Copy 1

SESSIONAL PAPERS.

VOL. XXII—PART V.

FOURTH SESSION OF SIXTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1890.

TORONTO:
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1890.

LIST OF SESSIONAL PAPERS.

ARRANGED ALPHABETICALLY.

Title.	No.	Remarks.
Accounts (*Dominion and the Provinces*)	66	*Printed.*
Accounts, Public	18	"
Agricultural and Arts, Report	8	"
Agricultural College, Report	24	"
Agricultural and Experimental Union, Report	5	"
Agricultural Societies, Analysis	39	*Not Printed.*
Ardagh, Judge, commutation	44	*Printed.*
Asylums, Report	10	"
Bail, recognizances of	68	*Printed.*
Ballot at School Elections	52	"
Beekeepers' Association, Report	78	"
Bi-lingual teaching	28	"
Births, Marriages and Deaths, Report	4	"
Blind Institute, Report	13	"
Borron's Report	87	"
Canada Temperance Act, where in force	67	*Printed.*
Canadian Institute, Report (*part of*)	6	"
Central Prison contracts	42	"
Common Gaols, Report	11	"
Crown Lands, Report	22	"
Custody of Title Deeds Act	26	*Not Printed.*
Dairy and Creamery Association, Report	49	*Printed.*
Deaf and Dumb Institute, Report	12	"
Departmental Reports, when presented	70	*Not Printed.*
Division Courts, Report	62	*Printed.*
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Drainage, Tile	31	*Not Printed.*
Dundas and Waterloo Macadamized Road	71	"
Eden, John, claim of	61	*Not Printed.*
Education, Report	6	*Printed.*
do publication of Text Books	1	"
do language in the Schools	2	"
do regulations, French and German Schools	7	"
do orders in Council *re* Department	29	*Not Printed.*
do regulations by Department	30	"

Title.	No.	Remarks.
Education, superannuation Fund	33	*Printed.*
do study of English	34	*Not printed.*
do bi-lingual teaching	28	*Printed.*
do text book history	40	"
do case to Judges	43	"
do correspondence, French Schools	53	"
Elgin House of Industry, Report	41	*Not printed.*
Entomological Society, Report	17	*Printed.*
Estimates	19	"
Factories, Report	35	*Printed.*
Fines and Penalties remitted	68	"
French Schools. See *Education.*		
Fruit Growers, Report	20	"
Gaols and Prisons, Report	11	*Printed.*
German Schools. See *Education.*		
Gosnell *vs.* Swarthout	73	"
Grand River Navigation Co'y	79	"
Health, Report	72	*Printed.*
Hospitals, Report	14	"
Immigration, Report	23	*Printed.*
Industries, Bureau of, Report	80	"
Insurance, Report	3	"
Judicature Act, commutation	44	*Printed.*
Killarney, amount expended	60	*Not printed.*
do licenses granted	86	"
Legal Offices, Report	36	*Printed.*
Legislative Assembly, convening of	70	*Not printed.*
Magdalen Asylums, Report	15	*Printed.*
Mechanics' Institutes, Report (*part of*)	6	"
Mercer Estate	54	*Not printed.*
Municipal Debentures	59	"
Municipal Indebtedness	58	"
Ontario Agricultural and Experimental Farm, Report	24	*Printed.*
Ontario Agricultural and Experimental Union, Report	5	"
Ontario and Rainy River Railway papers	81	"
Ontario Shops Regulation Act, By-laws	38	"
Orphan Asylums, Report	15	"
Ottawa and Parry Sound Railway papers	81	"
Pine Trees, dues on	74	*Printed.*
Police Magistrates, appointment	67	"
Poor and Indigent Persons, relief of	37	"
Poultry Associations, Report	76	"

Title.	No.	Remarks.
Poultry and Pet Stock, Report	77	*Printed.*
Practical Science, Report (*part of*)	6	"
Prisons, Report	11	"
Provincial Revenue	83	"
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Public Works, Report	21	"
Queen Victoria Niagara Falls Park, Report	65	*Printed.*
Railway Aid Certificates	85	*Printed.*
do Papers	81	"
Receipts and Expenditures	83	"
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Refuge Houses of, Report	15	"
Registrars, Fees of	51	"
Registry Offices, Report	63	"
Revenue, Provincial	83	"
Scientific Societies (*part of*)	6	*Printed.*
Scott Act, where in force	67	"
Secretary and Registrar, Report	84	"
Sheep Act, where in force	27	"
Sheep Breeders' Association, Report	50	"
Shops Regulation Act, By-laws	38	"
Spencer, W. H., appointment of	45	"
Statutes Revised, distribution	25	*Not printed.*
Sugar Beet, Report on	48	*Printed.*
Superannuation	33	"
Surrogate Court, commutation of fees	44	"
Tavern and Shop Licenses, Report	9	*Printed.*
Temperance Act, where in force	67	"
Text Books, publication	1	"
Tile Drainage	31	*Not printed.*
Timber Dues	74	*Printed.*
Title Deeds Act, filings under	26	*Not printed.*
Titles, Master of, Report	69	*Printed.*
Toronto General Trusts Co'y, Report	32	*Not printed.*
Toronto Registry Office, disbursements	46	*Printed.*
Toronto University, debentures issued	55	"
do biological building	56	"
do students attending	57	"
do residence	75	*Not printed.*
do report (*part of*)	6	*Printed.*
do bursar's statement	47	"
Upper Canada College, Report (*part of*)	6	*Printed.*
do Bursar's statement	16	"
Upper Canada Improvement Fund	82	"

LIST OF SESSIONAL PAPERS.

Arranged in Numerical Order, with their titles at full length; the Dates when Ordered and when Presented to the Legislature; the name of the Member who moved for the same, and whether Ordered to be Printed or not.

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CONTENTS PART II.

CONTENTS PART III.

CONTENTS PART IV.

CONTENTS PART V.

No. 22.. Report of the Commissioner of Crown Lands for the year 1889. Presented to the Legislature, 12th March, 1890. (*Printed.*)

No. 23.. Report of the Department of Immigration for the year 1889. Presented to the Legislature, 7th March, 1890. (*Printed.*)

No. 24.. Report of the Ontario Agricultural College and Experimental Farm for the year 1889. Presented to the Legislature, 24th March, 1890. (*Printed.*)

No. 25.. Statement as to the disposal of the Revised Statutes of Ontario for the year 1889. Presented to the Legislature, 3rd February, 1890. (*Not Printed.*)

No. 26.. Return to an Order of the House of the eighteenth day of March, 1889, shewing the number of documents filed under the "Custody of Title Deeds Act" up to the first day of January, 1889, and the amount of fees received. And shewing also, the amount paid in each Registration Division for the necessary books as required under the Act. Presented to the Legislature, 4th February, 1890.—*Mr. Wood, (Hastings.)* (*Not Printed.*)

No. 27.. Return to an Order of the House of the 18th day of March, 1889, shewing the Township Municipalities in which the Act to impose a tax on Dogs and for the Protection of Sheep is in force; the number of dogs assessed in such municipalities; the number of sheep killed and injured, and the amount paid for the same by such municipalities for the years 1886, 1887 and 1888 respectively. Also, shewing the municipalities in which a by-law is in force for the assessment of dogs without providing for damages to sheep, and the number of dogs so assessed for the above years, respectively. Presented to the Legislature, 4th February, 1890.—*Mr. Dryden.* (*Printed.*)

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No. 28.. Extracts and Statements respecting Bi-lingual teaching in Great Britain, the United States and Canada. Presented to the Legislature 17th February, 1890. (*Printed.*)

No. 29.. Orders in Council, made in the year 1889 under the Revised Statutes of Ontario, 1887, Cap. 224, respecting the Education Department. Presented to the Legislature 6th February, 1890. (*Not printed.*)

No. 30.. Regulations made or revised by the Department of Education during the year 1889. Presented to the Legislature 6th February, 1890. (*Not printed.*)

No. 31.. Statement of the Returns made by Municipalities under the Tile, Stone, and Timber Drainage Act, R. S. O., 1887, Cap. 39, for the year 1889. Presented to the Legisluture 6th February, 1890. (*Not printed.*)

No. 32.. Statement of the affairs of the Toronto General Trusts Company under the provisions of 35 Vic., Cap. 83, Sec. 13. Presented to the Legislature 6th February, 1890. (*Not printed.*)

No. 33.. Return to an Order of the House of the thirteenth day of March, 1889, shewing in detail the number of Public School teachers who have accepted the terms heretofore imposed in regard to the Superannuation Fund and have withdrawn one-half of the amount paid in. The number of teachers who

have not accepted the terms, and shewing to what purposes the sums not already withdrawn are devoted, or how funded. Presented to the Legislature 7th February, 1890. *Mr. Blythe.* (*Printed.*)

No. 34.. Copy of a Minute of the Department of Education respecting the study of English in those schools in which the French or German language prevails. Presented to the Legislature 11th February, 1890. (*Not printed.*)

No. 35.. Report of the Inspectors of Factories for the year 1889. Presented to the Legislature 14th February, 1890. (*Printed.*)

No. 36.. Report of the Inspector of Legal Offices for the year 1889. Presented to the Legislature, 3rd April, 1890. (*Printed.*)

No. 37.. Supplementary Return to an Order of the House of the fourth day of February, 1889, shewing the amount paid out from municipal funds, either by direct grants or remission of taxes, in each city, town, village or rural municipality in the Province of Ontario during 1887 or 1888, for the relief of poor and indigent persons, but not including any sum paid for the support of a House of Industry or similar institution; the number of indigents a permanent charge upon any municipality in 1887 and 1888, and the number of such indigents who received temporary aid from municipal funds in 1887 and 1888. Presented to the Legislature 18th February, 1890. *Mr. Clarke* (*Wellington.*) (*Printed.*)

No. 38.. Return to an Order of the House of the twenty-fifth day of February, 1889, shewing the name of the municipalities which have passed by-laws under the authority of the "Ontario Shops Regulation Act," distinguishing between cases where such by-laws were passed without petitions in favour thereof. And shewing also, the date of the passing of each such by-law; the class or classes of shops to which each such by-law applied; the hour at, and the period of the year during which the respective classes of shops were by the by-law required to be closed, and which of such by-laws have been repealed. Presented to the Legislature 18th February, 1890. *Mr. Morgan.* (*Printed.*)

No. 39.. Analysis of Reports of County, Township and Horticultural Societies for the year 1888. Presented to the Legislature 20th February, 1890. (*Not printed.*)

No. 40.. A brief history of Public and High School Text-Books authorized for the Province of Ontario, 1846-1889. Presented to the Legislature 26th March, 1890. (*Printed.*)

No. 41.. Report of the Inspector of the Elgin House of Industry for the year 1889. Presented to the Legislature 20th February, 1890. (*Not printed.*)

No. 42.. Copy of an agreement between the Inspector of Prisons and Public Charities and H. A. Nelson & Sons, relative to the manufacture of brooms at the Central Prison. Also, of Order in Council approved by His Honour the Lieutenant-Governor, the fifteenth day of June, A.D. 1889, authorizing the said agreement. Also, of agreement between the Inspector of Prisons and Public Charities and the Brandon Manufacturing Company of Toronto (Limited), relative to the manufacture of woodenware at the Central Prison. Also, of Order in Council approved by His Honour the Lieutenant-Governor, the thirty-first day of December, A.D, 1889, authorizing the said agreement. Presented to the Legislature 11th March, 1890. (*Printed.*)

No. 43.. Return to an Order of the House of the tenth day of February, 1890, shewing a copy of the Case submitted by the Minister of Education for the opinion of the Judges of the Chancery Division of the High Court of Justice, as to the true construction of certain provisions of the Public School Act relating to Separate School supporters. Also, the answers given by the Judges to the questions submitted by the Case. Presented to the Legislature 24th February, 1890. *Mr. Meredith.* (*Printed.*)

No. 44.. Copy of an Order in Council increasing the commutation of the Surrogate Court fees payable to His Honour Judge Ardagh. Presented to the Legislature 25th February, 1890. (*Printed.*)

No. 45.. Return to an Address to His Honour the Lieutenant-Governor, of the nineteenth day of February, 1890, praying that he will cause to be laid before the House, a copy of the Order in Council appointing W. H. Spencer Police Magistrate for parts of the Districts of Muskoka and Parry Sound, and fixing his salary or emolument, and of the Commission issued to him as such Police Magistrate. Presented to the Legislature 25th February, 1890. *Mr. Marter.* (*Printed.*)

No. 46.. Return to an Order of the House of the twenty-first day of February, 1890, shewing the amount of disbursements connected with the Registrar of Deeds office in the City of Toronto for the year 1889, as follows :—(*a*) To the City of Toronto. (*b*) To the Deputy Registrar. (*c*) To other clerks and assistants. (*d*) For other purposes. Also, shewing the gross earnings of the Registrar for the year 1889, and the total amount received by the Registrar for his personal use ; and also a statement of the expenditure, if any, rendered necessary in consequence of the creation of the second Registrar for the City of Toronto, together with a copy of the report of any committee, or sub-committee of the Council of the City of Toronto shewing the necessity for new buildings for the accommodation of the registry officers, books, papers, documents and like matter relating to said city. Presented to the Legislature 28th February, 1890. *Mr. H. E. Clarke* (*Toronto.*) (*Printed.*)

