,981 77	966 24	3 65	291 60	
318 21	....	....	....	....	....	166 15	879 50	226 80	
....	3,653 20	540 04	3,113 16	72 63	3,040 53	675 00	....	261 14	
....	....	....	....	....	....	....	....	813 39	
2 00	....	....	....	....	....	....	....	1,901 67	
361 26	2,122 07	202 50	1,919 57	....	1,919 57	728 66	829 50	577 42	Frontenac.
....	752 00	....	752 00	....	752 00	752 00	....	....	
....	57 00	....	57 00	....	57 00	....	....	137 70	
73 00	1,169 12	50 00	1,119 12	....	1,119 12	185 00	....	....	
345 80	....	....	....	....	....	114 80	763 12	95 00	
....	1,231 90	....	1,231 90	....	1,231 90	675 00	....	113 75	
....	....	....	....	....	....	....	....	443 15	
95 32	1,139 32	15 00	1,124 32	....	1,124 32	....	....	1,122 75	
560 77	2,132 24	1,011 73	1,120 51	....	1,120 51	770 03	761 14	669 52	Grey.
....	833 40	....	833 40	....	833 40	....	....	650 00	
80 00	....	....	....	....	....	....	....	145 00	
205 00	1,644 23	121 35	1,522 88	....	1,522 88	511 10	246 40	15 00	
259 73	....	....	....	....	....	153 55	929 70	208 33	
125 00	3,764 79	271 70	3,493 09	148 61	3,344 48	750 00	....	103 30	
....	....	....	....	....	....	....	....	591 80	
....	....	....	....	....	....	....	....	2,319 69	
513 32	1,913 78	369 92	1,543 86	....	1,543 86	785 89	663 89	256 90	Haldimand.
....	477 85	....	477 85	....	477 85	....	....	477 15	
....	....	....	....	....	....	....	....	0 70	
239 05	2,015 55	360 00	1,655 55	....	1,655 55	489 41	2 99	....	
344 50	....	....	....	....	....	102 35	1,147 24	61 55	
....	2,008 57	186 75	1,821 82	....	1,821 82	600 00	....	103 80	
5 65	....	....	....	....	....	....	....	270 20	
15 70	....	....	....	....	....	....	....	1,029 07	
493 93	1,508 67	803 44	705 23	....	705 23	594 08	500 65	410 49	Halton.
....	437 05	....	437 05	....	437 05	....	....	424 25	
12 80	....	....	....	....	....	....	....	....	
78 00	1,580 56	87 23	1,493 23	....	1,493 23	408 80	....	24 00	
383 80	....	....	....	....	....	108 75	993 18	43 76	
....	1,499 96	300 00	1,199 96	....	1,199 96	600 00	....	13 55	
....	....	....	....	....	....	....	....	88 76	
....	....	....	....	....	....	....	....	797 65	
907 51	3,047 48	901 95	2,145 53	....	2,145 53	1,369 73	898 56	685 13	Hastings.
....	985 00	....	....	....	....	985 00	....	....	
....	3,000 00	550 00	2,450 00	....	2,450 00	3,000 00	....	....	
....	....	....	....	....	....	....	....	....	
501 50	3,245 40	358 45	2,887 01	127 40	2,759 61	1,280 44	....	296 95	
106 50	....	....	....	....	....	221 95	1,050 00	79 07	
....	3,613 43	665 26	2,948 17	44 81	2,903 36	450 00	....	92 00	
....	....	....	....	....	....	....	....	874 47	
....	....	....	....	....	....	....	....	2,196 96	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present year's services.
			$ c.	$ c.	$ c	$ c.
HURON: Goderich.	Sheriff	R. G. Reynolds	2,496 07	....	2,496 07	2,374 42
	Surrogate Judge	Judge Doyle	Commuted	1,000 00	1,195 08	1,000 00
	Local Master	"	195 08	....	....	....
	Crown Attorney	C. Seager	859 69	....	2,206 84	539 17
	Clerk of the Peace	"	1,347 15	....	....	1,170 04
	Local Registrar	D. McDonald	52 00	750 00	3,871 75	802 00
	County Court Clerk	"	279 55	....	....	279 55
	Surrogate Registrar	"	2,790 20	....	....	2,790 20
KENORA: Kenora.	Sheriff	John W. Humble.	1,367 29	1,000 00	2,367 29	1,545 16
	Surrogate Judge	Judge Chapple	....	*500 00	875 80	500 00
	Local Master	"	375 80	....	....	375 80
	Crown Attorney	J. F. MacGillivray K.C.	421 25	....	1,014 29	342 85
	Clerk of the Peace.	"	343 04	250 00	....	434 66
	Local Registrar	C. W. Chadwick.	100 79	700 00	1,302 09	800 79
	District Court Cl'k.	"	288 45	....	....	288 45
	Surrogate Registrar	"	212 85	....	....	212 85
KENT: Chatham.	Sheriff	J. R. Gemmill	3,104 63	....	3,104 63	1,591 60
	Surrogate Judge	Judge Bell	965 00	....	965 00	....
	Local Master	Thos. Scullard	103 65	....	103 65	62 84
	Crown Attorney	H. D. Smith	1,817 24	....	3,183 15	1,459 42
	Clerk of the Peace.	"	1,365 91	....	....	1,019 31
	Local Registrar	James Holmes	137 10	675 00	2,851 95	812 10
	County Court Clerk.	"	698 35		....	698 35
	Surrogate Regist'r.	"	1,341 50	....	....	1,341 50
LAMBTON: Sarnia.	Sheriff	James Flintoft	2,345 18	....	2,345 18	1,539 39
	Surrogate Judge	Judge Macwatt	Commuted	1,000 00	1,039 20	1,000 00
	Local Master	"	39 20	....	....	18 80
	Crown Attorney	J. P. Bucke	653 97	....	1,812 07	482 95
	Clerk of the Peace.	"	1,158 10	....	....	1,114 20
	Local Registrar	Alex Saunders	162 95	675 00	3,129 24	725 45
	County Court Clerk.	"	633 81	....	....	633 81
	Surrogate Regist'r.	"	1,657 48	....	....	1,657 48
LANARK: Perth.	Sheriff	D. G. MacMartin.	1,434 20	....	1,434 20	1,019 13
	Surrogate Judge	Judge Senkler	647 75	....	667 40	647 75
	Local Master	"	19 65	....	....	....
	Crown Attorney	E.G.Malloch,K.C.	374 75	....	1,070 71	254 50
	Clerk of the Peace	"	695 96	....	....	376 47
	Local Registrar	W. P. McEwen	70 35	675 00	2,381 56	745 35
	County Court Clerk.	"	419 60	....	....	304 30
	Surrogate Regist'r.	"	1,216 61	....	....	803 31
LEEDS AND GRENVILLE: Brockville.	Sheriff †	Jas.A.McCammon	2,761 88	....	2,761 88	1,989 36
	Surrogate Judge	Judge McDonald,	Commuted	960 00	1,049 20	960 00
	Local Masters	"	89 20	....	....	29 10
		Judge Reynolds.	75 10	....	75 10	22 28
	Crown Attorney	M. M. Brown	792 96	....	2,023 65	466 30
	Clerk of the Peace.	"	1,230 69	....	....	778 23
	Local Registrar	O. K. Fraser	311 70	750 00	4,124 70	1,061 70
	County Court Clerk.	"	699 95	....	....	541 62
	Surrogate Regist'r.	"	2,363 05	....	....	2,187 98

* By 10 Edw. VII., Cap. 26, sec. 13. † Appointed 7th April. Assumed office 24th April.

Officers throughout the Province of Ontario, etc.—Continued.

Total received for past years' services.	Total receipts by officer from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public, respectively. From Province.	From County.	From General Public.	County.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
86 53	2,460 95	588 59	1,872 36		1,872 36	1,121 31	738 07	636 69	Huron.
	1,065 00		1,064 42		1,064 42	1,000 00			
65 00		0 58						195 08	
584 55	2,293 76	296 94	1,996 82		1,996 82	857 69		2 00	
						137 15	1,100 00	110 00	
	3,871 75	849 80	3,021 95	54 39	2,967 56	750 00		52 00	
								279 55	
								2,790 20	
663 49	2,208 65	619 54	1,589 11		1,589 11	1,909 98		457 31	Kenora.
	875 80	25 00	850 80		850 80	500 00			
								375 80	
137 05	916 56	14 00	902 56		902 56	421 25			
102 00						540 82		52 22	
	1,302 09	300 00	1,002 09		1,002 09	700 00		100 79	
								288 45	
								212 85	
692 32	2,283 92	712 34	1,571 58		1,571 58	1,142 92	819 16	1,142 55	Kent.
	965 00		965 00		965 00			965 00	
10 60	73 44		73 44		73 44			103 65	
248 48	3,061 21	650 00	2,411 21	41 12	2,370 09	1,427 94		389 30	
334 00						303 35	1,000 00	62 56	
	2,851 95	674 00	2,177 95		2,177 95	675 00		137 10	
								698 35	
								1,341 50	
588 49	2,127 88	667 20	1,460 68		1,460 68	1,093 08	585 42	666 68	Lambton.
	1,018 80		1,018 80		1,018 80	1,000 00			
								39 20	
140 66	1,802 21	112 55	1,690 26		1,690 26	616 65	37 32		
65 00						138 10	1,020 00		
1,125 50	3,129 24	720 00	2,409 24		2,409 24	675 00		162 95	
								633 81	
								1,657 48	
310 16	1,329 29	723 22	606 07		606 07	710 35	455 01	268 84	Lanark
	713 13		713 13		713 13			647 75	
65 38								19 65	
119 95	1,037 14	126 20	910 94		910 94	260 41	114 34		
286 22						193 32	453 09	49 55	
26 00	2,395 26	264 95	2,130 31		2,130 31	675 00		70 35	
103 30								419 60	
413 00								1,216 61	
582 19	2,571 55	913 35	1,658 20		1,658 20	1,200 35	731 65	829 88	Leeds and Grenville.
	1,157 20		1,157 20		1,157 20	960 00			
168 10								89 20	
77 20	99 48		99 48		99 48			75 10	
225 74	1,865 06	278 13	1,586 93		1,586 93	777 96		15 00	
394 79						255 75	853 87	121 07	
	4,020 30	415 60	3,604 70	202 35	3,402 35	750 00		311 70	
118 55								699 95	
110 45								2,363 05	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present year's services.
			$ c.	$ c.	$ c.	$ c.
LENNOX & ADDINGTON:	Sheriff	G. D. Hawley	1,397 31	....	1,397 31	1,037 88
Napanee.	Surrogate Judge	Judge Madden	483 60	....	483 60	483 60
	Local Master	S. S. Lazier	47 25	....	47 25	18 35
	Crown Attorney	H.M.Deroche,K.C.	70 50	....	695 69	19 00
	Clerk of the Peace.	"	625 19	....	....	402 08
	Local Registrar	W. P. Deroche	137 00	600 00	1,696 34	737 00
	County Court Clerk.	"	225 00	....	....	225 00
	Surrogate Regist'r.	"	734 34	....	....	734 34
LINCOLN:						
St. Catharines.	Sheriff	T. C. Dawson	2,036 15	....	2,036 15	1,729 28
	Surrogate Judge	Judge Carmen	Commuted	†900 00	911 00	823 50
	Local Master	"	87 50	....	....	80 50
	Crown Attorney	M. Brennan	726 30	....	2,193 01	598 30
	Clerk of the Peace.	"	1,466 71	....	....	923 31
	Local Registrar	Johnson Clench	211 14	675 00	2,491 73	861 44
	County Court Clerk	"	437 59	....	....	403 11
MANITOULIN:	Surrogate Regist'r.	"	1,168 00	....	....	1,168 00
Gore Bay.	Sheriff	J. Haddow Fell	752 01	750 00	1,502 01	1,296 13
	Surrogate Judge	Judge Hewson	....	*500 00	500 00	....
	Local Master	"	....	....	....	....
	Crown Attorney	‡A. G. Murray	261 00	....	885 36	155 00
	Clerk of the Peace.	"	374 36	250 00	....	474 79
	Local Registrar	C. C. Platt	8 00	....	959 23	8 00
	District Court Cl'k.	"	100 35	700 00	....	800 35
	Surrogate Regist'r.	"	150 88	....	....	150 88
MIDDLESEX:						
London.	Sheriff	D. M. Cameron	3,999 83	....	3,999 83	3,200 89
	Surrogate Judges.	Judge Macbeth	1,300 00	....	1,300 00	....
		Judge Elliott	1,000 00	....	1,000 00	....
	Local Master	R. K. Cowan	1,438 30	....	1,701 84	821 36
	Deputy Registrar	"	263 54	....	....	65 48
	Crown Attorney	J. B. McKillop	1,358 17	....	3,021 24	1,005 82
	Clerk of the Peace.	"	1,663 07	....	....	955 04
	Deputy Clerk of the Crown	Edmund Weld	91 20	500 00	5,271 85	571 20
	County Court Clerk.	"	845 85	....	....	819 35
	SurrogateRegistrar	"	3,834 80	....	....	3,755 06
MUSKOKA:						
Bracebridge.	Sheriff	D. E. Bastedo	1,669 86	750 00	2,419 86	2,048 92
	Surrogate Judge	Judge Mahaffy	....	*500 00	590 10	500 00
	Local Master	"	90 10	....	....	90 10
	Crown Attorney	Thomas Johnson	295 58	250 00	999 51	437 58
	Clerk of the Peace.	"	453 93	....	....	210 05
	Local Registrar	Isaac Huber	40 54	600 00	1,275 56	640 54
	District Court Cl'k.	"	216 29	....	....	216 29
	SurrogateRegistrar	"	418 73	....	....	418 73
NIPISSING:						
North Bay	Sheriff	H. C. Varin	6,046 08	1,000 00	7,046 08	5,079 90
	Surrogate Judge	Judge Valin	....	*500 00	547 00	500 00
	Local Master	"	47 00	....	....	15 10
	Crown Attorney	§T. E. McKee	277 95	128 00	704 05	233 70
	Clerk of the Peace.	"	298 10	....	....	84 20
	Local Registrar	T. J. Bourke	353 00	150 00	2,758 00	503 00
	District Court Cl'k	"	1,245 25	450 00	....	1,695 25
	SurrogateRegistrar	"	559 75	....	....	559 75