No. 47.. Bursar's statement of cash transactions of the University of Toronto for the year ending 30th June, 1889. Presented to the Legislature 3rd March, 1890. (*Printed.*)

No. 48.. Report of Robert H. Lawder upon the cultivation of the sugar beet in Ontario. Presented to the Legislature 4th March, 1890. (*Printed.*)

No. 49.. Report of the Dairy and Creamery Association of the Province for the year 1889. Presented to the Legislature 4th March, 1890. (*Printed.*)

No. 50.. Report of the Sheep Breeders' Association of Ontario for the year 1889. Presented to the Legislature 5th March, 1890. (*Printed.*)

No. 51.. Statement of the Returns forwarded to the office of the Provincial Secretary of all the fees and emoluments received by the Registrars of Ontario for the year 1889, made in accordance with the provisions of R. S. O., 1887, Cap. 114, Sec. 100, with which are contrasted receipts of the same nature in 1887 and 1888. Presented to the Legislature 5th March, 1890. (*Printed.*)

No. 52.. Return to an Order of the House of the nineteenth day of February, 1890, shewing the number and designation of School Boards in the cities, towns and incorporated villages in Ontario which have adopted the use of the

ballot at annual school elections under section 103 of chapter 225 R. S. O., with the number of School Boards in cities, towns and villages which have not adopted the ballot for such purposes. Presented to the Legislature 5th March, 1890. *Mr. Clarke* (*Wellington.*) (*Printed.*)

No. 53.. Papers and Correspondence respecting French Schools. Presented to the Legislature 6th March, 1890. (*Printed.*)

No. 54.. Return to an Order of the House of the twenty-eighth day of February, 1890, shewing in detail the amount, if any, paid out by the Crown on behalf of lots 83 and 84 in the 3rd concession south-west Toronto and Sydenham road, being a portion of the Mercer estate; also, shewing the amounts received for the sale of the same, and copies of all correspondence relating thereto. Presented to the Legislature 10th March, 1890. *Mr. Blythe.* (*Not printed.*)

No. 55.. Return to an Order of the House of the twenty-eighth day of February, 1890, specifying the amount of debentures issued on the credit of the permanent fund of the University of Toronto under the authority of section 5 of chapter 231, R. S. O., the amount realized by the sale of such debentures and the buildings, for the erection or alteration of which the money thus raised has been appropriated, with the estimated cost of the work done, or to be done, on each building. Presented to the Legislature 11th March, 1890. *Mr. Balfour.* (*Printed.*)

No. 56.. Return to an Address to His Honour the Lieutenant-Governor of the twenty-eighth day of February, 1890, praying that he will cause to be laid before the House a Return of a copy of the Order in Council authorizing the erection of the building known as the Biological Building in connection with the University of Toronto. Also, of any resolutions, recommendations or memorials from the Senate or Board of Trustees, asking for the appropriation of money for this purpose out of the permanent fund of the University, and of any contract that may have been let for additions to the building not yet completed. Presented to the Legislature 11th March, 1890. *Mr. Balfour.* (*Printed.*)

No. 57... Return to an Order of the House of the twenty-eighth day of February, 1890, shewing the total attendance of students matriculated and non-matriculated of each sex in University College from 1880 to 1890 inclusive. The number of graduates who have during each of these years lived in the College residence. The number of graduates who retained their rooms in residence during 1888, 1889 and 1890. The receipts and expenditures for the year 1888 and 1889, including list of water, fuel and gas and what proportion of the interior of the building is devoted to residence purposes. Presented to the Legislature 11th March, 1890. *Mr. Wood,* (*Hastings.*) (*Printed.*)

No. 58.. Statement of Returns transmitted by Municipal Councils to the office of the Provincial Secretary of the several debts of the corporation as they stood on the 31st day December, 1889, in accordance with the provisions of Section 382, Cap. 184, R. S. O., 1887. Presented to the Legislature 11th March, 1890. (*Not printed.*)

No. 59.. Statement of Returns transmitted by Municipal Corporations to the office of the Provincial Secretary of the debentures issued by them up to the 31st day of December, 1889, in accordance with the provisions of Section 5,

Cap. 186, R.S.O., 1887. Presented to the Legislature 11th March, 1890. (*Not printed.*)

No. 60.. Return to an Order of the House of the third day of March, 1890, shewing the amount expended in the year 1883, in Killarney out of the appropriation for Colonization Roads, with the dates and items, and persons to whom, and purposes for which the moneys were expended. Presented to the Legislature 12th March, 1890. *Mr. Monk.* (*Not printed.*)

No. 61.. Return to an Order of the House of twenty-eighth day of February, 1890, respecting the claim of John Eden, of Aylmer, for work done in digging wells by direction of Coroner McLay in connection with the enquiry made by him as to the death of one Gilford Williams, who was supposed to have been murdered, and for a statement in detail of all expenditure incurred in connection with the said enquiry, shewing the persons to whom any moneys were paid, and the dates when and the purposes for which the same were paid or expended. Presented to the Legislature 11th March, 1890. *Mr. Meredith.* (*Not printed.*)

No. 62.. Report of the Inspector of Division Courts for the year 1889. Presented to the Legislature 14th March, 1890. (*Printed.*)

No. 63.. Report of the Inspector of Registry Offices for the year 1889. Presented to the Legislature 14th March, 1890. (*Printed.*)

No. 64.. Return (in part) to an Order of the House of the fifth day of February, 1890, giving the dates, number of acres, location or other description of each Free Grant made since the first day of July, 1857, under the authority of section thirteen of "The Public Lands Act," or the like section in force from time to time, with the names of the persons or corporations to whom each of these grants were made, with the purposes for which they were made. Also, all correspondence respecting these grants or any other grants applied for under the said section during the said period. Presented to the Legislature 19th March, 1890. *Mr. Creighton.* (*Printed.*)

No. 65.. Report of the Commissioners for Queen Victoria Niagara Falls Park for the year 1889. Presented to the Legislature 20th March, 1890. (*Printed.*)

No. 66.. Correspondence relative to the Accounts between the Provinces of Ontario and Quebec and the Dominion of Canada. Presented to the Legislature 20th March, 1890. (*Printed.*)

No. 67.. Return to an Order of the House of the twenty-eighth day of February, 1890, shewing the number of Counties in the Province of Ontario, in which the Temperance Act of 1878 was in force on the first day of May, 1885. The number of County Councils to which it was submitted, prior to the first day of May, 1887, a Resolution affirming the expediency of the appointment of a salaried Police Magistrate, in compliance with 48 Vic., Cap. 17, Sec. 1. The names of the Counties in which such resolution was carried. The names of the Counties in which such resolution was lost. Also, number of Counties in which Police Magistrates were appointed under 50 Vic., Cap. 111, Sec. 1. Presented to the Legislature 20th March, 1890. *Mr. McLaughlin.* (*Printed.*)

No. 68.. Return to an Address to His Honour the Lieutenant-Governor of the nineteenth day of February, 1890, praying that he will cause to be laid before the House a Return of all cases in which fines or penalties imposed by

any Court have been remitted, or proceedings for the recovery of them have been stayed by the action of the Executive Government, or any member thereof, and of all cases in which persons liable upon recognizances of Bail have been released from liability or the proceedings against them have been stayed by the like action, with the reasons for the action taken in each case and also for copies of all Orders in Council relating to the said matters. Such Return to include the year 1873 and to continue down to the present time. Presented to the Legislature 24th March, 1890. *Mr. French.* (*Printed.*)

No. 69.. Report of the Master of Titles for the City of Toronto and County of York, under the Land Titles' Act for 1889. Also, Return of Fees received by the Master. Presented to the Legislature 25th March, 1890. (*Printed.*)

No. 70.. Return to an Order of the House of the eleventh day of February, 1890, shewing the dates in each year from 1884 to 1889, both inclusive, on which the Legislative Assembly of Ontario was convened and prorogued respectively. The dates during each Session of the Legislative Assembly on which all the several reports printed by order of the Legislative Assembly were presented during the same years. Presented to the Legislature 26th March, 1890. *Mr. Clancy.* (*Not printed.*)

No. 71.. Return to an Address to His Honour the Lieutenant-Governor, of the twenty-first day of March, 1890, praying that he will cause to be laid before the House a Return of copies of any correspondence between the Ontario and Dominion Governments, or between the former and any Corporation or person, relating to the ownership, sale or lease of the Dundas and Waterloo macadamized road, together with copies of any papers in the possession of the Government relating thereto, subsequent to that already brought down in the year 1886. Presented to the Legislature 26th March, 1890. *Mr. McMahon.* (*Not printed.*)

CONTENTS PART VII.

No. 72.. Report of the Provincial Board of Health for the year 1889. Presented to the Legislature 28th March, 1890. (*Printed.*)

No. 73.. Return to an Order of the House of the twelfth day of March, 1890, of a copy of the Judgment pronounced by the Honourable Mr. Justice Robertson, in an action in the High Court of Justice, wherein John J. Gosnell is plaintiff and Isaac Swarthout and others are defendants, and copies of all correspondence between the License Commissioners for the East Riding of the County of Kent, and the Provincial Secretary or any other member or officer of the Government on the subject of the granting of the licenses which were in question in the said action. Also, copies of all minutes of the Commissioners, with regard to the granting of said licenses, and all reports relating thereto. Presented to the Legislature 28th March, 1890. *Mr. Meredith.* (*Printed.*)

No. 74.. Return to an Order of the House of the nineteenth day of February, 1890, shewing what applications have been made for payments out of the Consolidated Revenue under the provisions of Section 4 of Chapter 4, 43 Victoria, in respect of the dues on pine trees. Also, shewing what is the aggregate sum which, up to the first day of February last, the patentees of lands, subject to the provisions of the Act, are entitled to receive out of the dues collected on pine trees cut after the date of their patents. Presented to the Legislature 28th March, 1890. *Mr. Marter.* (*Printed.*)

No. 75.. Return to an Address to His Honour the Lieutenant-Governor of the twenty-first day of March, 1890, praying that he will cause to be laid before the House, copies of any papers, memorials or petitions addressed to the Lieutenant-Governor in Council, or to any member of the Government, since the late partial destruction of the Provincial University building, for or against the maintenance of a residence in connection with that institution. Presented to the Legislature 31st March, 1890. *Mr. Balfour.* (*Not printed.*)

No. 76.. Report of the Poultry Association of Ontario for the year 1889. Presented to the Legislature 31st March, 1890. (*Printed.*)

No. 77.. Report of the Eastern Ontario Poultry and Pet Stock Association for the year 1889. Presented to the Legislature 31st March, 1890. (*Printed.*)

No. 78.. Report of the Ontario Bee-keepers' Association for the year 1889. Presented to the Legislature 31st March, 1890. (*Printed.*)

No. 79.. Return to an Address to His Honour the Lieutenant-Governer of the twenty-first day of March, 1890, praying that he will cause to be laid before the House a copy of a Petition presented to His Honour the Lieutenant-Governor from the Municipal Corporation of the Village of Cayuga, relating to the Grand River Navigation Company. Also, for a copy of all correspondence relating thereto. Presented to the Legislature 31st March, 1890. *Mr. Harcourt.* (*Printed.*)

No. 80.. Report of the Bureau of Industries for the year 1889. Presented to the Legislature 1st April, 1890. (*Printed.*)

No. 81... Papers and Documents relating to the Ontario and Rainy River Railway Company and the Ottawa and Parry Sound Railway Company. Presented to the Legislature 2nd April, 1890. (*Printed.*)

No. 82.. Documents and papers relating to the Upper Canada Improvement Fund. Presented to the Legislature 2nd April, 1890. (*Printed.*)

No. 83 . Return to an Order of the House of the fifth day of March, 1890, shewing in tabulated form a statement of Provincial Revenue from all sources, for each year since Confederation to the close of 1889, specifying such annual receipts under the various headings used in the Public Accounts of the Province. A similar statement of Provincial expenditure during the same period. Presented to the Legislature 2nd April, 1890. *Mr. Clarke,* (*Wellington.*) (*Printed.*)

No. 84.. Report of the Secretary and Registrar of the Province for the year 1889. Presented to the Legislature 2nd April, 1890. (*Printed.*)

No. 85.. Return to an Order of the House of the fifth day of March, 1890, shewing the amount still to be paid on Railway Aid Certificates issued by the Province, with the dates when the same became due and payable. Also, shewing the amounts of Annuity Certificates issued by the Province with the dates when they become due and payable. Also, an Estimate of the present value of the said Railway Aid Certificates and Annuity Certificates respectively. Also, specifying the amount to be paid on account of principal and interest respectively in each year during the currency of said Certificates. Presented to the Legislature 2nd April, 1890. *Mr. Balfour.* (*Printed.*)

No. 86.. Return to an Order of the House of the twenty-eighth day of February, 1890, shewing the number of Shop and Tavern Licenses granted to persons resident in Killarney in each of the years 1888 and 1889 and the names of the persons to whom they were respectively granted. Also, for copies of all petitions for or against the granting of such licenses or any of them, and of all correspondence between the head, or any officer of the License Branch of the Department of the Provincial Secretary, and any other person on the subject of the granting or working of such licenses, or any of them, and shewing also, the population of Killarney during the same years. Presented to the Legislature 2nd April, 1890. *Mr. Meacham.* (*Not printed.*)

No. 87... Report of E. B. Borron, upon the resources of the northerly part of the Province of Ontario and his explorations therein. Presented to the Legislature 7th April, 1890. (*Printed.*)

ESTIMATES

OF THE

PROVINCE OF ONTARIO

FOR THE

FINANCIAL YEAR ENDING 31ST DECEMBER,

1890.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

TORONTO:
PRINTED BY WARWICK & SONS, 68 AND 70 FRONT STREET WEST,
1890.