*By 10 Edw. VII., Cap. 26, Sec. 13. †From 1st March, 1911.
‡Acting since 31st October, M. McFadden, K.C. §Appointed 1st August, 1911.

Officers throughout the Province of Ontario, etc.—Continued.

Total received for past years' services.	Total receipts by officer from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public, respectively. From Province.	From County.	From General Public.	County.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
277 94	1,315 82	302 96	1,012 86	....	1,012 86	490 62	545 38	361 31	Lennox and
....	483 60	....	483 60	....	483 60	....	....	483 60	Addington.
9 78	28 13	9 00	19 13	....	19 13	....	....	47 25	
38 00	748 94	6 95	741 99	....	741 99	51 50	19 00	....	
289 86	....	....	....	....	....	....	625 19	....	
....	1,696 34	125 34	1,571 00	....	1,571 00	600 00	....	137 00	
....	....	....	....	....	....	....	....	225 00	
....	....	....	....	....	....	....	....	734 34	
516 18	2,245 46	279 05	1,966 41	....	1,966 41	791 77	670 74	573 64	Lincoln.
....	980 75	....	980 75	....	980 75	750 00	....	73 50	
76 75	....	....	....	....	....	....	....	87 50	
147 60	2,166 13	216 00	1,950 13	....	1,950 13	726 30	....	....	
496 92	....	....	....	....	....	149 45	1,164 26	153 00	
21 20	2,477 55	443 00	2,034 55	....	2,034 55	675 00	....	211 14	
23 80	....	....	....	....	....	....	....	437 59	
....	....	....	....	....	....	....	....	1,168 00	
178 28	1,474 41	138 25	1,336 16	....	1,336 16	1,452 45	....	49 56	Manitoulin.
....	500 00	....	500 00	....	500 00	500 00	....	....	
....	....	....	....	....	....	....	....	....	
93 40	892 53	179 92	712 61	....	712 61	203 00	....	58 00	
169 34	....	....	....	....	....	587 36	....	37 00	
....	959 23	....	959 23	....	....	....	....	8 00	
....	....	....	....	....	....	700 00	....	100 35	
....	....	....	....	....	....	....	....	150 88	
1,032 41	4,233 30	1,656 96	2,576 34	....	2,576 34	972 90	1,829 03	1,197 90	Middlesex.
....	1,300 00	....	1,300 00	....	1,300 00	....	....	1,300 00	
....	1,000 00	....	1,000 00	....	1,000 00	....	....	1,000 00	
123 30	1,010 14	422 28	587 86	....	587 86	....	....	1,438 30	
....	....	....	....	....	....	....	....	263 54	
770 10	3,439 38	983 00	2,456 38	45 63	2,410 75	1,207 82	40 00	110 35	
708 42	....	....	....	....	....	256 95	1,206 30	199 82	
19 92	5,502 28	1,975 00	3,527 28	163 64	3,363 64	500 00	....	91 20	
138 75	....	....	....	....	....	....	....	845 85	
198 00	....	....	....	....	....	....	....	3,834 80	
356 91	2,405 83	1,080 00	1,325 83	....	1,325 83	2,008 82	....	411 74	Muskoka.
....	590 10	....	589 85	....	589 85	500 00	....	....	
....	....	0 25	....	....	....	....	....	90 10	
97 00	1,011 16	19 00	992 16	....	992 16	545 58	....	....	
266 53	....	....	....	....	....	378 55	....	75 38	
....	1,275 56	28 38	1,247 18	....	1,247 18	600 00	....	40 54	
....	....	....	....	....	....	....	....	216 29	
....	....	....	....	....	....	....	....	418 73	
1,342 19	7,422 09	3,412 90	4,009 19	....	4,009 19	2,458 93	....	3,587 15	Nipissing
....	515 10	....	515 10	....	515 10	500 00	....	....	
....	....	....	....	....	....	....	....	47 00	
....	317 90	....	317 90	....	317 90	324 10	....	81 85	
....	....	....	....	....	....	298 10	....	....	
97 50	2,932 50	512 20	2,420 30	....	2,420 30	150 00	....	353 00	
58 80	....	....	....	....	....	450 00	....	1,245 25	
18 20	....	....	....	....	....	....	....	559 75	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present year's services.
NORFOLK:			$ c.	$ c.	$ c.	$ c.
Simcoe ...	Sheriff	F. S. Snider	1,567 55		1,567 55	1,096 59
	Surrogate Judge	Judge Robb	498 25		501 55	498 25
	Local Master	"	3 30			
	Crown Attorney	T. R. Slaght, K.C.	567 60		2,237 94	467 60
	Clerk of the Peace	"	1,670 34			942 96
NORTHUMBERLAND AND DURHAM:	Local Registrar	C. C. Rapelje	339 00	675 00	2,552 95	825 30
	County Court Cl'k	"	376 51			261 20
	SurrogateRegistrar	"	1,162 44			993 49
Cobourg ..	Sheriff	I. O. Proctor	3,446 38		3,446 38	1,795 97
	Surrogate Judge	Judge Benson	Commuted	1,000 00		
	Local Master	Judge Roger	69 00		69 00	12 00
	Crown Attorney	W. F. Kerr	1,362 29		2,406 59	972 10
	Clerk of the Peace	"	1,044 30			576 61
	Local Registrar	John T. Field	212 90	750 00	3,826 20	962 90
	County Court Clerk	"	403 50			403 50
	SurrogateRegistrar	"	2,459 80			2,459 80
ONTARIO:						
Whitby ..	Sheriff	J. F. Paxton	1,960 47		1,960 47	1,562 02
	Surrogate Judge	G. Y. Smith	802 00		997 85	802 00
	Local Master	"	195 85			118 35
	Crown Attorney	J.E.Farewell, KC	463 95		1,899 20	378 95
	Clerk of the Peace	"	1,435 25			879 13
	Local Registrar	T.A.McGillivray	69 14	675 00	2,613 18	744 14
	County Court Cl'k	"	371 45			371 45
	SurrogateRegistrar	"	1,497 59			1,497 59
OXFORD:						
Woodstock	Sheriff	†James Brady	2,214 16		2,214 16	2,152 23
	Surrogate Judge	Judge Finkle	Commuted	1,000 00		
	Local Master	W. T. McMullen	455 00		530 06	378 20
	Deputy Registrar	"	75 06			52 10
	Crown Attorney	R. N. Ball	466 50		466 50	424 80
	Clerk of the Peace	F. R. Ball, K.C.	638 00		638 00	367 91
	Deputy Clerk of the Crown	James Canfield	182 20	450 00	4,010 18	484 80
	County Court Clerk	"	534 50			392 50
PARRY SOUND:	SurrogateRegistrar	"	2,843 48			2,132 00
Parry Sound	Sheriff	Sam'l Armstrong	1,931 31	750 00	2,681 31	2,164 12
	Surrogate Judge	Judge McCurry		*500 00		
	Local Master	"				
	Crown Attorney	W. L. Haight	640 78	250 00	1,404 59	661 42
	Clerk of the Peace	"	513 81			337 40
	Local Registrar	E. Jordan	46 30	600 00	1,054 76	646 30
	District Court Cl'k	"	182 90			182 90
	SurrogateRegistrar	"	225 56			225 56
PEEL:						
Brampton	Sheriff	Nathan Henderson	1,488 31		1,488 31	1,122 15
	Surrogate Judge	Judge McGibbon	656 00		668 10	656 00
	Local Master	"	12 10			12 10
	Crown Attorney	W. H. McFadden, K.C.	380 38		1,269 18	283 23
	Clerk of the Peace	"	888 80			651 99
	Local Registrar	J. B. Dixon	195 08	600 00	2,552 10	706 48
	County Court Cl'k	"	280 46			227 46
	SurrogateRegistrar	"	1,476 56			1,476 56

†Died 29th Sept., and William McGhee appointed 10th January, 1912.
*By 10 Edward VII., chap. 26, sec. 13.

Officers throughout the Province of Ontario, etc.—Continued.