SUMMARY

Of the Estimated Expenditure of the Province of Ontario for the Financial Year ending 31st December, 1890.

No.	SERVICES.	PAGE.	To be Voted		
			For Current Expenditure	On Capital Account.	For other purposes.
			$ cts.	$ cts.	$ cts.
I.	Civil Government	5	215,556 66		
II.	Legislation	11	121,400 00		
III.	Administration of Justice	12	373,278 00		
IV.	Education	17	608,697 81		
V.	Public Institutions Maintenance	22	798,243 16		
VI.	Immigration	33	5,800 00		
VII.	Agriculture	34	130,478 00		
VIII.	Hospitals and Charities	37	125,579 67		
IX.	Maintenance and Repairs of Government and Departmental Buildings	38	63,436 73		
X.	Public Buildings	41			
	(1) Repairs		91,916 59		
	(2) Capital Account		.....	434,518 39	
XI.	Public Works	46			
	(1) Repairs		18,500 00		
	(2) Capital Account		.....	21,300 00	
XII.	Colonization Roads	47	.....	110,150 00	
XIII.	Charges on Crown Lands	52	115,900 00		
XIV.	Refund Account	52	.....	.....	25,249 04
XV.	Miscellaneous Expenditure	54	110,050 24		
XVI.	Unforeseen and Unprovided	54	50,000 00		
	Total	....	2,828,836 86	565,968 39	25,249 04

1.	Current Expenditure for 1890	2,828,836 86
2.	On Capital Account	565,968 39
3.	Other purposes	25,249 04
	Amount of Estimates	3,420,054 29

ESTIMATES OF EXPENDITURE

OF THE

PROVINCE OF ONTARIO

FOR THE YEAR 1890.

I.—CIVIL GOVERNMENT.

To be voted per Statement (A) $215,556 66

No. of Vote.	A.	1889.	1890.	Compared with Estimates of 1889.	
				Increase.	Decrease.
	To Salaries and Contingencies of the following Departments and Offices.	$ cts.	$ cts.	$ cts.	$ cts.
1	Government House	1,950 00	1,950 00		
2	Lieutenant-Governor's Office	3,980 00	3,980 00		
3	Executive Council and Attorney General's Department	17,280 00	18,316 66	1,036 66	
4	Department of Education	21,250 00	18,850 00		2,400 00
5	" Crown Lands	49,300 00	48,950 00		350 00
6	" Public Works	19,400 00	20,300 00	900 00	
7	Treasury Department	20,300 00	20,525 00	225 00	
8	Public Institutions	10,150 00	10,000 00		150 00
9	Department of Agriculture	24,500 00	24,225 00		275 00
10	Department of Immigration	1,600 00	1,600 00		
11	Provincial Secretary's Department	25,760 00	27,610 00	1,850 00	
12	Provincial Board of Health	6,975 00	7,050 00	75 00	
13	Miscellaneous	10,700 00	12,200 00	1,500 00	
		213,145 00	215,556 66	5,586 66	3,175 00

I.—CIVIL GOVERNMENT.—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
		$ cts.	$ cts.
	DETAILS.		
1	GOVERNMENT HOUSE.		
	Expenses.		
	Gardener and Caretaker	500 00	500 00
	Fireman and Assistant Gardener	550 00	550 00
	Assistant Gardeners	900 00	900 00
		1,950 00	1,950 00
2	LIEUTENANT-GOVERNOR'S OFFICE.		
	Salaries.		
	Official Secretary	1,200 00	1,200 00
	Private Secretary	800 00	800 00
	Messenger	480 00	480 00
	Expenses.		
	Contingencies	1,500 00	1,500 00
		3,980 00	3,980 00
3	EXECUTIVE COUNCIL AND ATTORNEY-GENERAL'S DEPARTMENT.		
	Salaries.		
	Attorney-General and Premier	5,000 00	5,000 00
	Clerk of Executive Council and Deputy Attorney-General	3,000 00	3,000 00
	Law Secretary of Department	800 00	800 00
	Clerk and Premier's Secretary	1,600 00	1,600 00
	Assistant Clerk of Executive Council	1,450 00	1,500 00
	Clerk and Shorthand-writer	1,000 00	1,050 00
	Clerk	750 00	750 00
	Clerk	700 00	450 00
	Messenger	350 00	300 00
	Arrears for 1889		766 66
	Expenses.		
	Housekeeper, Fireman } half only charged in 1889 ($500 00, 400 00)	430 00	500 00, 400 00
	Contingencies	2,200 00	2,200 00
		17,280 00	18,316 66
4	EDUCATION DEPARTMENT.		
	Salaries.		
	Minister of Education	4,000 00	4,000 00
	Deputy Minister	3,000 00	2,500 00
	Secretary	2,200 00	
	Chief Clerk and Accountant	1,400 00	1,400 00
	Clerk	1,250 00	1,250 00
	"	1,200 00	1,200 00
	"	1,200 00	1,200 00

I.—CIVIL GOVERNMENT—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
		$ cts.	
4	EDUCATION DEPARTMENT—*Continued.*		
	Salaries.		
	Clerk	1,000 00	1,100 00
	"	1,000 00	1,100 00
	"	750 00	750 00
	Junior Clerk	700 00	700 00
	"	600 00	650 00
	Clerk and Messenger	600 00	650 00
	Caretaker, including all allowances for cleaning offices, museum, etc	500 00	500 00
		19,400 00	17,000 00
	Expenses.		
	Postage	550 00	550 00
	Printing, paper for circulars and blanks	500 00	500 00
	Office stationery and account books	300 00	300 00
	Books, periodicals, papers, law and other reports, and advertising	150 00	150 00
	Contingencies	150 00	150 00
	Travelling and other expenses	200 00	200 00
		21,250 00	18,850 00
5	CROWN LANDS DEPARTMENT.		
	Salaries.		
	Commissioner	4,000 00	4,000 00
	Assistant Commissioner	2,800 00	2,800 00
	Law Clerk	2,000 00	2,000 00
	Shorthand writer and Clerk	1,200 00	1,250 00
	Land Sales and Free Grants :—		
	Chief Clerk	1,900 00	1,900 00
	Clerk	1,300 00	1,300 00
	"	900 00	950 00
	"	750 00	750 00
	"	700 00	750 00
	Surveys, Patents and Roads :—		
	Chief Clerk, Surveys	1,900 00	1,900 00
	" Draughtsman	1,200 00	1,200 00
	" Patents	1,400 00	1,400 00
	Clerk	1,200 00	1,200 00
	"	950 00	1,000 00
	Superintendent, Colonization Roads	1,900 00	1,900 00
	Clerk	1,150 00	1,150 00
	"	800 00	850 00
	Woods and Forests :—		
	Chief Clerk	2,000 00	1,650 00
	Clerk	1,350 00	1,350 00
	"	1,250 00	1,100 00
	"	1,000 00	950 00
	"	850 00	800 00
	"	700 00	700 00
	Accounts :—		
	Accountant and Book-Keeper	1,700 00	1,700 00
	Clerk	1,400 00	1,400 00
	"	850 00	900 00
	"	950 00	950 00
	Registrar	1,600 00	1,600 00

I.—CIVIL GOVERNMENT—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
5	CROWN LANDS DEPARTMENT—*Continued.*		
	Expenses.		
	Housekeeper	500 00	500 00
	Fireman	550 00	500 00
	Clerk and Messenger	550 00	550 00
	Night Watchman	500 00	500 00
	Contingencies	7,500 00	7,500 00
		49,300 00	48,950 00
6	PUBLIC WORKS DEPARTMENT.		
	Salaries.		
	Commissioner	4,000 00	4,000 00
	Architect	2,400 00	2,400 00
	Engineer	1,900 00	2,000 00
	Secretary, Public Works	2,000 00	2,100 00
	Accountant and Law Clerk	1,100 00	1,200 00
	Architectural Draughtsman	1,200 00	1,300 00
	Engineering	1,100 00	1,200 00
	Assistant Architectural Draughtsman	850 00	950 00
	Assistant Engineering Draughtsman (estimate of last year for only 9 months)	600 00	800 00
	First Clerk and Shorthand Writer	1,000 00	1,050 00
	Clerk and paymaster of outlying works	900 00	950 00
	Messenger	550 00	550 00
	Expenses.		
	Contingencies	1,800 00	1,800 00
		19,400 00	20,300 00
7	TREASURY DEPARTMEET.		
	Salaries.		
	Treasurer	4,000 00	4,000 00
	Assistant Treasurer	2,200 00	2,200 00
	Chief Clerk	1,300 00	1,300 00
	Clerk and Shorthand Writer	1,200 00	1,250 00
	Clerk and Cashier	1,000 00	1,100 00
	Clerk	900 00	950 00
	"	650 00	650 00
	Messenger	300 00	325 00
	Audit Branch.		
	Auditor	2,400 00	2,400 00
	Book-keeper	1,300 00	1,400 00
	Clerk	800 00	850 00
	"	800 00	850 00
	Contingencies	800 00	800 00
	Expenses.		
	Housekeeper (half charged under Provincial Secretary's Department)	200 00	200 00
	Fireman (half charged under Provincial Secretary's Department)	250 00	250 00
	Contingencies	2,200 00	2,000 00
		20,300 00	20,525 00

I.—CIVIL GOVERNMENT—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
8	PUBLIC INSTITUTIONS.		
	Salaries.		
	Two Inspectors	4,400 00	4,400 00
	Chief Clerk	1,400 00	1,200 00
	Clerk	1,000 00	1,000 00
	Shorthand writer	950 00	750 00
	Messenger, youth	300 00	300 00
	Expenses.		
	Travelling	900 00	900 00
	Postage and telegraph $500 00		
	Printing 500 00		
	Stationery 300 00		
	Contingencies 150 00		
		1,200 00	1,450 00
		10,150 00	10,000 00
9	DEPARTMENT OF AGRICULTURE.		
	Minister	4,000 00	4,000 00
	Deputy Minister and Secretary of Bureau of Industries	2,200 00	2,200 00
	Assistant Secretary	1,650 00	1,650 00
	Clerk	1,100 00	1,100 00
	"	850 00	850 00
	"	850 00	850 00
	"	800 00	800 00
	"	800 00	800 00
	" and shorthand writer	650 00	700 00
	Half wages to Messenger and Fireman (half to Board of Health)	425 00	250 00
		13,325 00	13,200 00
	EXPENSES.		
	Contingencies	1,250 00	1,250 00
		14,575 00	14,450 00
	Registrar-General's Branch.		
	Salaries.		
	First Clerk	1,400 00	1,400 00
	Second "	1,000 00	1,000 00
	Clerk	900 00	900 00
	"	900 00	900 00
	"	900 00	900 00
	"	800 00	800 00
	"	650 00	650 00
	Expenses.		
	For supply of blank forms to Postmaster	300 00	300 00
	Indices	200 00	200 00
	Schedules, slips and circulars	1,400 00	1,400 00
	Stationery and printing	400 00	400 00
	Postage	250 00	250 00
	Express charges	25 00	25 00
	Travelling expenses inspecting District Registrars	500 00	500 00
	Binding returns, two years	150 00	
	Contingencies	150 00	150 00
		9,925 00	9,775 00

I.—CIVIL GOVERNMENT—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
10	IMMIGRATION DEPARTMENT.	$ cts.	$ cts.
	Secretary and Intelligence Officer	1,300 00	1,300 00
	Contingencies	300 00	300 00
		1,600 00	1,600 00
11	PROVINCIA SECRETARY'S DEPARTMENT.		
	Salaries.		
	Secretary and Registrar	4,000 00	4,000 00
	Assistant Secretary	2,200 00	2,200 00
	Clerk	1,150 00	1,150 00
	"	1,000 00	1,100 00
	"	950 00	950 00
	Deputy Registrar	1,400 00	1,400 00
	Clerk	900 00	900 00
	"	850 00	850 00
	Shorthand writer	1,200 00	1,200 00
	Clerk and shorthand writer (heretofore paid out of contingencies)	.....	650 00
	Engrossing Clerk	650 00	650 00
	Messenger	450 00	450 00
	Expenses.		
	Housekeeper (half charged to Treasury Department)	200 00	200 00
	Fireman " " "	260 00	260 00
	Printing and binding	800 00	800 00
	Stationery	800 00	800 00
	Postage and telegraph	750 00	750 00
	Contingencies	650 00	650 00
		18,210 00	18,960 00
	LICENSE AND ADMINISTRATION OF JUSTICE ACCOUNTS BRANCH.		
	Salaries.		
	First Officer	1,900 00	1,900 00
	Accountant, License Branch	1,400 00	.....
	Provincial Inspector and Accountant	1,400 00	1,400 00
	Provincial Inspector (heretofore paid out of appropriation *re* Scott Act)	.....	1,400 00
	Clerk	1,300 00	1,350 00
	Clerk	900 00	950 00
	Clerk	.....	1,000 00
	Expenses.		
	Stationery $300 00		
	Postage and telegraph 300 00		
	Sundries 50 00		
		650 00	650 00
		7,550 00	8,650 00
12	PROVINCIAL BOARD OF HEALTH.		
	Chairman	400 00	400 00
	Secretary	1,750 00	2,000 00
	First Clerk	900 00	900 00
	Second "	800 00	800 00
	Printing, binding, stationery, etc	1,300 00	1,300 00
	Per diem allowance of members of Board when attending meetings of Council and Committees	800 00	800 00
	Travelling expenses of members of Board and Secretary	600 00	600 00
	Half wages of Messenger and Fireman (half to Bureau of Statistics)	425 00	250 00
		6,975 00	7,050 00

I.—CIVIL GOVERNMENT—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
13	MISCELLANEOUS.		
	Cost of Official Gazette	3,000 00	3,000 00
	Queen's Printer's Salary	1,300 00	1,300 00
	Assistant Queen's Printer	1,000 00	1,000 00
	Contingencies, including stationery, postage, etc	100 00	100 00
	Inspector of Registry Offices	1,500 00	1,500 00
	Travelling expenses	400 00	400 00
	Inspector of Insurance } Repaid by Insurance	2,200 00	2,200 00
	Clerk } Companies	700 00	700 00
	Contingencies }	500 00	500 00
	Clerk for special services *re* investigations	.....	1,500 00
		10,700 00	12,200 00

II.—LEGISLATION.

To be voted per Statement (A).....$121,400 00

No. of Vote.	A.	1889.	1890	Compared with Estimates of 1889. Increase.	Decrease.
		$ cts.	$ cts.	$ cts.	$ cts.
14	Legislation	121,550 00	121,400 00	.....	150 00

II.—LEGISLATION—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
14	DETAILS.	$ cts.	$ cts.
	Salaries.		
	Mr. Speaker's salary	1,250 00	1,250 00
	Clerk of the House, salary	1,800 00	1,800 00
	Clerk Assistant and Clerk of Routine	1,400 00	1,400 00
	Law Clerk	1,000 00	400 00
	Clerk and Postmaster	1,000 00	1,000 00
	Librarian	1,600 00	1,600 00
	Assistant Librarian	750 00	750 00
	Accountant of the House and Stationery Clerk (also Queen's Printer)	400 00	400 00
	Sergeant-at-Arms	600 00	600 00
	Housekeeper and Chief Messenger	600 00	700 00
	Five Messengers	2,500 00	2,550 00
	Fireman	450 00	450 00
	Night Watchman	500 00	500 00
	Sessional Clerks, Writers, Messengers and Pages	10,000 00	10,000 00
	Expenses.		
	Postages and Cost of House Post Office	3,200 00	3,500 00
	Stationery, including printing paper, printing and binding	25,000 00	25,000 00
	Printing Bills and distributing Statutes	4,000 00	4,000 00
	Library, for books and binding, etc	3,000 00	3,000 00
	Printing and Binding Library Catalogue.	1,500 00	1,500 00
	Indemnity to Members, including mileage	57,000 00	56,000 00
	Subscription to newspapers and periodicals	1,000 00	1,000 00
	Contingencies	3,000 00	4,000 00
		121,550 00	121,400 00

III.—ADMINISTRATION OF JUSTICE.

To be voted per Statement (A).....$373,278 00.

No. of Vote.	A.	1889.	1890
		$ cts.	$ cts.
15	Supreme Court of Judicature	56,331 00	56,083 00
16	Surrogate Judges and Local Masters	25,535 51	24,385 00
17	Miscellaneous Criminal and Civil Justice	287,900 00	292,810 00
		369,766 51	373,278 00

III.—ADMINISTRATION OF JUSTICE—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
	DETAILS.	$ cts.	
15	SUPREME COURT OF JUDICATURE.		
	Allowances to Judges as Heir and Devisee Commissioners	6,000 00	6,000 00
	Registrar of Supreme Court and Court of Appeal	2,000 00	2,000 00
	Contingencies, printing, etc	200 00	300 00
	Master in Chambers	3,800 00	4,000 00
	Clerk	1,200 00	1,200 00
	Assistant Clerk	.....	700 00
	Entering Clerk	700 00	550 00
	Contingencies	350 00	350 00
	Master in Ordinary	3,800 00	3,800 00
	Chief Clerk	1,450 00	1,500 00
	Shorthand writer	800 00	800 00
	(This is besides certain fees, and an allowance as reporter to Judges on Circuit)		
	Contingencies	200 00	200 00
	Two Taxing Officers	3,400 00	3,400 00
	Salaries in Accountant's office, as regulated by the Court and borne by General Interest Account out of surplus interest (Suitor's Fund) are as follows:—		
	Chief Clerk 2,000 00		
	Second " 1,000 00		
	Third " 950 00		
	Fourth " 500 00		
	Fifth " 550 00		
	5,000 00		
	In addition to the foregoing there are also the following sums paid out of the surplus interest, viz.:		
	Accountant (Registrar Chancery Division) 400 00		
	Registrar of the Q. B. D 500 00		
	Official Guardian 1,700 00		
	F. W. Harcourt 200 00		
	Contingencies of the office, say 500 00		
		.....	
	COURT OF APPEAL.		
	Clerk	800 00	800 00
	Usher and Messenger	600 00	600 00
	Judge's Library	100 00	100 00
	Contingencies	430 00	430 00
	HIGH COURT.		
	Clerk of the Process and the Heir and the Devisee Commission	2,000 00	2,000 00
	Clerk in his office	950 00	950 00
	Contingencies	50 00	50 00
	Clerk of Assize	1,050 00	1,100 00
	Contingencies	50 00	50 00
	Procedure and Judgment Books for outer office	1,500 00	.....

III.—ADMINISTRATION OF JUSTICE.—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889	**1890**
15	CHANCERY DIVISION.	$ cts.	$ cts.
	Registrar and Judgment Clerk	2,100 00	2,100 00
	(*The Registrar has also $400 from the Suitor's Fund.*)		
	Assistant Registrar and Judgment Clerk	1,600 00	1,600 00
	Entering Clerk	750 00	750 00
	Clerk of Records and Writs	1,450 00	1,500 00
	Clerk in Records Office	750 00	800 00
	Youth (clerk last year)	550 00	300 00
	Usher	600 00	600 00
	Messenger and Housekeeper	400 00	400 00
	Assistant	250 00	250 00
	Judges' Library	200 00	200 00
	Surrogate Clerk	2,000 00	2,000 00
	Clerk in Surrogate Office	650 00	650 00
	Contingencies	20 00	20 00
	Contingencies for office of Registrar and Clerk of Records and Writs	750 00	750 00
	QUEEN'S BENCH DIVISION.		
	Registrar (*The Registrar has also $500 from Suitor's Fund*	2,000 00	2,000 00
	Clerk	1,400 00	1,400 00
	"	950 00	950 00
	"	700 00	700 00
	Housekeeper and Messenger	600 00	600 00
	Two Assistants	588 00	588 00
	Usher and Crier	160 00	160 00
	Message Youth	208 00	160 00
	Judge's Library	100 00	100 00
	Messenger for Judges	.....	450 00
	Contingencies	450 00	500 00
	COMMON PLEAS DIVISION.		
	Registrar of the Crown and Pleas	2,500 00	2,500 00
	Clerk	1,200 00	1,200 00
	Second Clerk	800 00	800 00
	Usher and Messenger	575 00	575 00
	Judge's Library	100 00	100 00
	Contingencies	500 00	500 00
		56,331 00	56,083 00
16	SURROGATE JUDGES AND LOCAL MASTERS.		
	Allowances payable to Judges of Surrogate upon commutation of fees	12,022 34	10,451 00
	Junior Judge of County of York, allowance out of Receipts from Surrogate fees	666 00	666 00
	Allowance to Local Masters on commutation of their fees	12,847 17	13,268 00
		25,535 51	24,385 00
17	MISCELLANEOUS CRIMINAL AND CIVIL JUSTICE.		
	Crown Counsel prosecutions	10,000 00	10,000 00
	Administration of Criminal Justice	145,000 00	145,000 00
	Inspector of Offices under Judicature Act	2,500 00	2,500 00
	Clerk and Shorthand Writer	900 00	950 00
	Travelling and other expenses	600 00	600 00
	Inspector of Division Courts	1,700 00	1,800 00
	Clerk	950 00	950 00
	do	950 00	1,000 00

III.—ADMINISTRATION OF JUSTICE—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
17	Miscellaneous Criminal and Civil Justice—*Continued.*	$ cts.	$ cts.
	Travelling expenses and contingencies	1,050 00	1,050 00
	Salaries, Provincial Detectives	2,900 00	2,900 00
	Special services	2,000 00	2,000 00
		168,550 00	168,750 00
	To pay Sheriffs, Criers and Constables in attending Courts of Chancery and County Courts, Deputy Clerks of the Crown and Pleas attending Assizes, and their postages, etc.	6,000 00	6,000 00
	Seals and other contingencies	300 00	300 00
	Litigation of Constitutional questions	12,000 00	12,000 00
	Expenses of County Judges in grouped Counties	1,200 00	1,200 00
	Judges travelling expenses *re* Ditches and Water Courses Act	500 00	500 00
		20,000 00	20,000 00
	Deputy Clerks of the Crown	17,200 00	17,200 00
	" " " as Local Registrars	5,500 00	5,500 00
		22,700 00	22,700 00
	Land Titles Office.		
	Masters of Titles	3,600 00	3,800 00
	Chief Clerk	850 00	1,000 00
	Clerk	750 00	800 00
	do	Taken out of	800 00
	do	unforeseen	700 00
	Youth	& unprovid-	260 00
	Temporary assistance, if required	ed $1,033.88.	600 00
	Registers and Index Books	300 00	500 00
	Stationery and contingencies		100 00
	Additional iron shelving and furniture		100 00
		5,500 00	8,660 00
	The fees received since the establishment of the office are as follows: In 1885 and 1886 together, $2,656.12; in 1887, $4,307.51; in 1888, $5,855.70; in 1889, $10,119.78. In consequence of the great increase of business during last year, clerical assistance, in addition to what was provided for in the estimates for this office, had to be procured at a cost of $1,033.88, paid out of the vote for unforeseen items.		
	Offices of Local Masters in the Districts.		
	Salaries of Local Masters	$1,750 00	1,750 00
	Arrears, 1888	350 00	
	To be distributed as follows:—		
	Master at Sault Ste. Marie $500 00		
	do Parry Sound 500 00		
	do Bracebridge 300 00		
	do Pt. Arthur 250 00		
	do North Bay 200 00		
	Registry and Index Books		300 00
	Forms and other contingencies	400 00	400 00
	Travelling expenses	150 00	150 00
		2,650 00	2,600 00