Total received for past years' services.	Total receipts by officer from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw., VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public respectively.			County.
						From Province.	From County.	From General Public.	
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
324 55	1,421 14	667 05	754 09		754 09	647 58	672 69	247 28	Norfolk.
	498 25		498 25		498 25			498 25	
								3 30	
235 50	2,271 23	605 70	1,665 53		1,665 53	512 60		55 00	
625 37						156 20	1,358 86	155 28	
181 80	2,661 48	141 62	2,519 86	1 98	2,517 88	675 00		339 00	
88 75								376 51	
310 94								1,162 44	
808 45	2,604 62	765 05	1,839 57		1,839 57	1,641 65	1,408 25	396 48	Northumberland and Durham.
	1,000 00		1,000 00		1,000 00	1,000 00			
	12 00		12 00		12 00			69 00	
338 92	2,304 04	513 40	1,790 64		1,790 64	1,229 23		133 06	
416 41						188 75	780 26	75 29	
	3,826 20	608 70	3,217 50	93 50	3,124 00	750 00		212 90	
								403 50	
								2,459 80	
578 44	2,140 46	748 11	1,392 35		1,392 35	769 19	510 18	861 09	Ontario.
	995 35		995 35		995 35			802 00	
75 00								195 85	
169 30	1,920 41	465 86	1,454 55		1,454 55	408 90		55 05	
493 03						847 44	1,180 44	7 37	
	2,613 18	640 00	1,973 18		1,973 18	675 00		69 14	
								371 45	
								1,497 59	
162 70	2,314 93	1,266 27	1,048 66		1,048 66	967 32	637 40	609 44	Oxford.
	1,000 00		1,000 00		1,000 00	1,000 00			
122 35	572 55	100 00	472 55		472 55			455 00	
19 90								75 06	
100 10	524 90	8 00	516 90		516 90	341 50		125 00	
258 29	626 20	8 00	618 00		618 00	60 35	572 10	5 55	
140 30	3,939 60	236 50	3,703 10	251 55	3,451 55	450 00		182 20	
220 00								534 50	
570 00								2,843 48	
657 40	2,821 52	1,376 46	1,445 06		1,445 06	2,100 61		580 70	Parry Sound.
	500 00		500 00		500 00	500 00			
180 08	1,353 97	243 62	1,110 35		1,110 35	854 28		36 50	
175 07						500 61		13 20	
	1,054 76	6 60	1,048 16		1,048 16	600 00		46 30	
								182 90	
								225 56	
	1,122 15	644 47	477 68		477 68	603 30	453 94	431 07	Peel.
	668 10		668 10		668 10			656 00	
								12 10	
161 69	1,292 76	160 55	1,132 21		1,132 21	318 25		62 13	
103 65						133 30	716 50	39 00	
26 00	2,460 50	196 26	2,264 24		2,264 24	600 00		195 08	
24 00								280 46	
								1,476 56	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present year's services.
			$ c.	$ c.	$ c.	$ c.
PERTH: Stratford.	Sheriff	ThomasMagwood	2,347 40	....	2,347 40	1,682 89
	Surrogate Judge	Judge Barron	Commuted	873 00	1,723 00	....
	Local Master	"	Commuted	850 00	....	....
	Crown Attorney	G. G. McPherson K.C.	684 70	....	2,311 86	410 70
	Clerk of the Peace.	"	1,627 16	....	....	795 92
	Local Registrar	*E. Sydney Smith	405 94	675 00	3,705 30	1,024 69
	County Court Clerk	" K.C.	809 69	....	....	809 69
	SurrogateRegistrar	"	1,814 67	....	....	1,814 67
PETERBOROUGH: Peterboro'	Sheriff	James A. Hall	1,787 66	....	1,787 66	1,340 22
	Surrogate Judge	Judge Huycke	1,000 00	....	1,360 50	1,000 00
	Local Master	"	360 50	....	....	157 00
	Crown Attorney	R. E. Wood	566 21	....	1,522 29	450 91
	Clerk of the Peace.	"	956 08	....	....	536 75
	Local Registrar	G. J. Sherry	244 45	675 00	3,195 18	731 83
	County Court Clerk	"	626 68	....	....	606 68
	SurrogateRegistrar	"	1,549 05	....	....	1,540 40
PRESCOTT & RUSSELL: L'Orignal	Sheriff	Albert Hagar	1,399 15	....	1,399 15	1,083 24
	Surrogate Judge	Judge Constantineau.	333 75	....	379 57	333 75
	Local Master	"	45 82	....	....	45 82
	Crown Attorney	John Maxwell	247 29	....	1,166 75	247 29
	Clerk of the Peace.	"	919 46	....	....	779 74
	Local Registrar	Joseph Bélanger.	33 70	675 00	1,665 14	707 60
	County Court Clerk	"	218 70	....	....	199 15
	SurrogateRegistrar	"	737 74	....	....	720 44
PRINCE EDWARD: Picton	Sheriff	James Gibson	1,052 71	....	1,052 71	905 32
	Surrogate Judge	Judge Morrison	449 50	....	489 10	449 50
	Local Master	"	39 60	....	....	21 70
	Crown Attorney	J. Roland Brown	75 00	....	645 87	60 00
	Clerk of the Peace.	"	570 87	....	....	359 74
	Local Registrar	Nehemiah Gilbert	116 80	600 00	1,759 10	716 80
	County Court Clerk	"	290 50	....	....	290 50
	SurrogateRegistrar	"	751 80	....	....	751 80
RAINY RIVER: Fort Frances	Sheriff	W. A. Baker	1,462 41	750 00	2,212 41	1,537 46
	Surrogate Judge	Judge Fitch	....	†500 00	580 50	500 50
	Local Master	"	80 50	....	....	19 50
	Crown Attorney	A. D. George,	429 60	....	1,094 45	268 80
	Clerk of the Peace.	"	414 85	250 00	....	538 60
	Local Registrar	Wm. H. Elliott	....	450 00	768 12	450 00
	District Court Cl'k.	"	198 65	....	....	198 65
	Surrogate Regist'r	"	119 47	....	....	119 47
RENFREW: Pembroke.	Sheriff	Alex. Morris	2,328 35	....	2,328 35	2,146 38
	Surrogate Judge	Judge Donahue	797 75	....	856 42	797 75
	Local Master	"	58 67	....	....	34 72
	Crown Attorney	‡J.H.Burritt,K.C.	341 86	....	976 49	283 86
	Clerk of the Peace.	"	634 63	....	....	381 47
	Local Registrar	H. W. Perrett	44 10	600 00	1,785 37	644 10
	County Court Clerk	"	352 40	....	....	352 40
	SurrogateRegistrar	"	788 87	....	....	788 87

* E. Sydney Smith, K.C., appointed 19th January, 1911. ‡ Appointed 5th October, 1911.
† By 10 Edw. VII. Cap. 26, Sec. 13.

Officers throughout the Province of Ontario, etc.—Continued.

Total received for past years' services.	Total receipts by officer from all offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public respectively. From Province.	From County.	From General Public.	County.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
385 97	2,068 86	795 77	1,273 09	....	1,273 09	914 14	527 96	905 30	Perth.
....	1,723 00	....	1,723 00	....	1,723 00	873 00	....	....	
....	....	....	....	....	....	850 00	....	....	
99 00	1,859 30	363 00	1,496 30	....	1,496 30	614 50	....	70 20	
553 68	....	....	....	....	....	129 95	1,287 47	209 74	
....	3,649 05	1,049 09	2,599 96	9 99	2,589 97	675 00	....	405 94	
....	....	....	....	....	....	....	....	809 69	
....	....	....	....	....	....	....	....	1,814 67	
469 02	1,809 24	782 73	1,026 51	....	1,026 51	873 86	406 36	507 44	Peterborough
....	1,157 00	....	1,157 00	....	1,057 00	....	....	1,000 00	
....	....	....	....	....	....	....	....	360 50	
287 30	1,744 91	128 45	1,616 46	....	1,616 46	491 55	39 30	35 36	
469 95	....	....	....	....	....	159 30	689 08	108 00	
146 80	3,046 46	520 50	2,525 96	2 59	2,523 37	675 00	....	244 45	
20 20	....	....	....	....	....	....	....	626 68	
0 55	....	....	....	....	....	....	....	1,549 05	
493 06	1,576 30	857 11	719 19	....	719 19	438 64	443 84	516 67	Prescott and
100 50	480 07	....	480 07	....	480 07	....	....	333 75	Russell.
....	....	....	....	....	....	....	....	45 82	
39 14	1,194 43	47 00	1,147 43	....	1,147 43	88 84	78 65	80 00	
128 26	....	....	....	....	....	99 10	680 64	139 72	
21 50	1,733 49	304 20	1,429 29	....	1,429 29	675 00	....	33 70	
19 15	....	....	....	....	....	....	....	218 70	
65 65	....	....	....	....	....	....	....	737 74	
211 07	1,116 39	759 31	357 08	....	357 08	501 00	490 59	161 12	Prince Edward
....	471 70	5 00	466 70	....	466 70	....	....	449 50	
0 50	....	....	....	....	....	....	....	39 60	
14 00	625 55	98 00	527 55	....	527 55	50 00	....	25 00	
191 81	....	....	....	....	....	54 00	489 88	26 99	
....	759 10	36 70	1,722 40	....	1,722 40	600 00	....	116 80	
....	....	....	....	....	....	....	....	290 50	
....	....	....	....	....	....	....	....	751 80	
520 14	2,057 60	583 80	1,473 80	....	1,473 80	2,065 88	....	146 53	Rainy River
....	519 50	....	519 50	....	519 50	500 00	....	....	
....	....	....	....	....	....	....	....	80 50	
119 00	1,037 20	15 75	1,021 45	....	1,021 45	429 60	....	....	
110 80	....	....	....	....	....	664 85	....	....	
....	768 12	....	768 12	....	768 12	450 00	....	....	
....	....	....	....	....	....	....	....	198 45	
....	....	....	....	....	....	....	....	119 47	
173 31	2,319 69	851 52	1,468 17	....	1,468 17	767 27	965 51	595 57	Renfrew.
....	832 47	....	832 47	....	832 47	....	....	797 75	
....	....	....	....	....	....	....	....	58 67	
....	888 49	33 92	854 57	....	854 57	341 86	....	....	
223 16	....	....	....	....	....	88 30	487 12	59 21	
....	1,785 37	102 00	1,683 37	....	1,683 37	600 00	....	44 10	
....	....	....	....	....	....	....	....	352 40	
....	....	....	....	....	....	....	....	788 87	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present years' services.
SIMCOE:			$ c.	$ c.	$ c.	$ c.
Barrie....	Sheriff	W. McL. Harvey	2,836 01	....	2,836 01	2,407 08
	Surrogate Judge...	Judge Ardagh...	Commuted	585 00	....	....
	Local Master......	J. R. Cotter.....	29 65	....	2,612 19	29 65
	Crown Attorney...	"	965 85	....	....	781 30
STORMONT,	Clerk of the Peace.	"	1,616 69	....	....	1,099 04
DUNDAS	Local Registrar...	John McCosh....	368 00	750 00	2,080 80	1,118 00
AND	County Court Clerk	"	962 80	....	....	962 80
GLEN-	Surrogate Regist'r.	E. A. Little.....	2,490 16	....	2,490 16	2,490 16
GARRY:						
Cornwall .	Sheriff	W. R. Mack.....	2,395 63	....	2,395 63	1,720 37
	Surrogate Judge...	Judge O'Reilly..	1,000 00	....	1,583 28	1,000 00
	Local Master......	"	583 28	....	....	553 43
	Crown Attorney...	James Dingwall.	286 20	....	1,052 84	192 70
	Clerk of the Peace.	"	766 64	....	....	427 81
	Local Registrar...	J. A. McDougald	136 95	750 00	3,317 50	886 95
	County Court Clerk	"	617 20	....	....	617 20
	Surrogate Regist'r.	"	1,813 35	....	....	1,813 35
SUDBURY:						
Sudbury..	Sheriff	Alex. Irving	2,414 49	ǀ950 00	3,164 49	2,620 71
	Surrogate Judge...	Judge Kehoe	....	†500 00	516 70	500 00
	Local Master	"	16 70	....	....	16 70
	Crown Attorney...	J. H. Clary......	429 85	250 00	1,138 13	634 05
	Clerk of the Peace.	"	458 28	....	....	377 64
	Local Registrar...	John D. Shipley .	203 85	150 00	1,647 17	353 85
THUNDER	Dist. Court Clerk..	"	620 40	450 00	....	1,070 40
BAY:	Surrogate Regist'r.	"	222 91	....	....	222 91
Port Ar-						
thur.. ...	Sheriff	A. W. Thompson.	5,414 23	1,000 00	6,414 23	5,086 41
	Surrogate Judge...	Judge O'Leary ..	....	†500 00	532 40	500 00
	Local Master......	"	332 40	....	....	47 00
	Crown Attorney...	W.F. Langworthy [K.C.	1,370 06	250 00	2,029 76	1,263 86
	Clerk of the Peace.	"	409 70	....	....	156 40
	Local Registrar...	*T. S. T. Smellie	291 00	150 00	2,286 52	439 60
	Dist. Court Clerk..	"	843 75	450 00	....	1,212 65
	Surrogate Regist'r.	"	551 77	....	....	536 12
VICTORIA:						
Lindsay ..	Sheriff	John McLennan .	1,398 76	....	1,398 76	988 24
	Surrogate Judge...	Judge McMillan.	644 00	....	644 00	644 00
	Local Masters... {	"	....	....	....	....
		Judge Harding ..	52 44	....	52 44	....
	Crown Attorney ...	A. P. Devlin	109 12	....	685 22	87 12
	Clerk of the Peace.	"	576 10	....	....	348 25
	Local Registrar ...	J. H. Sootheran..	314 90	675 00	2,752 29	989 90
	County Court Clerk	"	479 73	....	....	479 73
	Surrogate Regist'r.	"	1,282 66	....	....	1,282 66
WATERLOO:						
Berlin....	Sheriff	‡John Motz	2,182 84	....	2,182 84	1,618 16
	Surrogate Judge...	Judge Chisholm .	1,000 00	....	1,000 00	1,000 00
	Local Master......	J. J. A. Weir	217 65	....	217 65	91 34
	Crown Attorney ...	W.H.Bowlby,K.C.	516 70	....	1,654 47	409 70
	Clerk of the Peace.	"	1,137 77	....	....	1,126 57
	Local Registrar ...	E. J. Beaumont..	281 91	675 00	1,616 36	956 91
	County Court Clerk	"	659 45	....	....	601 28
	Surrogate Regist'r.	John M. Scully.	2,076 04	....	2,076 04	2,018 39