III.—ADMINISTRATION OF JUSTICE—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
17	*District of Algoma.*	$ cts.	$ cts.
	Sheriff's salary	1,400 00	1,400 00
	Registrar's salary	800 00	.....
	Clerk of the Peace and District Attorney	800 00	800 00
	Clerk of the District Court	600 00	600 00
	Magistrate at Sudbury	1,400 00	1,400 00
	Magistrate at Sault	1,400 00	.....
	Magistrate at Chapleau	1,400 00	1,400 00
	Administration of Justice, etc	10,500 00	14,000 00
		18,300 00	19,600 00
	District of Thunder Bay.		
	Sheriff's salary	1,000 00	1,000 00
	House, fuel and light	250 00	250 00
	Chief Constable	400 00	400 00
	Police Magistrate at Port Arthur	800 00	800 00
	Travelling expenses of Police Magistrate on line between Port Arthur and Rat Portage, for 1888 and 1889	400 00	400 00
	Administration of Justice, etc	7,200 00	7,200 00
		10,050 00	10,050 00
	District of Rainy River.		
	Stipendiary Magistrate, salary	1,600 00	1,600 00
	Sheriff	1,000 00	1,000 00
	Registrar and Clerk of District Court	650 00	650 00
	Safe for Registry office –(Registry safe transferred to Sheriff's office)	300 00	.....
	Administration of Justice, etc	7,500 00	7,500 00
		11,050 00	10,750 00
	District of Nipissing.		
	Stipendiary Magistrate for Southern Nipissing, salary	1,600 00	1,600 00
	" " Northern Nipissing, salary	1,200 00	1,200 00
	Administration of Justice, including travelling expenses	4,600 00	4,600 00
		7,400 00	7,400 00
	District of Muskoka and Parry Sound.		
	Stipendiary Magistrate, Parry Sound	1,800 00	1,800 00
	Stipendiary Magistrate, Muskoka, salary	1,800 00	1,800 00
	Sheriff (Muskoka), salary	500 00	500 00
	do (Parry Sound), salary	500 00	500 00
	Clerk, District Court	600 00	600 00
	Deputy Clerk, (Bracebridge)	300 00	500 00
	Administration of Justice, etc	3,700 00	4,300 00
		9,200 00	10,000 00
	Provisional County of Haliburton.		
	Administration of Justice	150 00	150 00
		150 00	150 00

ADMINISTRATION OF JUSTICE.—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
17	*District of Manitoulin.*	$ cts.	$ cts.
	Administration of Justice	2,000 00	2,000 00
	Salary of Registrar of Deeds and Master of Titles, Manitoulin	500 00	500 00
	Salary of Clerk of District Court and Surrogate Court, Manitoulin Island	250 00	250 00
	Salary of County Attorney and Clerk of the Peace, Manitoulin Island	400 00	400 00
		3,150 00	3,150 00
	Provincial Police on Niagara and Detroit Rivers.		
	Salary of Police Magistrate on Niagara River	1,200 00	1,200 00
	Administration of Justice do	6,000 00	5,800 00
	do Detroit River	2,000 00	2,000 00
		9,200 00	9,000 00

IV.—EDUCATION.

To be voted per Statement (A)..... $608,697 81

No. of Vote.	A.	1889	1890
		$ cts.	$ cts.
18	Public and Separate Schools	240,000 00	241,413 81
19	Schools in new and poor Townships	25,000 00	25,000 00
20	Model Schools	8,700 00	9,300 00
21	Teachers' Institutes	2,900 00	2,300 00
22	High Schools and Collegiate Institutes	97,000 00	100,000 00
23	Training Institutes	2,100 00	2,500 00
24	Inspection of Normal, High, Model, and Public and Separate Schools	50,950 00	52,200 00
25	Departmental Examinations	8,200 00	12,400 00
26	Normal and Model Schools, Toronto	21,060 00	22,310 00
27	Normal Schools, Ottawa	20,390 00	20,940 00
28	Museum and Library, etc	4,950 00	5,260 00
29	School of Practical Science	8,522 00	9,574 00
30	Mechanics' Institutes, Art Schools, Literary and Scientific	38,500 00	43,200 00
31	Miscellaneous	2,500 00	2,500 00
32	Superannuated Teachers	59,300 00	59,800 00
		590,072 00	608,697 81

EDUCATION—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889	1890
	DETAILS.	$ cts.	$ cts.
18	PUBLIC AND SEPARATE SCHOOLS	240,000 00	240,000 00
	Add from Municipalities Fund	.....	1,413 81
			241,413 81
19	SCHOOLS IN NEW AND POOR TOWNSHIPS AND UNORGANIZED TERRITORY	25,000 00	25,000 00
20	58 MODEL SCHOOLS (including $600.00 for Training School for French Teachers)	8,700 00	9,300 00
21	TEACHERS' INSTITUTES, INCLUDING PROVINCIAL	2,900 00	2,300 00
22	119 HIGH SCHOOLS AND COLLEGIATE INSTITUTES, including special to Port Arthur, $500, (115 in 1889)	97,000 00	100,000 00
23	5 TRAINING INSTITUTES	2,000 00	2,000 00
	Expenses, Printing, etc	100 00	500 00
		2,100 00	2,500 00
24	INSPECTION OF NORMAL, HIGH, MODEL, PUBLIC AND SEPARATE SCHOOLS.		
	5,800 Public Schools at $5, (including Model Schools)	29,000 00	29,500 00
	Inspector of Model Schools and Director of Teachers' Institutes	2,600 00	2,600 00
	Two Inspectors of High Schools	5,000 00	5,000 00
	Inspector of County Model Schools	1,750 00	1,750 00
	Two Inspectors of Separate Schools	3,400 00	3,400 00
	Two Inspectors of Schools in Algoma, Parry Sound and Nipissing	3,000 00	3,000 00
	School Inspection, Muskoka		
	Travelling expenses (eight Inspectors)	3,200 00	3,200 00
	Proportion of Payments to Inspectors in the Districts, vis.: (1) Haliburton and Muskoka, and (2) the Northern parts of the Counties of Victoria, Peterborough, Hastings, Addington and Renfrew	1,100 00	1,100 00
	Stationery, postage, printing paper, and incidentals	1,900 00	1,900 00
	Arrears, Public School Inspectors (1889)	.....	750 00
		50,950 00	52,200 00
25	DEPARTMENTAL EXAMINATIONS.		
	Central Committee of Examiners	1,100 00	1,100 00
	Sub Examiners for reading the answers of Candidates for 2nd and 3rd Class Certificates, the estimated number being 5,000 (to be re-imbursed from fees)	4,000 00	3,200 00
	Clerk	700 00	700 00
	Postage, stationery and incidentals	500 00	500 00
	Confidential printing of examination papers:—		
	(1) New Type	100 00	100 00
	(2) Ink, fire, light, water, and incidentals	100 00	100 00
	(3) Paper for printing envelopes, etc	800 00	800 00
	(4) Salary of printer and assistant	900 00	900 00
		8,200 00	12,400 00

IV.—EDUCATION—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
26	NORMAL AND MODEL SCHOOLS, TORONTO.	$ cts.	$ cts.
	Salaries		
	The Principal	2,250 00	2,400 00
	Second Master	1,900 00	2,000 00
	Drawing Master	1,000 00	1,000 00
	French Teacher	150 00	150 00
	Music Master	800 00	800 00
	Drill and Gymnastic Master	300 00	300 00
	Head Master of Boys' Model School	1,400 00	1,400 00
	First Assistant "	1,000 00	1,100 00
	Second " "	850 00	850 00
	Third " "	650 00	650 00
	Fourth " "	.....	650 00
	Head Mistress of Girls' Model School	1,000 00	1,000 00
	First Assistant "	800 00	850 00
	Second " "	700 00	700 00
	Third " "	650 00	650 00
	Fourth " "	650 00	650 00
	Teacher of Kindergarten	800 00	800 00
	Assistant Teacher of Kindergarten	480 00	480 00
	Head Gardener (including $250 in lieu of House)	660 00	660 00
	Assistant Gardener	400 00	400 00
	First Engineer, including $200 for house and fuel	410 00	610 00
	Second "	400 00	400 00
	Third "	400 00	400 00
	Janitor of Normal School, including cleaning	510 00	510 00
	" Boys' Model School "	400 00	400 00
	" Girls' " "	400 00	400 00
		18,960 00	20,210 00
	Expenses.		
	Text and reference book for Masters, and reading-room for Students	200 00	200 00
	Stationery, chemicals and contingencies	1,150 00	1,150 00
	Text Books for Model School pupils	600 00	600 00
	Supplies for Kindergarten	150 00	150 00
		21,060 00	22,310 00
27	NORMAL AND MODEL SCHOOLS, OTTAWA.		
	Salaries.		
	The Principal	2,250 00	2,400 00
	Second Master	1,900 00	2,000 00
	Drawing Master	800 00	800 00
	French Master	150 00	150 00
	Music Master	800 00	800 00
	Clerk and Accountant	600 00	600 00
	Drill and Gymnastic Master	300 00	300 00
	Head Master of Boys' Model School	1,400 00	1,400 00
	First Assistant "	1,000 00	1,100 00
	Second " "	850 00	1,000 00
	Third " "	650 00	650 00
	Head Mistress of Girls' Model School	1,000 00	1,000 00
	First Assistant "	800 00	850 00
	Second " "	700 00	700 00
	Third " "	650 00	650 00
	First Engineer and Gardener	600 00	600 00
	Second " "	450 00	450 00
	Laborer on Grounds	400 00	400 00
	Janitor, Normal School, salary with allowance for cleaning	510 00	510 00

IV.—EDUCATION.—*Continued.*

No. of Vote.	SERVICE.	Salaries and expenses. 1889.	1890
	NORMAL AND MODEL SCHOOLS, OTTAWA—*Continued.*	$ cts.	$ cts.
	Salaries—Continued.		
	Janitor, Boys' Model School, salary	400 00	400 00
	" Girls' " "	400 00	400 00
	Teacher of Kindergarten	800 00	800 00
	Assistant Teacher of Kindergarten	480 00	480 00
	Night Watchman	400 00	400 00
	Expenses.		
	Text and reference books for masters, and reading room for students	200 00	200 00
	Stationery, chemicals and supplies	1,150 00	1,150 00
	Text Books for Model School pupils	600 00	600 00
	Supplies for Kindergarten	150 00	150 00
		20,390 00	20,940 00
	LIBRARY.		
28	*Salaries and Expenses.*		
	Superintendent Mechanics' Institute (transferred to Mechanics Institute Account)	1,700 00	.....
	Clerk and Messenger (transferred to Mechanics' Institute Account)	600 00	.....
	Librarian and Historiographer	.....	2,000 00
	Assistant Librarian	500 00	500 00
	Clerk	500 00	500 00
	Postage and stationery	100 00	100 00
	Incidentals and purchases	650 00	650 00
	binding books and periodicals	200 00	200 00
	Educational and technical books for reference	500 00	500 00
	Binding pamphlets, Library	200 00	200 00
	Unpaid Accounts, 1889	.....	610 00
		4,950 00	5,260 00
29	SCHOOL OF PRACTICAL SCIENCE.		
	Salaries and Expenses.		
	Professor in Engineering	2,500 00	2,500 00
	Professor of Applied Chemistry	1,500 00	1,500 00
	Lecturer in Surveying	1,000 00	1,200 00
	Lecturer in Architecture, one quarter's salary	.....	300 00
	Demonstrator in Engineering do	.....	300 00
	Engineer do	.....	180 00
	Fellow in Engineering Department	500 00	500 00
	Fellow in Chemistry	500 00	500 00
	Secretary	100 00	.....
	Attendant on Professor of Chemistry	72 00	144 00
	Chemicals and other materials	1,100 00	1,100 00
	Supplies for Physical Laboratory	.....	100 00
	Printing, advertising, postage, stationery, binding and incidentals	450 00	450 00
	Telephone	50 00	50 00
	Caretaker, including allowance for house	750 00	750 00
		8,522 00	9,574 00

IV.—EDUCATION—*Concluded.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
30	MECHANICS' INSTITUTES, ART SCHOOLS, LITERARY AND SCIENTIFIC.	$ cts.	$ cts.
	Superintendent Mechanics' Institutes (transferred from library)		1,700 00
	Clerk do do		600 00
	207 Mechanics' Institutes (178 in 1889)	32,000 00	34,000 00
	Art Examinations	1,200 00	1,200 00
	Ontario Society of Artists	500 00	500 00
	Eight Art Schools (7 in 1889)	2,800 00	3,200 00
	Aid to Canadian Institute, Toronto	1,000 00	1,000 00
	" Institut Canadien, Ottawa	300 00	300 00
	" Ottawa Literary and Scientific Society	300 00	300 00
	" Hamilton Literary Institute	400 00	400 00
		38,500 00	43,200 00
31	MISCELLANEOUS.		
	For cost of Minister's Report	500 00	500 00
	School Registers	1,000 00	1,000 00
	School Act to be sold to Trustees, etc	1,000 00	500 00
	Museum		500 00
		2,500 00	2,500 00
32	SUPERANNUATED PUBLIC AND HIGH SCHOOL TEACHERS.		
	Annual retiring allowance to Teachers and Inspectors	59,000 00	59,500 00
	Medical examination fees, printing paper and incidentals	300 00	300 00
		59,300 00	59,800 00

V.—PUBLIC INSTITUTIONS MAINTENANCE.