* Appointed 8th November, 1911. Crown Attorney acted from 20th January, the date of Mr. Meek's death. † By 10 Edw. VII. Cap. 26, sec. 13. ‡ Died 29th October.
ǀ Of which $200 is salary as District Treasurers.

Officers throughout the Province of Ontario, etc.—Continued.

Total received for last years' services.	Total receipts by officers from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public, respectively. From Province.	From County.	From General Public.	County.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
611 02	3,018 10	1,468 66	1,549 44		1,549 44	1,025 86	825 21	984 94	Simcoe.
	585 00		585 00		585 00	585 00			
	2,422 45	396 46	2,025 99		2,025 99			29 65	
94 75						955 85		10 00	
417 71						241 84	1,280 91	93 94	
	2,080 80	120 00	1,960 80		1,960 80	750 00		368 00	
								962 80	
	2,490 16	240 00	2,250 16		2,250 16			2,490 16	
512 30	2,232 67	753 90	1,478 77		1,478 77	978 31	695 39	721 93	Stormont, Dundas and Glengarry.
	1,587 03		1,587 03		1,587 03			1,000 00	
33 60								583 28	
51 70	939 38	624 71	314 67		314 67	202 84	5 36	78 00	
267 17						162 27	516 44	87 93	
	3,317 50	744 54	2,572 96	7 29	2,565 67	750 00		136 95	
								617 20	
								1,813 35	
639 99	3,260 70	988 78	2,271 92		2,271 92	2,630 17		534 32	Sudbury.
	516 70	0 12	516 58		516 58	500 00			
								16 70	
241 45	1,378 99		1,378 99		1,378 99	679 85			
125 35						458 28			
	1,647 16		1,647 16		1,647 16	150 00		203 85	
						450 00		620 40	
								222 91	
1,269 26	6,355 67	2,255 18	4,100 49		4,100 49	3,840 11		2,574 42	Thunder Bay.
	555 30		555 30		555 30	500 00			
8 30								332 40	
612 95	2,257 46	108 00	2,149 46		2,149 46	1,620 06			
224 25						409 70			
	2,188 37	1,055 02	1,133 35		1,133 35	150 00		291 00	
						450 00		843 75	
								551 77	
321 26	1,309 50	264 15	1,045 35		1,045 35	637 90	332 91	427 95	Victoria.
	644 00		644 00		644 00			644 00	
		1 00						52 44	
71 00	791 52		791 52		791 52	109 12			
285 15						59 45	516 65		
	2,752 29	668 50	2,083 79		2,083 79	675 00		314 90	
								479 73	
								1,282 66	
588 96	2,207 12	1,108 43	1,098 69		1,098 69	811 73	442 97	928 14	Waterloo.
	1,000 00		1,000 00		1,000 00			1,000 00	
117 16	208 50		208 50		208 50			217 65	
133 30	1,723 92	202 50	1,521 42		1,521 42	506 70		10 00	
54 35						67 25	1,000 00	70 52	
	1,602 57	170 50	1,432 07		1,432 07	675 00		281 91	
44 38								659 45	
32 37	2,050 76	437 31	1,613 45		1,613 45			2,076 04	

APPENDIX F.—Return of fees and emoluments of County Judicial

County and Town.	Office.	Officer.	Amount earned.	Salary paid by Province.	Total earnings and salary in all offices.	Total received for present years' salaries.
WELLAND:			$ c.	$ c.	$ c.	$ c.
Welland..	Sheriff	James Smith	1,747 35		1,747 35	1,497 29
	Surrogate Judge	Judge Wells	554 75		695 25	554 75
	Local Master	"	140 50			67 80
	Crown Attorney	T. D. Cowper	374 90		3,056 37	277 90
	Clerk of the Peace.	"	2,681 47			1,752 54
	Local Registrar	J. E. Cohoe	158 65	800 00	2,376 45	958 65
	County Court Clerk	"	381 00			381 00
	Surrogate Regist'r.	"	1,036 80			1,036 80
WELLINGTON:						
Guelph	Sheriff	A. S. Allan	2,072 16		2,072 16	1,624 44
	Surrogate Judge	Judge Chadwick.	commuted	1,000 00	1,000 00	
	Local Master / Local Registrar	A. M. McKinnon.	commuted	2,000 00	2,000 00	
	Crown Attorney	H. W. Peterson	497 80		2,572 80	297 80
	Clerk of the Peace.	"	2,074 98			1.872 20
	County Court Clerk	Wm. Carroll	306 95		2,270 61	293 70
	Surrogate Regist'r.	"	1,963 66			1,874 66
WENTWORTH:						
Hamilton	Sheriff	J. T. Middleton	5,941 70		5,941 70	4,799 20
	Surrogate Judge	Judge Snider	1,500 00		1,500 00	1,500 00
	"	Judge Monck	1,000 00		1,174 60	1,000 00
	Local Master	"	174 60			174 60
	Deputy Registrar	*T. H. A. Begue. K.C.	28 00	250 00	278 00	236 34
	Crown Attorney	S. F. Washington, K.C.	3,784 40		5,775 28	2,970 40
	Clerk of the Peace.	S. F. Washington, K.C.	1,990 88			1,162 08
	Deputy Clerk of the Crown	T.H.A.Begue,K.C.	176 24	500 00	5,439 99	592 91
	County Court Clerk	"	1,517 10			1,517 10
	Surrogate Regist'r.	"	3,246 65			3,246 65
YORK:						
Toronto	Sheriff	F. T. Daville	9,750 03		9,750 03	8,216 54
	Surrogate Judges	Judge Winchester	2,600 00		2,600 00	
		Judge Morgan	1,600 00		1,600 00	
		Judge Morson	1,600 00		1,600 00	
		Judge Denton	1,200 00		1,200 00	
	Crown Attorney	†R. H. Greer	1,357 29		1,357 29	
	Clerk of the Peace	H. E. Irwin, K.C.	9,207 46		9,207 46	5,906 27
	County Court Clerk	John Richardson.	7,416 45		7,416 45	7,415 45
	Surrogate Regist'r	‡Joseph Tait / ¶Geo. F. Harman. / §Arthur F.Wallis	12,980 72		12,980 72	12,980 72
TORONTO:	Sheriff	Fred'k Mowat	20,191 23		20,191 23	17,780 83
	Crown Attorney	J.W.S.Corley,K.C.	commuted	5,000 00		

* Acting. † Appointed 18th October 1911. § Appointed 30th May, 1911.
‡ Died 18th March, 1911. ¶ Pro tem 18th March to 30th May, 1911.

Officers throughout the Province of Ontario, etc.—Concluded.