To be voted per Statement (A) $798,243.16

No. of Vote.	A	Voted for 1889.	To be voted for 1890	Compared with estimate of 1889. Increase.	Compared with estimate of 1889. Decrease.
		$ cts.	$ cts.	$ cts.	$ cts.
33	Asylum for Insane, Toronto	103,157 00	101,453 00		1,704 00
34	Mimico Branch	5,530 00	24,482 00	18,952 00	
35	Asylum for Insane, London	127,354 00	134,452 00	7,098 00	
36	" " Kingston	87,505 00	90,693 00	3,188 00	
37	" " Hamilton	118,967 00	131,257 00	12,290 00	
38	" Idiots, Orillia	49,657 00	47,657 00		2,000 00
39	Central Prison, Toronto	94,995 00	116,395 00	21,400 00	
40	Ontario Reformatory for Boys, Penetanguishene	42,210 00	41,850 00		360 00
41	Institution for the Deaf and Dumb, Belleville	40,727 16	42,427 16	1,700 00	
42	" " Blind, Brantford	34,866 00	35,901 00	1,035 00	
43	Andrew Mercer Reformatory for Women and Refuge for Girls, Toronto	31,526 00	31,676 00	150 00	
		736,494 16	798,243 16	65,813 00	4,064 00

No. of Vote.	SERVICES.	Salaries and Expenses. 1889.	Salaries and Expenses. 1890
33	DETAILS.	$ cts.	$ cts.
	ASYLUM FOR INSANE, TORONTO.		
	(For 710 patients.)		
	Salaries. No. of Officers and Employés.		
	Medical Superintendent 1	2,000 00	2,000 00
	Assistant " 1	1,100 00	1,100 00
	Second Assistant " 1	800 00	800 00
	Bursar 1	1,400 00	1,400 00
	Bursar's Clerk 1	800 00	800 00
	Steward 1	750 00	750 00
	Storekeeper 1	800 00	800 00
	Assistant Storekeeper 1	700 00	600 00
	Engineer 1	740 00	740 00
	Stokers 3	792 00	815 00
	Engine-driver for laundry 1	300 00	300 00
	Bricklayer and Mason 1	625 00	625 00
	Carpenters 2	1,150 00	1,150 00
	Gardener 1	400 00	400 00
	Assistant Gardener 1	300 00	300 00
	Porter 1	264 00	275 00
	Baker 1	400 00	400 00
	Assistant Baker 1	216 00	216 00
	Tailor 1	625 00	625 00
	Farmer and Assistant 2	652 00	652 00
	Teamster 1	240 00	240 00
	Night Watchers 4	756 00	1,008 00
	Chief Attendants 8	2,388 00	2,388 00
	Ordinary Male Attendants 18	4,080 00	4,320 00
	Painter and Jobber 1	575 00	575 00

V.—PUBLIC INSTITUTIONS MAINTENANCE.—*Continued.*

No. of Vote.	SERVICE.	No. of Officers and Employés.	Salaries and Expenses. 1889.	1890
33	ASYLUM FOR THE INSANE, TORONTO—*Continued.*		$ cts.	$ cts.
	FEMALES.			
	Matron	1	450 00	500 00
	Assistant Matron	1	250 00	300 00
	Chief Attendants	6	996 00	996 00
	Ordinary "	20	3,000 00	3,000 00
	Night "	4	450 00	600 00
	Cooks	5	684 00	684 00
	Laundresses	6	576 00	696 00
	Housemaids	4	396 00	396 00
	Seamstress	1	132 00	132 00
	Dairymaid	1	120 00	120 00
		105	29,907 00	30,703 00
	Expenses.			
	Medicine and Medical comforts		550 00	550 00
	Fuel		11,400 00	11,400 00
	Butchers' meat, fish and fowl		15,000 00	15,000 00
	Flour, meal, etc		6,500 00	6,500 00
	Butter		4,000 00	4,000 00
	Gas and oil		2,500 00	2,500 00
	Water supply		6,000 00	3,000 00
	Groceries		9,000 00	9,500 00
	Fruit and vegetables		2,500 00	2,500 00
	Bedding, clothing and shoes		5,000 00	5,000 00
	Furniture and furnishings		1,500 00	1,500 00
	Laundry, soap and cleaning		1,200 00	1,200 00
	Farm, feed and fodder		4,000 00	4,000 00
	Miscellaneous		900 00	900 00
	Repairs and alterations		2,500 00	2,500 00
	Printing, postage and stationery		700 00	700 00
			103,157 00	101,453 00
34	MIMICO BRANCH.			
	(For 240 patients.)			
	Salaries.	No. of Officers and Employés.		
	First Assistant Physician	1		1,000 00
	Steward and Storekeeper	1		360 00
	Engineer	1		600 00
	Firemen	2		528 00
	Male Supervisors	3	288 00	1,152 00
	Male Attendants	3	240 00	720 00
	Male Attendants and Cooks	3	240 00	720 00
	Officers's Cook and Housemaid	1		150 00
	Night Watch	1		240 00
	Female Supervisor	1	162 00	162 00
	Female Attendants	3	150 00	450 00
	Cook	1	150 00	150 00
		21	1,230 00	6,232 00
	Expenses.			
	Medicine and medical comforts		40 00	150 00
	Fuel		810 00	2,500 00
	Butchers' meat, fish and fowl		1,100 00	3,500 00
	Flour, meal, etc		450 00	1,800 00

V.—PUBLIC INSTITUTIONS MAINTENANCE—*Continued.*

No. of Vote.	SERVICE.	No. of Officers and Employés.		Salaries and Expenses. 1889	1890
	INSANE ASYLUM, TORONTO (MIMICO BRANCH)—*Continued.*				
	Salaries—Continued.				
	Butter			300 00	1,000 00
	Gas and oil			180 00	1,000 00
	Groceries			650 00	2,600 00
	Fruit and vegetables			180 00	500 00
	Bedding, Clothing and Shoes			..	2,250 00
	Farm Feed and Fodder				1,500 00
	Printing, postage and stationery				150 00
	Laundry, soap, etc			90 00	300 00
	Miscellaneous			500 00	1,000 00
35				5,530 00	24,482 00
	ASYLUM FOR THE INSANE, LONDON.				
	(For 950 patients).				
	Salaries.				
	Medical Superintendent	1		2,000 00	2,000 00
	First Assistant Physician	1		1,100 00	1,100 00
	Second "	1		1,000 00	1,000 00
	Third "	1		700 00	750 00
	Bursar	1		1,400 00	1,400 00
	Bursar's Clerk	1		800 00	800 00
	Storekeeper	1		800 00	800 00
	Assistant Storekeeper	1		600 00	600 00
	Engineer	1		740 00	740 00
	Assistant Engineer	1		400 00	400 00
	Stokers	7		1,296 00	1,776 00
	Bricklayer and Plasterer	1		600 00	600 00
	Carpenters	2		1,050 00	1,050 00
	Tailor	1		460 00	460 00
	Gardener	1		450 00	450 00
	Assistant Gardener	1		240 00	240 00
	Butcher	1		240 00	240 00
	Yardman	1		216 00	216 00
	Porter and Messenger	1		216 00	216 00
	Baker	1		400 00	400 00
	Assistant Baker	1		216 00	216 00
	Farmer	1		600 00	600 00
	Assistant Farmer	1		.....	360 00
	Ploughmen	2		432 00	432 00
	Chief Attendants	3		936 00	936 00
	Supervisors	7		1,884 00	1,884 00
	Ordinary Male Attendants	30		6,720 00	7,200 00
	Cowman	1		216 00	216 00
	Laundryman	1		240 00	240 00
	FEMALES.				
	Matron	1		500 00	500 00
	Assistant Matron	1		300 00	300 00
	Chief Attendant	1			
	Nurse	1			
	Supervisors	6		5,098 00	5,586 00
	Ordinary Female Attendants	24			
	Night Attendants	3			
	Cooks and Assistant Cooks	5		672 00	672 00
	Laundresses	4		480 00	480 00
	Housemaids	9		1,932 00	1,032 00
	Dairymaid	1		120 00	120 00
	Seamstress	1		120 00	120 00
	Portress	1		120 00	120 00
		132		35,294 00	36,252 00

V.—PUBLIC INSTITUTIONS MAINTENANCE—*Continued.*

No. of Vote.	SERVICE.			Salaries and Expenses 1889.	Salaries and Expenses 1890
	ASYLUM FOR THE INSANE, LONDON—*Continued.*			$ c.	$ c.
	Expenses.				
	Medicines and medical comforts			600 00	700 00
	Fuel			15,000 00	15,500 00
	Butchers' meat, fish and fowl			14,400 00	15,000 00
	Flour			8,500 00	8,500 00
	Butter			7,200 00	7,500 00
	Gas and oil			2,560 00	3,000 00
	Groceries			11,000 00	12,000 00
	Fruit and vegetables			1,000 00	1,000 00
	Bedding, clothing and shoes			15,000 00	15,500 00
	Furniture and furnishings			3,000 00	3,500 00
	Laundry, soap and cleaning			1,200 00	2,000 00
	Farm, feed and fodder			5,000 00	5,000 00
	Miscellaneous			1,500 00	2,000 00
	Repairs and alterations			5,000 00	6,000 00
	Printing, postage and stationery			1,100 00	1,000 00
				127,354 00	134,452 00
36	ASYLUM FOR THE INSANE, KINGSTON.				
	(For 672 Patients.)				
	Salaries.	No. of Officers and Employés.			
	Medical Superintendent	1		2,000 00	2,000 00
	Assistant Physician	1		1,100 00	1,100 00
	Second Assistant Physician	1		750 00	800 00
	Bursar	1		1,300 00	1,300 00
	Clerk	1		700 00	800 00
	Steward	1		600 00	600 00
	Storekeeper	1		700 00	700 00
	Engineer	1		740 00	740 00
	Assistant Engineer	1		300 00	300 00
	Carpenter	1		500 00	500 00
	Baker	1		400 00	400 00
	Tailor	1		500 00	500 00
	Attendant Tradesman 3 Supervisors 9 Ordinary Attendants 11 Night Watches 2	25		7,516 60	7,456 00
	Farmer	1		360 00	400 00
	Gardene.	1		400 00	400 00
	Butcher	1		240 00	240 00
	Stokers	2		425 00	425 00
	Ploughman	1		360 00	360 00
	Laundryman	1		240 00	240 00
	Stableman and Messenger	1		216 00	216 00
	FEMALES.				
	Matron	1		450 00	450 00
	Assistant Matron	1		250 00	250 00
	Trained nurse for Infirmary	1		210 00	210 00
	Seamstress	1		120 00	120 00
	Supervisors 7 Attendants 16 Night Watchers 1	24		3,624 00	3,732 00
	Porteress	1		120 00	120 00
	Cooks	3		408 00	408 00
	Laundresses	2		264 00	264 00
	Servants, Dairymaid, etc	3		312 00	312 00
		82		25,105 00	25,343 00

V.—PUBLIC INSTITUTIONS MAINTENANCE—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
	ASYLUM FOR THE INSANE, KINGSTON—*Continued.*	$ cts.	$ cts.
	Expenses.		
	Medicines	500 00	600 00
	Butchers' meat, fish and fowl	12,500 00	12,500 00
	Butter	3,600 00	3,600 00
	Flour	7,000 00	7,000 00
	Fuel	10,500 00	11,500 00
	Gas and oil	1,100 00	1,000 00
	Groceries	8,000 00	8,200 00
	Fruit and vegetables	1,600 00	2,000 00
	Bedding' clothing and shoes	6,000 00	6,000 00
	Furniture and furnishings	1,700 00	1,750 00
	Laundry, soap and cleaning	1.000 00	1,100 00
	Printing, postage and stationery	1,000 00	1,100 00
	Farm, feed and fodder	4,000 00	4,000 00
	Repairs	2,400 00	3,000 00
	Miscellaneous	1,500 00	2,000 00
		87,505 00	90,693 00
37	ASLLUM FOR THE INSANE, HAMILTON.		
	(For 900 Patients.)		
	Salaries. No. of Officers and Employés.		
	Medical Superintendent 1	2,000 00	2,000 00
	Assistant Physician 1	1,150 00	1,150 00
	Second Assistant Physician (in new building 1	900 00	900 00
	Third do 1	800 00	700 00
	Bursar 1	1,300 00	1,400 00
	Bursar's Clerk 1	800 00	800 00
	Storekeeper 1	750 00	750 00
	Engineer 1	650 00	650 00
	Assistant Engineer 1	240 00	240 00
	Stokers 5	1,440 00	1,200 00
	Carpenters 2	1,050 00	1,050 00
	Baker 1	450 00	450 00
	Gardener 1	500 00	500 00
	Assistant in store 1	580 00	600 00
	Porter and Gatekeeper 1	250 00	250 00
	Chief Attendant 1	300 00	300 00
	Night Watch, Chief 1	365 00	365 00
	do 2	480 00	480 00
	Ordinary Male Attendants 28	6,972 00	6,972 00
	Tailor 1	450 00	450 00
	Farmer 1	550 00	550 00
	Butcher and Yardman 1	240 00	240 00
	Ploughman 1	240 00	240 00
	Messenger and Stableman 1	240 00	240 00
	Farm hand 1	180 00	180 00
	Laundryman 1	240 00	240 00
	Shoemaker 1	300 00	300 00
	Cowman 1	180 00	180 00