Total received for past years' services.	Total receipts by officer from all his offices.	Total disbursements.	Net receipts.	Amount paid to Province under 10 Edw. VII., cap. 5.	Net income.	Earnings of each officer payable by the Province, the County, and the General Public, respectively.			County.
						From Province.	From County.	From General Public.	
$ c.	$ c.	$ c.	$ c	$ c.	$ c.	$ c.	$ c.	$ c.	
530 29	2,027 58	810 65	1,216 93	....	1,216 93	688 10	641 53	417 72	Welland.
....	647 85	....	647 85	....	647 85	....	....	554 75	
25 30	....	....	....	....	....	....	....	140 50	
181 00	3,159 53	656 00	2,503 53	50 70	2,452 83	374 90	....	....	
948 09	....	....	....	....	....	77 35	2,604 02	....	
....	2,376 45	409 90	1,966 55	....	1,966 55	800 00	....	158 65	
....	....	....	....	....	....	....	....	381 00	
....	....	....	....	....	....	....	....	1,036 80	
444 77	2,069 21	264 92	1,804 29	....	1,804 29	891 54	565 16	615 46	Wellington.
....	1,000 00	....	1,000 00	....	1,000 00	1,000 00	....	....	
....	2,000 00	17 00	1,983 00	....	1,983 00	2,000 00	....	....	
152 88	2,498 04	416 00	2,082 04	8 20	2,073 84	332 80	....	165 00	
175 16	....	....	....	....	....	122 10	1,700 00	252 88	
22 74	2,291 52	290 74	2,000 78	....	2,000 78	....	....	306 95	
100 42	....	....	....	....	....	....	....	1,963 66	
1,067 71	5,866 91	2,077 20	3,789 71	....	3,789 71	3,056 89	720 32	2,164 49	Wentworth
....	1,500 00	....	1,500 00	....	1,500 00	....	....	1,500 00	
....	1,174 60	....	1,174 60	....	1,174 60	....	....	1,000 00	
....	....	....	....	....	....	....	....	174 60	
41 66	278 00	125 00	153 00	....	153 00	250 00	....	28 00	
1,231 10	6,011 30	1,434 12	4,577 18	838 59	3,738 59	3,744 40	....	40 00	
647 72	....	....	....	....	....	694 64	1,237 29	58 95	
89 59	5,446 25	1,499 71	3,946 54	373 27	3,573 27	500 00	....	176 24	
....	....	....	....	....	....	....	....	1,517 10	
....	....	....	....	....	....	....	....	3,246 65	
1,258 17	9,474 71	3,374 01	6,100 70	....	6,100 70	6,142 03	1,236 79	2,371 21	York.
....	....	....	2,600 00	....	....	2,600 00	....	....	
....	....	....	1,600 00	....	....	1,600 00	....	....	
....	....	....	1,600 00	....	....	1,600 00	....	....	
....	....	....	1,200 00	....	....	1,200 00	....	....	
....	....	271 54	....	....	....	1,233 99	123 30	....	
2,699 97	8,606 24	3,305 16	5,301 08	1,200 54	4,100 54	2,754 25	5,283 30	1,169 91	
0 60	7,416 05	2,598 45	4,817 60	808 80	4,008 80	....	....	7,416 45	
....	12,980 72	3,803 22	9,177 50	2,433 03	6,744 47	....	....	12,980 72	
1,897 92	19,678 75	9,024 44	10,654 31	....	10,654 31	4,381 87	*1,299 98	14,509 38	Toronto.
....	5,000 00	....	5,000 00	....	5,000 00	5,000 00	....	....	

* $541.00 payable by City of Toronto.

APPENDIX G.—Table showing the business of the High Court of Justice in York County during 1911, compiled from statements furnished by the officers at Osgoode Hall.

Writs of summons issued		1,345
Actions entered in Procedure Book commenced by writs issued during the year 1911		981
" " " " previous years		51
" " otherwise than by writ		255
Præcipe Orders issued		743
Court " "		660
Chamber " "		2,652
Records passed		331
Actions entered for trial with Jury		80
" " without a Jury		234
Actions tried with a Jury		90
" without a Jury		189
Judgments entered in default of appearance or pleading		127
" " without trial		95
" " after trial		93
Interlocutory judgments		10
Judgments dismissing actions		44
" for administration		7
" of the Master in Chambers under Con. Rule 603. etc		59
" under Con. Rule 938		36
" " " " 596		35
" in mechanics' lien actions		50
" of reference		23
" " official referees		63
" entered in respect of Writs issued in the year 1907		3
" " " " " 1908		10
" " " " " 1909		18
" " " " " 1910		241
Total judgments entered		642
Amount recovered on Judgments (exclusive of costs)	$1,924,371 24	
Amount of Taxed costs (including disbursements) on judgments of all kinds	$14,636 05	
Writs of Execution Fi. Fa. issued		364
" renewed, and Alias and Pluries Writs issued		184
Special writs (Habeas Corpus, etc.) issued		19
Amount of Jury fees paid City Treasurer	$261 00	
Petitions under The Quieting Titles Act		11
Certificates of Title under The Quieting Titles Act		9

Accountant's office:

Amount of moneys paid into Court	$2,570,651 82	
" " " out of Court	1,796,606 76	
Number of directions issued for payments of moneys into Court		1,417
" cheques issued		4,228
" certificates issued		194
" new accounts opened		1,154
" individual accounts		800

Orders issued by the Master in Ordinary, in Winding-up Matters	31

References brought into the office of the Master in Ordinary:

Trustee accounts	0
Partition	0
Foreclosure	23
Administration	3
Title	0
Partnership	0
Alimony	0
Winding up	19
Lunacy	5
Executors	0
Mechanics' liens	0

APPENDIX G.—Table showing the business of the High Court of Justice in York County, etc.—Continued.

Sale	5
Damages	0
Redemption	0
Receiver	0
Settling conveyances	1
Specific performances	1
Account	6
	63

References before Official Referees—

Trial or assessment	0
Trustees and Executors' accounts	0
Winding up	10
Lunacy	1
Accounts	6
Mechanics' liens	110
Title	0
Partition or sale	0
Administration	0
Receivership	1
Foreclosure	2
Under Arbitration Act	0
Vendor and Purchaser	3
	133

Fees paid in law stamps (Stamps cancelled by Taxing officers not included):

Central office	Records and Writs Branch	$6,383 85	$8,235 65
	Judgment Branch	1,851 80	
Registrars' office	For Fee Fund	1,048 20	1,640 20
	For Shorthand Reporters' Fund	592 00	
Accountant's office			1,297 70
Official Referee Cameron's office			220 50
Office of the Inspector and Referee (Quieting Titles)			156 50
" Master in Ordinary			1,053 80
" Clerk in Chambers			1,973 20
" Registrar of the Court of Appeal			749 10
			$15,326 65

APPENDIX H.—Table showing the number of actions tried or otherwise disposed of by the Judges of the High Court of Justice and the Court of Appeal and the disposition thereof during the year ending Dec. 31st, 1911.

Trial Judges.	With a Jury.	Without a Jury.	Total.
Actions disposed of by the Judges of the King's Bench.	73	126	199
" " " " Chancery.....	56	113	169
" ' " " Common Pleas	53	107	160
" " " " Exchequer...	50	118	168
Totals	232	464	696

Judges in Chambers.	Allowed or varied.	Dismissed.	Standing for Judgment.	Total
Toronto:				
Appeals from the Masters in Chambers	14	30	....	44
" Local Masters and other officers acting in Chambers..................	17	12	....	29
Appeals from Official Referees............	....	....	....	0
" Local Taxing Officers	2	....	... .	2
" Taxing Officers at Toronto.........	....	....	....	0
Motions, other than appeals	....	....	....	1,141
Ottawa:—				
Appeals from Local Masters and other officers acting in Chambers	....	....	....	....
Appeals from Taxing Officers	....	....	....	....
Motions, other than appeals	10	1	....	11
London;—				
Appeals from Local Masters or other officers acting in Chambers................................	....	....	....	....
Motions, other than appeals	30	3	....	33
Totals	73	46	....	1,260

Weekly Courts.	Allowed.	Dismissed.	Standing for Judgment.	Total.
Toronto:—				
Appeals from reports of Local Masters and Official Referees	10	19	....	29
Appeals from awards and motions to set aside awards	2	....	....	2
Motions, other than appeals	563	58	4	625
Number struck off the list, no one appearing	....	....	....	9
" of motions enlarged	....	....	....	258
" " " stayed.....................	....	....	....	....
Ottawa:—				
Appeals from Local Judge	....	....	....	....
Appeals from reports of Local Masters and Official Referees	1	1	....	2
Motions, other than appeals.......	21	3	....	24
London:—				
Motions, other than appeals	18	1	.. ..	19
Appeals from reports of Local Masters and Official Referees	1	3	....	4
Totals	616	85	4	972

Master in Chambers:—	
Motions in respect of pleadings, for particulars, for discovery and for commissions to take evidence..	373
Motions in respect of venue, to set aside jury notices and notices of trial and proceedings under quo warranto	62
Motions for judgments and orders...	466
Motions, setting aside judgments or orders, staying trials, and dismissing actions ...	461
Miscellaneous motions	311
Ex parte motions	191
Total...	1,864

APPENDIX H.—Table showing number of actions tried, etc.—Continued.

Divisional Court.	Allowed.	Dismissed.	Varied.	Standing for Judgment.	Total.
Appeals from Trial Judges	30	80	8	5	123
Appeals from Weekly Courts and Chambers	10	40	3	...	53
Appeals from County and District Courts	45	90	8	5	148
Appeals from Surrogate Courts	...	4	...	...	4
Appeals from Division Courts	...	7	...	...	7
Appeals under special statutes	6	13	...	...	19
Motions to quash convictions	...	...	...	...	1
Motions, other than above	...	...	...	...	198
Totals	91	234	19	10	553

Court of Appeal.	Allowed.	Dis-missed.	Varied.	Standing for		With-drawn.	Total.
				Argu-ment.	Judg-ment.		
Appeals from Single or Trial Judges	23	38	2	...	16	3	82
Appeals from Divisional Courts	9	20	3	2	7	1	42
Appeals from Board of County Judges	...	...	...	...	...	...	...
Appeals from Arbitrators	...	...	...	...	...	...	...
Appeals from Drainage Referee	1	1	...	...	1	...	3
Appeals from the Ontario Railway and Municipal Board	...	1	...	1	2	...	4
Election Trial appeals	...	...	...	...	...	...	...
Habeas Corpus appeals	...	1	...	...	...	...	1
Reserved or criminal cases	2	1	...	1	...	...	4
Stated cases	4	2	...	...	1	...	7
Appeals from County and District Judges	1	...	...	...	...	...	1
Appeals from Surrogate Courts	...	...	...	...	...	...	...
Appeals from Mining Commissioner	...	...	...	...	...	...	...
Motions to full Court	...	...	...	...	...	...	...
Submitted under Con. Questions Act	...	...	...	...	1	...	1
Referred under Orders in Council	...	...	...	...	1	...	1
Orders and certificates issued, 227.							
Totals	40	64	5	4	29	4	146

APPENDIX "I."

TABLE showing the business in the office of the Surrogate Clerk, Osgoode Hall, Toronto, for the year ending December 31st, 1911.

	No.
Probate Certificates issued	4,900
Administration Certificates issued	2,582
Guardianship Certificates issued	135
Caveats fyled	83
Elections received under R.S.O. cap. 128, sec. 20	2

Fees paid in law stamps, $3,993.55.

APPENDIX J.—Table showing the Criminal business of the High Court of Justice at its sittings throughout the Province during the year 1911.

County or District.	Bills.		Nolle prosequi.	Indictments quashed.	Traversed to the Sessions.	Number of persons pleading guilty.	Number of persons tried by the Judges of the King's Bench.		Chancery.		Common Pleas.		Exchequer.		Verdicts after trial.				Number of days of sittings.
	True.	No.					With a Jury.	Without a Jury.	With a Jury.	Without a Jury.	With a Jury.	Without a Jury.	With a Jury.	Without a Jury.	Guilty.	Not guilty.	Disagreed.	Reserved.	
Algoma	10					2	10								6	4			5
Brant																			
Bruce																			
Carleton	1						1								1				2
Dufferin									1							1			2
Elgin	9	1				1			1		1				5	1			6
Essex																			
Frontenac																			
Grey																			
Haldimand																			
Halton																			
Hastings																			7
Huron	4						3								3				8
Kenora	2				1		2								1	1	1		5
Kent	2						1								1				1
Lambton	9						1						8			8			10
Lanark																			
Leeds and Grenville																			
Lennox and Addington	1												1		1				3
Lincoln	1								1										9
Manitoulin	1				1				1								1		2
Middlesex																			
Muskoka																			
Nipissing	12	1			3	14	3						31		2	5	2		11
Norfolk																			
Northumberland & D'm	2			2	1								1			1			13
Ontario	1						1									1			2
Oxford																			
Parry Sound		1						1	1						1	1			2
Peel																			
Perth																			
Peterborough	2					1					1				1				4
Prescott and Russell																			
Prince Edward																			
Rainy River	5	1			2	1	3								2	1			3
Renfrew	1				1				1							1			3
Simcoe	4					1			1		2				2	1	1		6
Stormont, D's and G'y	7					1		1					4		2	1			8
Sudbury	3				1		2								1	1			3
Thunder Bay																			
Victoria																			
Waterloo																			
Welland	1	1				1			1						1				1
Wellington		1																	
Wentworth	7				2		2				2				2	2			7
York	14	1				2	11				2				4	14	1	1	38
Totals	99	7	..	2	12	24	40	2	8	....	8	....	45	....	36	44	6	1	161

APPENDIX K.—Table showing the business of the Courts of General Sessions of the Peace and of the District and County Court Judge's Criminal Courts of the Province for the year 1911.

County or District.	Bills in Sessions.		Cases C. C. J. C. C.	Number of Persons Pleading Guilty.		Number of Persons Tried.		Verdicts after Trial.					Persons Accused.				Days of Sittings.	
						With Jury.	Without Jury.	Guilty.		Not Guilty.		Disagreed.	Sessions.		C. C. J. C. C.			
	True.	No.		Sessions.	C. C. J. C. C.	Sessions.	C. C. J. C. C.	Sessions.	C. C. J. C. C.	Sessions.	C. C. J. C. C.		Male.	Female.	Male	Female.	Sessions.	C. C. J. C. C.
Algoma	3	1	27	....	7	2	27	....	11	2	16	....	3	....	27	....	4	16
Brant	2	....	18	1	2	5	17	2	7	3	11	....	5	....	15	2	3	14
Bruce	2	....	24	....	17	1	24	....	19	1	5	6	2	....	24	....	2	25
Carleton	3	1	20	....	....	2	16	2	11	1	5	....	2	1	19	1	8	36
Dufferin	....	....	3	....	....	....	3	....	....	....	2	....	....	....	3	....	....	3
Elgin	....	....	11	....	5	....	2	....	3	....	....	....	....	....	7	....	....	10
Essex	7	....	17	2	1	....	16	....	7	....	9	....	2	....	13	2	5	12
Frontenac	3	....	10	....	5	2	10	2	7	....	3	....	3	....	10	....	5	10
Grey	1	....	18	....	8	....	16	....	6	....	4	....	....	....	17	1	6	24
Haldimand	....	....	24	....	10	....	14	....	13	....	1	....	....	....	14	....	2	27
Halton	2	....	9	....	6	2	9	1	6	1	3	....	2	....	8	1	2	7
Hastings	2	....	59	....	20	1	36	....	44	....	15	1	....	1	36	....	5	29
Huron	1	1	20	1	15	1	20	....	4	....	1	17	3	....	12	....	6	31
Kenora	1	....	4	....	....	1	4	1	3	....	1	1	1	....	4	....	3	4
Kent	35	....	48	....	20	10	47	4	30	5	17	1	7	....	46	....	6	38
Lambton	2	1	15	....	8	2	8	....	8	2	....	....	3	....	7	1	3	26
Lanark	....	....	12	....	4	....	8	....	6	....	2	....	....	....	12	....	2	12
Leeds and Grenville	2	....	60	....	42	1	60	....	42	1	18	18	2	....	58	2	1	23
Lennox and Addington	....	....	2	....	1	....	1	....	1	....	....	....	....	....	1	....	....	2
Lincoln	4	....	16	1	1	3	17	3	11	....	5	....	3	....	17	....	8	24
Manitoulin	2	....	....	1	....	....	....	....	....	1	....	1	2	....	....	....	5	....
Middlesex	5	....	28	....	16	7	16	3	19	5	13	....	8	....	32	....	11	50

Muskoka	3	....	11	....	....	4	8	4	10	2	2	....	4	....	10	1	5	8
Nipissing	8	1	15	....	6	6	15	2	10	4	5	....	8	1	15	....	6	15
Norfolk	4	3	5	....	2	4	5	2	3	2	3	....	6	....	4	1	7	4
Northumberland and Durham	1	....	28	....	5	1	28	....	12	1	15	....	1	....	28	....	10	47
Ontario	1	....	7	....	3	1	6	1	6	....	....	....	1	....	7	....	7	9
Oxford	*1	....	10	....	5	....	6	....	2	....	4	....	....	....	10	....	....	8
Parry Sound	7	1	10	1	....	7	10	2	5	5	5	....	7	1	10	1	4	7
Peel	....	....	8	....	2	....	6	....	....	....	6	....	....	....	7	....	6	13
Perth	1	....	16	....	4	1	12	....	8	1	4	....	1	....	16	....	5	18
Peterborough	6	....	3	....	....	5	3	2	3	3	....	....	5	....	3	....	8	3
Prescott and Russell	....	....	....	....	5	....	5	....	4	....	1	....	....	....	5	....	2	5
Prince Edward	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Rainy River	7	1	3	2	....	5	3	4	....	1	3	....	7	....	3	....	6	3
Renfrew	....	....	10	....	4	....	12	....	8	....	5	....	....	....	13	....	4	16
Simcoe	3	....	15	3	6	3	15	3	8	....	7	....	3	....	15	....	8	11
Stormont, Dundas and Glengarry	2	....	8	....	8	2	....	2	....	....	....	....	2	....	8	....	3	11
Sudbury	5	....	5	....	1	3	6	....	1	3	5	....	4	1	6	....	3	6
Thunder Bay	6	....	13	5	2	6	18	5	11	1	2	3	6	....	15	....	7	14
Victoria	1	....	1	....	....	2	1	....	....	....	1	1	2	....	1	....	2	1
Waterloo	....	....	8	....	5	....	3	....	....	....	....	....	....	7	1	....	....	11
Welland	2	1	4	....	1	1	4	....	1	2	....	2	4	....	4	....	4	4
Wellington	....	....	20	....	11	....	11	....	17	....	3	....	....	....	11	....	....	15
Wentworth	4	....	105	....	21	1	80	1	38	....	42	....	1	....	97	4	9	49
York	160	14	127	63	49	86	82	52	27	31	54	3	168	33	131	13	97	95
Totals	299	25	877	80	328	178	710	98	432	78	298	54	278	45	802	30	290	796

* Not proceeded with.

APPENDIX "L."

Sheriffs.

Nathan Henderson, of the Township of Albion (Palgrove P.O.), Esquire, to be Sheriff in and for the County of Peel, in the room and stead of Robert Broddy, deceased.—*Gazette, 7th January.*

James A. McCammon, of the Town of Gananoque, Esquire, M.D., to be Sheriff in and for the United Counties of Leeds and Grenville, in the room and stead of George A. Dana, deceased.—*Gazette, 29th April.*

Surrogate Judge.

Frederick Stone, Esquire, Senior Judge of the District Court of Algoma, to be Judge of the Surrogate Court of the said District of Algoma.—*Gazette, 6th May.*

Charles H. Widdifield, Esquire, Junior Judge of the County of Grey, to be appointed Judge of the Surrogate Court in and for the said County of Grey, in the room and stead of W. J. Hatton, Deceased.—*Gazette, 19th August.*

Local Masters.

G. E. Deroche, Esquire, Judge of the County Court of the County of Hastings, to be Local Master of the Supreme Court of Judicature in and for the said County of Hastings, *pro tempore.*—*Gazette, 6th May.*

Frederick Stone, Esquire, Senior Judge of the District Court of the District of Algoma, to be Local Master of the Supreme Court of Judicature in and for the said District of Algoma.—*Gazette, 6th May.*

County Crown Attorney: Clerks of the Peace.

Thomas E. McKee, of the Town of North Bay, in the District of Nipissing, Esquire, Barrister-at-Law, to be Crown Attorney and Clerk of the Peace in and for the Provisional Judicial District of Nipissing, in the room and stead of A. G. Browning, Esquire, resigned.—*Gazette, 12th August.*

Richard H. Greer, of the City of Toronto, in the County of York, Esquire, Barrister-at-Law, to be Crown Attorney in and for the said County of York, in the room and stead of James Baird, Esquire, deceased.—*Gazette, 11th November.*

Local Registrar, Deputy Clerks of the Crown, etc.

Horace Pratt, of the City of Ottawa, in the County of Carleton, Esquire, Barrister-at-Law, to be Deputy Clerk of the Crown, Clerk of the County Court and Registrar of the Surrogate Court in and for the said County of Carleton in the room and stead of John P. Featherston, resigned.—*Gazette, 25th March.*

George F. Harman, of the City of Toronto, in the County of York, Esquire, K.C., to be Registrar of the Surrogate Court for the said County of York, *pro tempore,* in the room and stead of Joseph Tait, deceased.—*Gazette, 25th March.*

Arthur Frederick Wallis, of the City of Toronto, in the County of York, Esquire, to be Registrar of the Surrogate Court of the County of York in the room and stead of Joseph Tait, deceased.—*Gazette, 17th June.*

THOMAS STUART TRAILL SMELLIE, of the City of Fort William, in the District of Thunder Bay, Esquire, to be Local Registrar of the High Court, Clerk of the District Court, and Registrar of the Surrogate Court in and for the Provincial Judicial District of Thunder Bay, in the room and stead of James Meek, Esquire, deceased.—*Gazette, 18th November.*

POLICE MAGISTRATES.