V.—PUBLIC INSTITUTIONS MAINTENANCE.—*Continued.*

No. of Vote.	SERVICE.		Voted for 1889.	Voted for 1890
	ASYLUM FOR THE INSANE, HAMILTON—*Continued.*		$ c.	$ c.
	FEMALES.			
	Matron	1	500 00	500 00
	Assistant Matron	1	300 00	300 00
	Chief Attendant	1	250 00	250 00
	Supervisors	9	1,566 00	1,566 00
	Ordinary Female Attendants	17	2,400 00	2,550 00
	Night Watchers	3	360 00	450 00
	Cooks	5	648 00	648 00
	Laundresses	3	384 00	384 00
	Housemaids	4	444 00	444 00
	Seamstresses	2	268 00	288 00
		107	30,117 00	30,757 00
	Expenses.			
	Medicines and medical comforts		500 00	600 00
	Fuel		17,000 00	17,500 00
	Butchers' meat, fish and fowl		15,000 00	17,000 00
	Flour, bread, etc		6,600 00	8,000 00
	Butter		5,250 00	7,000 00
	Gas and oil		2,800 00	3,000 00
	Groceries		12,500 00	14,500 00
	Fruit and vegetables		1,800 00	1,800 00
	Bedding, clothing and shoes		8,000 00	9,200 00
	Laundry, soap and cleaning		1,700 00	2,000 00
	Furniture and furnishings		2,600 00	2,000 00
	Farm. feed and fodder		5,000 00	7,000 00
	Repairs and alterations		4,000 00	4,500 00
	Miscellaneous, including rents, etc		3,000 00	3,500 00
	Water supply		1,500 00	1,700 00
	Printing, postage and stationery		1,000 00	1,200 00
			118,967 00	131,257 00
38	ASYLUM FOR IDIOTS, ORILLIA.			
	For 375 Patients.			
	Salaries.	No. of Officers and Employés.		
	Medical Superintendent	1	1,600 00	1,600 00
	Bursar	1	1,100 00	1,000 00
	Storekeeper	1	700 00	700 00
	Engineers	2	1,100 00	1,000 00
	Gardener	1	300 00	300 00
	Chief Attendant	1	300 00	300 00
	Night Watchers	3	845 00	845 00
	Ordinary Male Attendants	6	1,440 00	1,440 00
	Messenger, Porter and Stable-keeper	2	480 00	480 00
	Carpenter	1	500 00	500 00
	Farmer	1	450 00	450 00
	Stokers	4	960 00	960 00

V.—PUBLIC INSTITUTIONS MAINTENANCE.—*Continued.*

No. of Vote.	SERVICE.			Salaries and Expenses. 1889.	Salaries and Expenses. 1890
				$ cts.	$ cts.
	ASYLUM FOR IDIOTS, ORILLIA—*Continued.*				
	FEMALES.				
	Matron	1	.....	450 00	450 00
	Assistant Matron at new buildings	1	.....	300 00	300 00
	Teachers for feeble-minded children	3	.....	650 00	850 00
	Ordinary Female Attendants	9	.....	1,350 00	1,350 00
	Night Attendants	2	.....	300 00	300 00
	Cooks	4	.....	528 00	528 00
	Laundresses	2	.....	264 00	264 00
	Housemaids	7	.....	840 00	840 00
	Seamstresses	2	.....	300 00	300 00
		55		14,757 00	14,757 00
	Expenses.				
	Medicine and medical comforts			100 00	100 00
	Fuel			11,000 00	10,000 00
	Butchers' meat, fish and fowl			3,300 00	3,500 00
	Flour, bread, etc			4,400 00	3,800 00
	Butter			1,900 00	2,000 00
	Gas and oil			600 00	600 00
	Groceries			2,700 00	2,800 00
	Fruit and vegetables			1,200 00	1,200 00
	Bedding, clothing and shoes			3,500 00	3,000 00
	Laundry, soap and cleaning			1,000 00	1,000 00
	Furniture and furnishings			900 00	600 00
	Farm, feed and fodder			1,500 00	1,500 00
	Repairs			1,050 00	1,100 00
	Miscellaneous			1,300 00	1,000 00
	Printing, postage and stationery			450 00	400 00
				49,657 00	47,657 00
3	CENTRAL PRISON, TORONTO.				
	For 385 Prisoners.				
	Salaries.	No. of Officers and Employés.			
	Warden	1	.....	2,000 00	2,000 00
	Deputy Warden	1	.....	1,400 00	1,400 00
	Bursar	1	.....	1,300 00	1,300 00
	Physician	1	.....	1,000 00	1,000 00
	Clerk and Prison Librarian	1	.....	850 00	850 00
	Steward and Storekeeper	1	.....	800 00	800 00
	Clerk (one-half charged to Industrial Department)		.....	400 00	400 00
	Guards	28	.....	12,825 00	12,825 00
	Engineer	1	.....	890 00	890 00
	Baker	1	.....	500 00	600 00
		36		21,965 00	22,065 00
	Expenses.				
	Hospital expenses and medicines			300 00	500 00
	Butchers' meat and fish			8,500 00	8,500 00
	Flour, bread and meal			5,000 00	5,500 00
	Groceries			4,000 00	5,000 00
	Bedding, clothing and shoes			5,000 00	6,000 00

V.—PUBLIC INSTITUTIONS MAINTENANCE.—*Continued.*

No. of Vote.	SERVICE.		Salaries and Expenses. 1889.	**1890**
	CENTRAL PRISON, TORONTO—*Continued.*			
	Expenses—Continued.		$ cts.	$ cts.
	Fuel		5,200 00	5,200 00
	Gas and oil		1,000 00	1,100 00
	Water supply		6,000 00	3,000 00
	Laundry, soap and cleaning		2,000 00	2,000 00
	Stationery, advertising, printing and postage		550 00	550 00
	Library, schools and expenses of religious services		1,000 00	1,000 00
	Furniture and furnishings		1,050 00	1,000 00
	Stable, forage, etc		2,000 00	2,000 00
	Grounds		450 00	450 00
	Repairs, etc		1,600 00	1,600 00
	Unenumerated		2,000 00	2,000 00
			67,615 00	67,465 00
	INDUSTRIAL DEPARTMENT.			
	Salaries.	No. of Officers and Employés.		
	Clerk (one-half charged to Maintenance)	1	400 00	400 00
	Shoemaker	1	600 00	600 00
	Tailor	1	600 00	600 00
	Foremen and Instructors	10	4,830 00	9,880 00
	Night Watch	1	450 00	450 00
	Material	..	20,500 00	37,000 00
		16	94,995 00	116,395 00
40	ONTARIO REFORMATORY FOR BOYS, PENETANGUISHENE.			
	For 235 Inmates.			
	Salaries.	No. of Officers and Employés.		
	Superintendent	1	1,600 00	1,600 00
	Assistant Superintendent	1	900 00	950 00
	Bursar	1	850 00	900 00
	Surgeon	1	700 00	700 00
	Chaplains		1,200 00	1,200 00
	Steward and Storekeeper	1	800 00	800 00
	Chief Guard (for night duty)	1	500 00	500 00
	School Teachers	3	1,650 00	1,650 00
	Carpenter Instructor	1	600 00	600 00
	Engineer	1	600 00	600 00
	Baker and Cook	1	450 00	450 00
	Instructors in shoe and tailor shop	2	1,150 00	1,150 00
	Farmer	1	450 00	450 00
	Gardener	1	400 00	400 00
	Ordinary Guards	4	1,700 00	1,700 00
	Night Guards	4	2,000 00	2,000 00
	Guard at out-buildings	1	400 00	400 00
	Gate-keeper	1	400 00	400 00
	Organists	2	160 00	160 00
	FEMALES.			
	Matron		400 00	.....
	Laundress, etc	1	.....	240 00
		29	16,910 00	16,850 00

V.—PUBLIC INSTITUTIONS MAINTENANCE—*Continued.*

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	**1890.**
	ONTARIO REFORMATORY FOR BOYS, PENETANGUISHENE.—*Continued.*	$ cts.	$ cts.
	Expenses.		
	Rations	6,000 00	6,000 00
	Clothing	5,500 00	5,500 00
	Farm, farm stock and stables	2,200 00	2,200 00
	Hospital	300 00	300 00
	Library and schools	700 00	700 00
	Fuel	3,500 00	3,500 00
	Cleaning, light and laundry	1,200 00	1,200 00
	Furniture, tools and shop fixtures	900 00	900 00
	Workshops, tools and fixtures	400 00	400 00
	Repairs, ordinary	1,500 00	1,500 00
	Incidentals (recaptures, freight, rent, etc)	2,200 00	2,200 00
	Postage and stationery	600 00	600 00
	Horse and buggy for superintendent	300 00	. . . . .
		42,210 00	41,850 00
41	INSTITUTE FOR THE DEAF AND DUMB, BELLEVILLE.		
	For 250 pupils.		
	Salaries. No. of Officers and Employés.		
	Superintendent 1	1,600 00	1,600 00
	Physician 1	650 00	650 00
	Bursar 1	850 00	850 00
	Matron and Housekeeper 1	400 00	400 00
	Teachers 14	8,579 16	8,579 16
	Storekeeper and Clerk 1	600 00	600 00
	Engineer 1	600 00	600 00
	Stoker 1	300 00	300 00
	Farmer 1	400 00	400 00
	Teamster 1	216 00	216 00
	Gardener 1	300 00	300 00
	Baker 1	425 00	425 00
	Night Watchman 1	300 00	300 00
	Carpenter and Assistant 2	700 00	750 00
	Shoemaker 1	550 00	550 00
	Messenger 1	168 00	168 00
	Cook 1	168 00	168 00
	Small Boy's and Girls' Nurses 2	240 00	240 00
	Maid, Laundresses and Cook's Assistant 12	1,356 00	1,356 00
	Supervisor of Boys 1	550 00	550 00
	Assistant Supervisor of Boys 1	300 00	300 00
	Seamstress and Supervisor of Girls 1	300 00	300 00
	48	19,552 16	19,602 16
	Expenses.		
	Medicines and Medical Comforts	125 00	175 00
	Butchers' meat, fish and fowl	3,600 00	3,900 00
	Flour	2,200 00	2,200 00
	Butter	2,100 00	2,300 00
	Groceries	2,000 00	2,500 00
	Fruit and vegetables	500 00	500 00
	Bedding, clothing and shoes	900 00	900 00
	Fuel	3,700 00	3,700 00

V.—PUBLIC INSTITUTIONS MAINTENANCE—*Continued.*

No. of Vote.	SERVICE.	No. of Officers and Employés.	Salaries and Expenses. 1889.	1890.
	INSTITUTE FOR THE DEAF AND DUMB, BELLEVILLE—*Continued.*		$ cts.	$ cts.
	Expenses.—Continued.			
	Gas and oil		1,200 00	1,200 00
	Laundry, soap and cleaning		400 00	400 00
	Furniture and furnishings		600 00	600 00
	Farm, feed and fodder		700 00	700 00
	Repairs and alterations		900 00	900 00
	Advertising, printing, stationery and postage		650 00	750 00
	Books, apparatus and appliances		600 00	600 00
	Unenumerated		1,000 00	1,500 00
			40,727 16	42,427 16
42	INSTITUTION FOR THE BLIND, BRANTFORD.			
	(For 150 ; pupils.)			
	Salaries.			
	Principal	1	1,600 00	1,600 00
	Physician	1	600 00	600 00
	Bursar	1	900 00	900 00
	Matron	1	400 00	400 00
	Teachers	15	6,296 00	6,575 00
	Trade Instructor	1	1,100 00	1,100 00
	Visitors' Attendant	1	156 00	156 00
	Carpenter	1	424 00	424 00
	Engineer	1	600 00	600 00
	Assistant Engineer	1	500 00	500 00
	Fireman in winter and farm hand in summer	1	276 00	276 00
	Gardener	1	400 00	400 00
	Teamster	1	288 00	288 00
	Porter and Messenger	1	240 00	216 00
	Cook and Baker	2	568 00	568 00
	Cook's Assistant	1	120 00	120 00
	Maids	10	984 00	984 00
	Laundress	1	168 00	168 00
	Laundress's Assistants	2	216 00	216 00
	Nurses	3	380 00	410 00
	Night Watchman	1	300 00	300 00
	Temporary Assistance, including extra farm hands in summer	..	350 00	350 00
		48	16,866 00	17,151 00
	Expenses.			
	Medicine and medical comforts		100 00	150 00
	Butchers' meat, fish and fowl		3,100 00	3,100 00
	Flour, bread, etc		1,100 00	1,100 00
	Butter		1,100 00	1,200 00
	General groceries		2,000 00	2,000 00
	Fruit and vegetables		300 00	300 00
	Bedding, clothing and shoes		500 00	500 00
	Fuel		3,800 00	3,800 00
	Gas, oil and candles		1,200 00	1,200 00
	Laundry, soap and cleaning		300 00	300 00
	Furniture and furnishings		400 00	500 00
	Farm, feed and fodder		900 00	900 00
	Repairs and alterations		500 00	600 00
	Advertising, printing, stationery and postage		600 00	600 00
	Books, apparatus and appliances		1,000 00	1,100 00
	Unenumerated		1,000 00	1,400 00
			34,866 00	35,901 00