WILLIAM EAGER, of the Village of Morrisburg, in the County of Dundas, Esquire, to be Police Magistrate in and for the said Village of Morrisburg (without salary), in the room and stead of A. A. Logan, Esquire, resigned.—*Gazette, 11th February.*

JOHN SAMUEL JEPHSON, of the Township of Pickering, in the County of Ontario (Pickering P. O.), to be Police Magistrate in and for the said Township of Pickering, in the room and stead of Major Harper, who has resigned, as far as the said Township of Pickering is concerned.—*Gazette, 18th March.*

THOMAS D. STANLEY, of the Town of St. Mary's, in the County of Perth, Esquire, to be Police Magistrate in and for the said Town of St. Mary's.—*Gazette, 25th March.*

EDWIN H. SHEPHERD, of the Town of Niagara, in the County of Lincoln, Esquire, to be Police Magistrate in and for said Town of Niagara.—*Gazette, 8th April.*

JOHN A. RAMSDEN, of the City of Toronto, in the County of York, Esquire, to be appointed Police Magistrate in and for the said County of York.—*Gazette, 15th April.*

GEORGE A. PAYNE, Police Magistrate of the Town of Campbellford, in the County of Northumberland, Esquire, to be also Police Magistrate in and for the Township of Seymour.—*Gazette, 15th April.*

JAMES A. LAGROIS, of the Town of Rockland, in the County of Russell, Esquire, to be Police Magistrate in and for the said Town of Rockland.—*Gazette, 17th June.*

JOSEPH C. JUDD, of the City of London, in the County of Middlesex, Esquire, K.C., to be Police Magistrate in and for the said City of London in the room and stead of Francis Love, deceased.—*Gazette, 24th June.*

J. J. O'CONNOR, of the City of Port Arthur, in the District of Thunder Bay, to be a Police Magistrate in and for the Districts of Thunder Bay, Algoma and Sudbury, not including the Cities of Port Arthur and Fort William and the Town of Sudbury, to exercise jurisdiction in the territory along the line of the Canadian Northern Railway between Port Arthur and Sudbury.—*Gazette, 9th September.*

JOHN ATWELL HOUGH, of the Town of Matheson, in the District of Nipissing, Esquire, to be Police Magistrate in and for the said Town of Matheson, and in and for the territory composed of the following Townships: Stock, Moody, Calvert, Carr, Hislop, Barnet, Prosser, Bond, McCann, Taylor, Lucas, Cook, Wilkie, Bowman, Aurora, Milligan, McCool, Curry, Galna, Rickard, Teefy, Playfair, Michaud, McCart, Tully, Coulson, Sheraton, Carnegie, Crawford, Knox, Dundonald, Duff, Guibord, Egan, Newmarket, Edwards, Clergue, Munro, Mahaffy, Little, Beatty, Marden, Kerrs, Reid, Walker, Wesley, Mann.—*Gazette, 28th October.*

ROBERT JOHN RENISON, of Moose Factory, Hudson Bay, Clerk in Holy Orders, to be Police Magistrate in and for those portions of the Districts of Nipissing, Sudbury and Algoma extending from 50 degrees north latitude to the northern boundary of the Province, without salary, in the room and stead of A. McLean Banting, who has removed from the Province.—*Gazette, 11th November.*

Ward Stanworth, of the City of Chatham, in the County of Kent, Esquire, Barrister-at-Law, to be Police Magistrate in and for the said City of Chatham, *pro tempore,* in the room and stead of Michael Houston, Esquire, removed from office.—*Gazette, 11th November.*

Charles M. McCarthy, of the Village of Elk Lake, in the District of Nipissing, to be Police Magistrate in and for the said Village of Elk Lake, and for the Montreal Mining Division and the Gowganda Mining Division, in the room and stead of Thomas H. Torrance, Esquire, resigned, and A. E. Landrian, Esquire, removed from the District.—*Gazette, 25th November.*

Thomas H. Torrance, of South Porcupine, in the District of Nipissing, Esquire, to be Police Magistrate in and for the Township of Tisdale, in the room.and stead of T. E. Godson, Esquire, resigned.—*Gazette, 30th December.*

Associate Coroners.

John P. Armour, of the City of St. Catharines, in the County of Lincoln, Esquire, M.D., to be an Associate Coroner in and for the said County of Lincoln.—*Gazette, 21st January.*

William Thomas Greenwood, of the City of St. Catharines, in the County of Lincoln, Esquire, M.D., to be an Associate Coroner in and for the said County fo Lincoln.—*Gazette, 21st January.*

Rene Edward Weston, of the Town of Tillsonburg, in the County of Oxford, Esquire, M.B., to be an Associate Coroner in and for the said County of Oxford.—*Gazette, 21st January.*

Morris Kinsley Dillane, of the Village of Schomberg, in the County of York, Esquire, M.D., to be an Associate Coroner in and for the said County of York.—*Gazette, 21st January.*

James Carruthers Masson, of the Town of Dunnville, in the County of Haldimand, Esquire, M.D., to be an Associate Coroner in and for the said County of Haldimand.—*Gazette, 12st January.*

William John Boynton, of the Village of Pefferlaw, in the County of York, Esquire, M.D., to be an Associate Coroner in and for the said County of York.—*Gazette, 4th February.*

Andrew F. Demary, of the City of Toronto, Esquire, M.D., to be an Associate Coroner in and for the County of York, including the said City of Toronto.—*Gazette, 18th March.*

Hugh Arthur Johnston, of the Village of Port Burwell, in the County of Elgin, Esquire, M.D., to be an Associate Coroner in and for the said County of Elgin.—*Gazette, 25th March.*

John J. Thompson, of the City of Toronto, in the County of York, Esquire, M.D., to be an Associate Coroner in and for the said County of York.—*Gazette, 1st April.*

Herbert Lorne Minthorn, Esquire, M.D., Porcupine P.O., to be an Associate Coroner in and for the District of Sudbury, also for Nipissing.—*Gazette, 22nd April.*

Herman Henry Moore, of the Village of Porcupine, in the District of Sudbury, Esquire, M.D., to be an Associate Coroner in and for the said District of Sudbury.—*Gazette, 22nd July.*

Herman Henry Moore, of the Village of Porcupine, in the District of Sudbury, Esquire, M.D., to be an Associate Coroner for the District of Nipissing.—*Gazette, 22nd July.*

Alexander McTaggart Burgess, of the Village of Bala, Esquire, M.D., to be an Associate Coroner in and for the District of Muskoka.—*Gazette, 22nd July.*

James Spence, of the Town of Thessalon, in the District of Algoma, Esquire, M.D., to be an Associate Coroner in and for the said District of Algoma.—*Gazette, 5th August.*

Richard Martin Bateman, of the City of Toronto, in the County of York, Esquire, M.D., to be an Associate Coroner in and for the City of Toronto.—*Gazette, 5th August.*

Albert B. Boyd to be a Provincial Coroner under the provisions of Sub-Section 1, Section 32, Cap. 23, 1 George V., being "An Act respecting Coroners and Coroners' Inquests."—*Gazette, 19th August.*

William Jamieson, of the Village of Wellandport, in the County of Lincoln, Esquire, M.D., to be an Associate Coroner in and for the said County of Lincoln.—*Gazette, 26th August.*

John Christie, Esq., M.D., of the Town of Stayner, in the County of Simcoe, to be an Associate Coroner in and for the said County of Simcoe.—*Gazette, 16th September.*

Peter Stewart MacLaren, of the Village of Porcupine, in the District of Sudbury, Esquire, M.D., to be an Associate Coroner in and for the said District of Nipissing.—*Gazette, 30th September.*

Ninian Wildridge Woods, of the Village of Bayfield, in the County of Huron, Esquire, M.R.E.S. Eng., L.M.R.C.P.I., to be an Associate Coroner in and for the said County of Huron.—*Gazette, 4th October.*

Gordon Parke Jackson, Esq., M.D., of the Village of Wroxeter, in the County of Huron, to be an Associate Coroner in and for the said County of Huron.—*Gazette, 28th October.*

George Edward Jurben Lannin, of the City of Hamilton, in the County of Wentworth, Esquire, M.D., C.M., to be an Associate Coroner in and for said County of Wentworth.—*Gazette, 25th November.*

J. A. Burgess, of the Village of Lakefield, in the County of Peterborough, Esquire, M.D., C.M., to be an Associate Coroner in and for the County of Peterborough.—*Gazette, 9th December.*

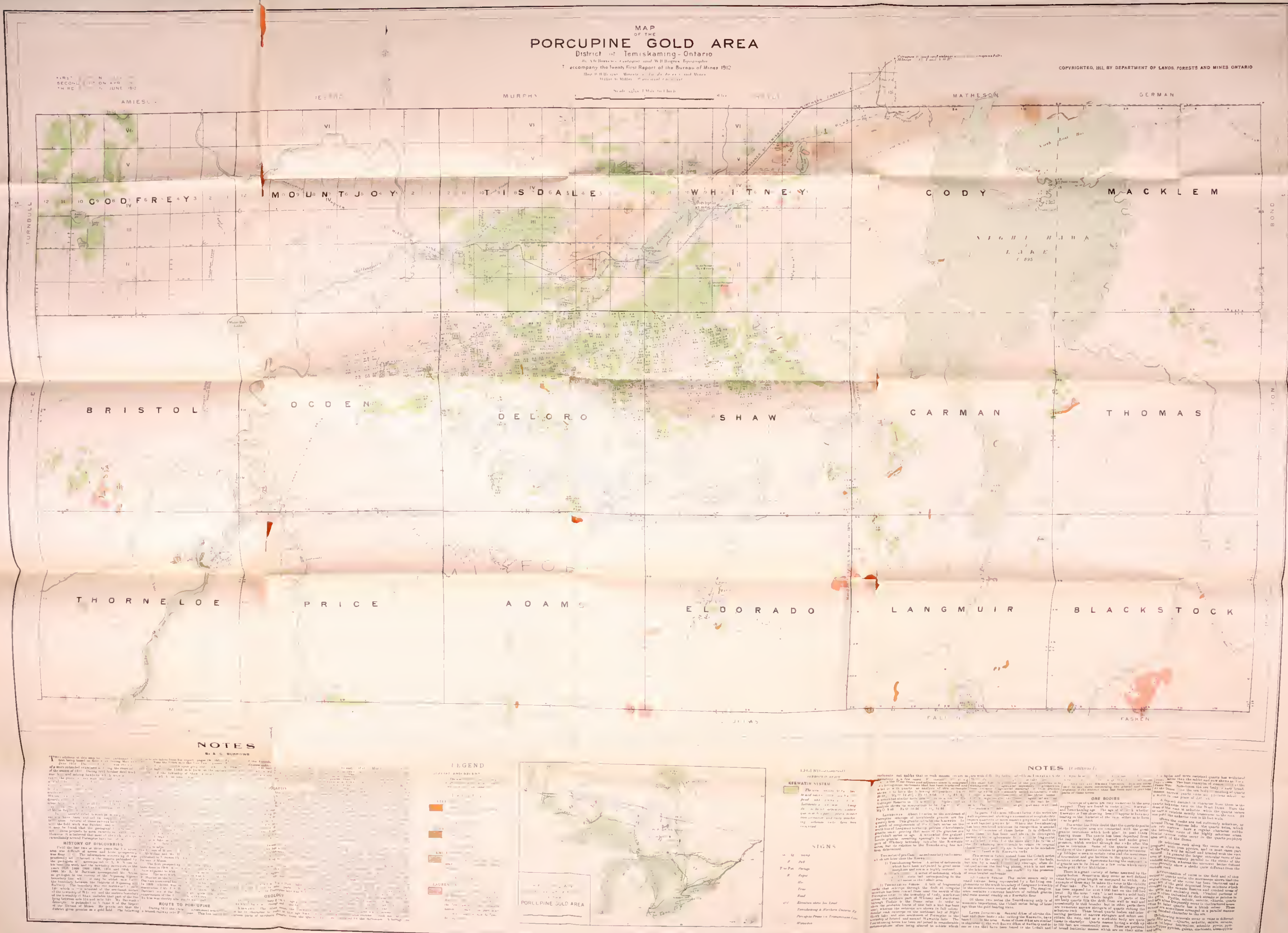
John Silverthorn, of the Township of Windham, in the County of Norfolk (Teeterville P.O.), Esquire, M.D., to be an Associate Coroner in and for the said County of Norfolk.—*Gazette, 16th December.*

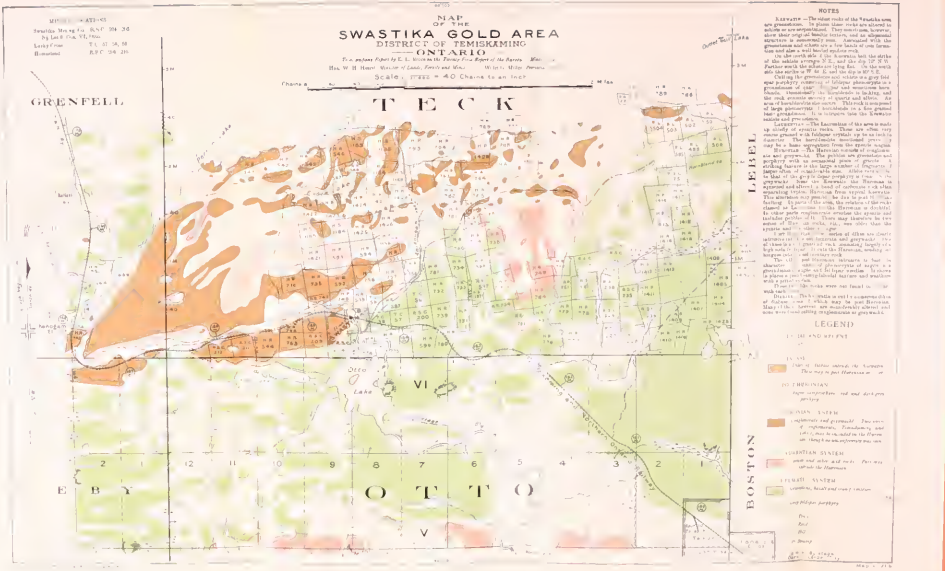
James Archer Brown, of the Village of Colborne, in the County of Northumberland, Esquire, M.D., to be an Associate Coroner in and for the United Counties of Northumberland and Durham.—*Gazette, 30th December.*

Allan McLennan, of the Town of Kenora, in the District of Kenora, Esquire, Police Magistrate, to be an Associate Coroner in and for the said District of Kenora.—*Gazette, 30th December.*

Williard Gordon Middleton McCormack, of the City of Toronto, in the County of York, Esquire, M.B., to be an Associate Coroner in and for the County of York.—*Gazette, 30th December.*

Charles Fothergill McGillivray, of the Town of Whitby, in the County of Ontario, Esquire, M.D., to be an Associate Coroner in and for the said County of Ontario.—*Gazette, 30th December.*


MAP OF THE
PORCUPINE GOLD AREA
District of Temiskaming - Ontario
To accompany the Twenty First Report of the Bureau of Mines 1912
COPYRIGHTED, 1911, BY DEPARTMENT OF LANDS, FORESTS AND MINES ONTARIO
AMIESU
MURPHY
MATHESON
GERMAN
GODFREY
MOUNTJOY
TISDALE
WHITNEY
CODY
MACKLEM
NIGHT HAWK LAKE
TURNBULL
BOND
BRISTOL
OGDEN
DELORO
SHAW
CARMAN
THOMAS
THORNELOE
PRICE
ADAMS
ELDORADO
LANGMUIR
BLACKSTOCK
FASKEN
NOTES
By A. G. BURROWS
HISTORY OF DISCOVERIES
ROUTE TO PORCUPINE
GEOLOGY
LEGEND
SIGNS
PORCUPINE GOLD AREA
NOTES (Continued)
ORE BODIES



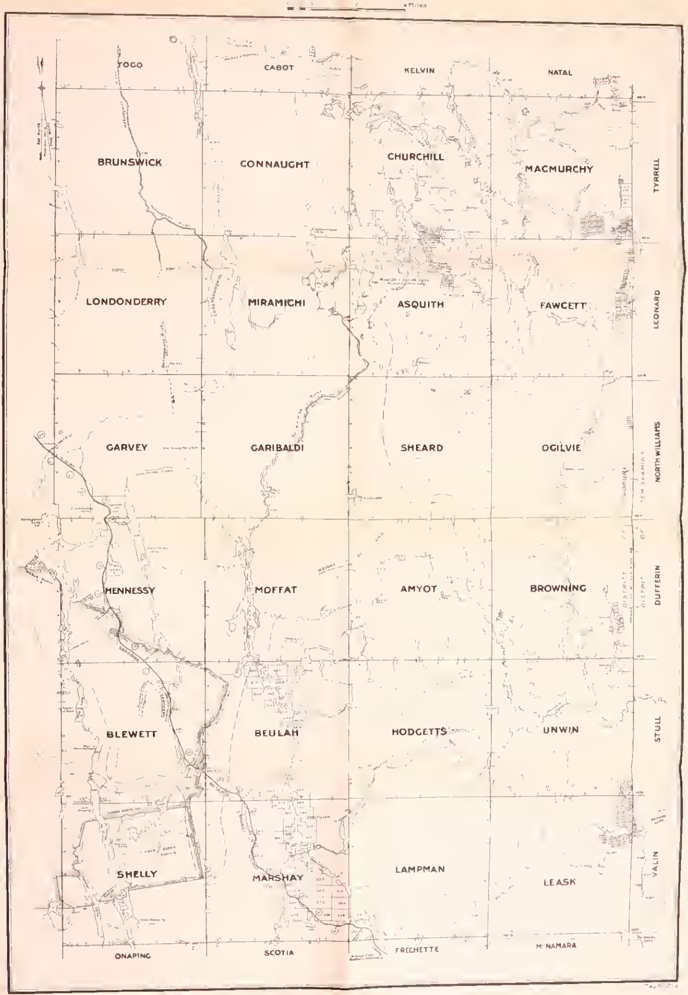
MAP
OF THE
SWASTIKA GOLD AREA
DISTRICT OF TEMISKAMING
ONTARIO
Scale = 40 Chains to an Inch
T E C K
GRENFELL
LEBEL
BOSTON
E B Y
O T T O
VI
V
Lake
Kenogami
NOTES
LEGEND

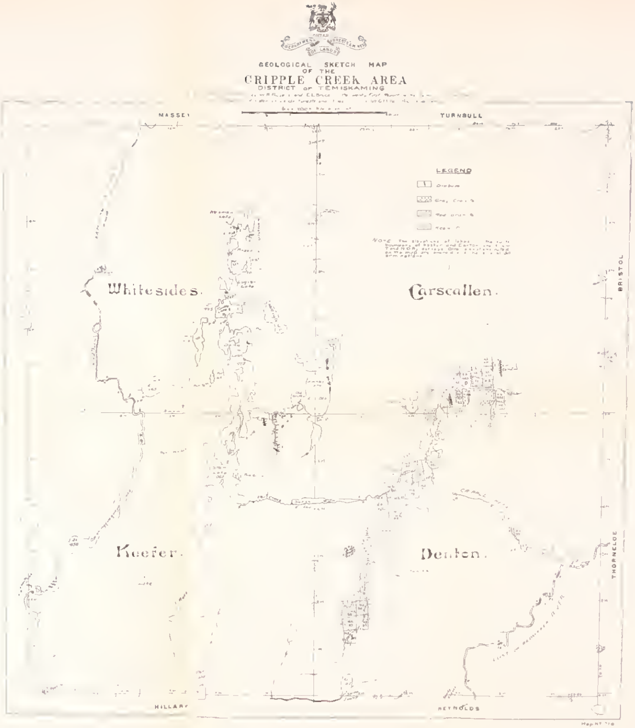
BUREAU OF MINES
MAP
OF THE
DISTRICT OF PATRICIA
PROVINCE OF ONTARIO
HUDSON
BAY
JAMES
BAY
MANITOBA
DISTRICT
OF
PATRICIA
ONTARIO
QUEBEC
LAKE SUPERIOR
MINNESOTA
ALBANY RIVER
ATTAWAPISKAT
WINISK
SEVERN RIVER
EASTMAIN RIVER
RUPERT RIVER
NOTTAWAY RIVER
GREAT WHALE RIVER
Port Nelson
York Factory
Port Arthur
Fort William

MAP
OF THE
WEST SHININGTREE AREA
DISTRICT OF SUDBURY

Showing Route from Canadian Northern Ontario Railway

SCALE $\frac{1}{126,720}$ or 2 Miles = 1 Inch




GEOLOGICAL SKETCH MAP
OF THE
CRIPPLE CREEK AREA
DISTRICT OF TEMISKAMING
MASSEY
TURNBULL
LEGEND
Whitesides.
Carscallen.
Keefer.
Denton.
BRISTOL
THORNELOE
HILLARY
REYNOLDS

MAP
SHOWING
GOLD AREA
IN THE TOWNSHIPS OF
MUNRO AND GUIBORD
DISTRICT OF TEMISKAMING
ONTARIO

To accompany Report of A. G. B.
in Twenty First Report of the Bureau of Mines

Scale

LEGEND

DIABASE

TEMISKAMING

Greywacke and slate

KEEWATIN

Amygdaloidal greenstone, ... diabase, graphitic schists, iron formation, and ... carbonate

Swamp

Hill

Road

Trail

NOTES

The Munro-Guibord gold area lies ... of the town of Matheson, mileage 2.. on the Temiskaming and Northern Ontario railway. A good wagon road connects the mining camp with the railway. The locality was geologically examined in August, 1911.

Claims were first staked for gold in 19.. and since that time some development work has been done. The active mining claims are located along the south boundary of Munro, being partly in Munro and partly in Guibord.

The rocky portions of Munro, which occupy a considerable part of the west half of the township, have been burned over in recent years, so that prospecting has been facilitated. The eastern part is made up largely of rolling sand ridges with occasional swamps.

Three series of rocks occur in the area, namely, an old igneous complex, the Keewatin, an old sedimentary series, the Temiskaming, and a series of later intrusives. An ellipsoidal basalt is the most widely distributed Keewatin eruptive. At times amygdules are abundant, giving the rock a conglomeratic appearance. Some light-coloured felsitic dikes cut the greenstone. Other Keewatin rocks are serpentine and iron formation. The Temiskaming series occurs as a narrow belt in the southwesterly part of Munro and the adjoining part of Guibord. It consists of rather coarse greywacke and finely banded clay rocks, which have been considerably altered to quartzite, slates and schists. In one locality the series is intruded by a narrow dike of grey feldspar porphyry. The later intrusives are quartz-diabase and gabbro. Under the microscope these rocks greatly resemble the diabase from the sill at Cobalt. A gabbro-like rock occurs in large areas in the north part of Munro and as a high conical hill in the third concession of Guibord.

Quartz Veins.—The gold bearing veins which are being worked are in the sedimentary rocks of the Temiskaming series. They are often quite regular and traceable over several hundred feet. Their strike is, for the most part, nearly East and West. As at Porcupine the veins have been considerably disturbed, showing several generations of quartz. Iron pyrites is the chief sulphide, and galena occurs in small quantity. Visible gold was noted in the quartz in several veins.

The first operations were at the Munro mine, where a shaft was sunk 92 feet and some drifting done at the 60-foot level. The greatest development has taken place at the Detroit-New Ontario mine, where a 9 x 7 shaft has been sunk 1.. feet and 2.. feet of drifting and cross-cutting on three narrow veins accomplished. The main vein at this property dips 50° S. A small prospecting stamp mill was in operation and some bullion has been produced.

At the Gold Pyramid mine, in Guibord township, there are two prominent quartz veins. On the southerly of these the development work consisted of a shallow shaft and open cut, with some trenching in deep soil to the south. This vein has been exposed for about 250 feet. The northerly vein had been traced for 400 feet and a shaft was being sunk on it. A 5-stamp mill was being erected on this property.