V.—PUBLIC INSTITUTIONS MAINTENANCE.—*Concluded.*

No. of Vote.	SERVICE.		Salaries and Expenses. 1889.	**1890**
43	ANDREW MERCER REFORMATORY FOR FEMALES AND REFUGE FOR GIRLS, TORONTO.		$ cts.	$ cts.
	(For 170 inmates.)			
	Salaries.	No. of Officers and Employés.		
	Superintendent	1	900 00	1,000 00
	Deputy Superintendent	1	600 00	600 00
	Secretary	1	300 00	300 00
	Physician	1	800 00	800 00
	Bursar and Storekeeper	1	800 00	800 00
	Teacher and Housekeeper for Refuge	1	500 00	550 00
	Instructors	3	700 00	700 00
	Attendants	8	1,380 00	1,380 00
	Gatekeeper and Visitors' Attendant	1	120 00	120 00
	Cook and Baker	1	168 00	168 00
	Chief Attendant	1	200 00	200 00
	Maid	1	108 00	108 00
	Engineer	1	600 00	600 00
	Assistant Engineer	1	500 00	500 00
	Night Watch	1	400 00	400 00
	" females	1	200 00	200 00
	Messenger	1	400 00	400 00
	Outside Night Watch	1	400 00	400 00
	Gardener	1	400 00	400 00
		28	9,476 00	9,626 00
	Expenses.			
	Hospital expenses and medicines		250 00	250 00
	Butchers' meat and fish		2,400 00	2,400 00
	Flour, bread and meal		1,600 00	1,600 00
	Groceries		3,500 00	3,500 00
	Bedding, clothing and shoes		2,100 00	2,100 00
	Fuel		3,500 00	3,500 00
	Gas and oil		800 00	800 00
	Laundry, soap, cleaning and water		2,200 00	2,200 00
	Stationery, advertising, postage, etc.		400 00	400 00
	Library, schools and lectures		500 00	500 00
	Furniture and furnishings		600 00	600 00
	Grounds and garden		800 00	800 00
	Repairs		400 00	400 00
	Unenumerated		1,200 00	1,200 00
	For manufacturing operations		1,500 00	1,500 00
	Feed and forage		300 00	300 00
			31,526 00	31,676 00

VI.—IMMIGRATION.

To be voted per Statement (A).....$5,800 00

No. of Vote.	A	1889.	1890
		$ cts.	$ cts.
	Agencies in Europe	3,900 00	3,900 00
44	Agencies in Ontario	550 00	600 00
	Allowance for maps, circulars and literature	1,600 00	.....
	Incidentals	800 00	1,300 00
		6,850 00	5,800 00

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890
44	Details.	$ cts.	$ cts.
	Agencies in Europe.		
	Agent in Liverpool	2,000 00	2,000 00
	Clerk	240 00	240 00
	Travelling expenses	500 00	500 00
	Printing and contingencies	500 00	500 00
	Office rent and expenses, including fuel, stationery, etc	660 00	660 00
		3,900 00	3,900 00
	Agencies in Ontario.		
	Allowance for constable at railway station and sheds	550 00	600 00
		550 00	600 00

VII.—AGRICULTURE.

To be voted per Statement (A).....$130,478 00.

No. of Vote.	A.	1889.	1890.
		$ cts.	$ cts.
45	Agriculture	144,017 00	130,478 00

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890.
45	Details.	$ cts.	$ cts.
	(a) Agriculture.		
	Electoral Division Societies, 86 at $700	60,200 00	60,200 00
	" 1 at 550	550 00	550 00
	" 4 at 350	1,400 00	1,400 00
	" Outlying Districts	2,000 00	2,000 00
	Fruit Growers' Association	1,800 00	1,800 00
	Entomological Society	1,000 00	1,000 00
	Dairymen's Associations	4,000 00	4,000 00
	Agricultural and Arts Associations	10,000 00	6,000 00
	Ontario Experimental Union	200 00	200 00
	Ontario Creamery Association	1,500 00	1,500 00
	Poultry Associations	900 00	900 00
	Beekeepers' Association	500 00	500 00
	Travelling expenses of Professors and Lecturers attending Farmers' Institutes	1,500 00	1,500 00
	Farmers' Institutes, a grant of $25 to one Institute in each Electoral District, on condition that an equal sum be granted by the County Council, and on such further conditions as may be imposed by regulations of Commissioner of Agriculture	2,000 00	2,000 00
	Provincial Institute	850 00	1,500 00
	For sundry services in connection with Agriculture and Arts—such as investigations of disease in animals and crops, and of ravages of insects; printing reports, and for agricultural instruction, dairy products, travelling expenses and contingencies, not otherwise provided for	4,500 00	4,500 00
	Forestry	2,000 00	2,000 00
	Tree-planting—Bonus to Municipalities under 46 Vic., chap. 36	1,000 00	1,000 00
	Bureau of Statistics.		
	Printing, stationery, postage, and collection of labour and mining statistics, etc	6,500 00	5,000 00
		102,400 00	97,550 00
	Ontario Agricultural College.		
	(130 Students.)		
	(a) *Salaries and Wages.*		
	President, etc	2,000 00	2,000 00
	Professor of Agriculture and Farm Superintendent	2,000 00	2,000 00

VII.—AGRICULTURE.—*Concluded.*

No. of Vote.	SERVICE.			Voted for 1889.	Voted for 1890.
45	ONTARIO AGRICULTURAL COLLEGE AND EXPERIMENTAL FARM—*Continued.*			$ cts.	$ cts.
	(a) Salaries and Wages.				
	Professor of Chemistry			1,500 00	1,600 00
	" Geology and Natural History			1,500 00	1,600 00
	" Veterinary Science (part time)			800 00	800 00
	" Dairy Husbandry			2,000 00	1,000 00
	Mathematical and Assistant Resident Master			900 00	1,000 00
	Instructor in Drill and Gymnastics (part time)			150 00	150 00
	Bursar			900 00	950 00
	Shorthand writer and tutor			300 00	400 00
	Physician			300 00	300 00
	Matron and Housekeeper			400 00	400 00
	Engineer			700 00	700 00
	Assistant Engineer for 4 months (6 months in 1889)			210 00	144 00
	Stoker, 8 months (6 months in 1889)			120 00	176 00
	Janitor and Messenger			240 00	240 00
	Night Watchman and Assistant in looking after Students in Boarding-house for nine months			225 00	225 00
	Temporary assistance			100 00	100 00
				14,345 00	13,785 00
	(b) Expenses of Boarding House.				
	Meat, fish and fowl			4,000 00	4,000 00
	Bread and biscuit			800 00	800 00
	Groceries, butter and fruit			4,000 00	4,000 00
	Laundry, soap and cleaning			300 00	300 00
	Women servants for boarding-house—Cooks, laundresses, etc			1,700 00	1,700 00
	Advertising, printing, postage and stationery			800 00	800 00
	Maintenance of chemicals, apparatus, etc			250 00	250 00
	Library (books, papers and periodicals)			300 00	300 00
	Medals			100 00	100 00
	Unenumerated			700 00	700 00
				27,295 00	26,735 00
	Less estimated revenue			6,310 00	6,300 00
				20,985 00	20,435 00
	II.—EXPERIMENTAL FARM.				
	(a) Farm Proper.				
	Permanent improvements—fencing, etc			600 00	500 00
	" " carpenter work			.....	200 00
	Farm maintenance—				
	Salaries and wages	2,378 00	2,900 00		
	Live stock	7,500 00	1,100 00		
	Maintenance of stock	2,900 00	300 00		
	Seeds	500 00	250 00		
	Manure	250 00			
	Binding twine	60 00	50 00		
	Repairs, etc., — lumber, blacksmithing, implements and harness repairs	800 00	450 00		
	Furniture and furnishings—pails, baskets, brooms, brushes, farm tools, etc	100 00	100 00		
	Implements		200 00		

VII.—AGRICULTURE.—*Concluded.*

No. of Vote.	SERVICE.			Voted for 1889.	Voted for **1890.**
	II.—Experimental Farm.—*Continued.*			$ cts.	$ cts.
	(a) *Farm proper.*				
	Advertising, printing, postage and stationery		250 00		
	Fuel, light, etc	50 00	35 00		
	Contingencies	200 00	200 00		
		14,738 00	5,835 00		
	Less estimated revenue	2,000 00	2,600 00	12,738 00	3,235 00
				13,338 00	3,935 00
45	(b) *Experiments.*				
	Experimental Plots and feeding—				
	Salaries and wages—				
	Assistant Superintendent	600 00	800 00		
	Instructor (part wages)	100 00	150 00		
	Labor	100 00	500 00		
		800 00	1,450 00		
	Seeds	400 00	150 00		
	Fertilizers		130 00		
	Manures	150 00	300 00		
	Live stock for experimental feeding	270 00	100 00		
	Furniture, furnishings,	50 00	50 00		
	Printing, postage and stationery	50 00	50 00		
	Implements		450 00		
	Feed and fodder—oil cake, etc		100 00		
	Exhibitions		200 00	1,720 00	2,980 00
	Experimental Dairy—				
	Salary of Assistant	450 00	600 00		
	Labor for cultivation of corn, etc	336 00	300 00		
	Live Stock	525 00			
	Feed and fodder		400 00		
	Furniture, furnishings, repairs, etc	50 00	150 00		
	Laboratory expenses—for analyses, etc	100 00	50 00		
	Printing, postage and stationery	39 00	30 00		
	Contingencies		100 00		
				1,500 00	1,630 00
	Less revenue				400 00
					1,230 00
	(c) *Garden, Lawn, etc.*				
	Salaries and Wages—				
	Foreman (part salary)	500 00	500 00		
	Gardener	420 00	420 00		
	Assistant Gardener, 8 months (6 months in 1889)	210 00	288 00		
	Teamster	240 00	240 00		
	Laborers	840 00	1,000 00		
		2,210 00	2,448 00		

VII.—AGRICULTURE.—*Continued.*

No. of Vote.	SERVICE.			Voted for. 1889.	**1890.**
	II.—Experimental Farm.—*Continued.*			$ cts.	$ cts.
	(c) *Garden, Farm, Etc.*				
	Manure and fertilizers		100 00		
	Seeds, bulbs, plants, trees, etc.		250 00		
	Furniture, furnishings, repairs, etc. (including flower pots and implements)	80 00	100 00		
	Fuel, light, etc	50 00	30 00		
	Contingencies		20 00		
				2,600 00	2,948 00
	(d) *Instruction.*				
	Salaries and Wages—				
	Farm Foreman (part salary)	300 00	400 00		
	Gardener (part salary)	200 00	200 00		
	Carpenter (part salary)	500 00	400 00		
	Instructor (part salary)	99 00	125 00		
	Cattleman (part salary)	100 00	99 00		
		1,199 00	1,224 00		
	Lumber, nails, oil, paint, etc., for practice	200 00	100 00		
	Furniture and furnishings, tools, etc	50 00	50 00		
	Fuel	25 00	26 00		
				1,474 00	1,400 00
	Vote for 1889			20,632 00	12,493 00

VIII.—HOSPITALS AND CHARITIES.

To be voted per Statement (A)..... $125,579.67.

No. of Vote.	A.	1889.	**1890.**
		$ cts.	$ cts.
46	For Hospitals and Institutions mentioned in Schedule "A" of Statute	67,294 50	68,556 46
	For Institutions, Schedule "B"	35,210 61	39,143 23
	" " "C"	17,723 55	17,579 98
	For printing, stationery and other contingencies connected with above Institutions	300 00	300 00
	Total	120,528 66	125,579 67

IX.—MAINTENANCE AND REPAIRS OF GOVERNMENT AND DEPARTMENTAL BUILDINGS.

To be voted per Statement (A)..... $63,436 73.

No. of Vote.	A.	1889.	1890.
		$ cts.	$ cts.
47	Government House	8,154 31	8,057 12
48	Parliament Buildings—Main Building	10,463 25	10,445 82
49	West Wing	3,363 25	3,345 80
50	East Wing	4,613 25	4,595 80
51	Education Department—(Normal School Building)	9,674 05	9,300 79
52	Rented premises, Simcoe Street	2,741 00	2,700 00
53	" " Wellington Street	1,550 00	1,550 00
54	Miscellaneous	3,094 00	3,094 00
55	Normal School, Ottawa	3,350 00	3,350 00
56	School of Practical Science	1,200 00	1,200 00
57	Agricultural College	5,950 00	6,150 00
58	Agricultural Hall	650 00	650 00
59	Osgoode Hall	9,337 55	8,997 40
		64,140 66	63,436 73
	DETAILS		
	GOVERNMENT HOUSE.		
47			
	Water	650 00	650 00
	Gas	1,350 00	1,350 00
	Fuel	2,200 00	2,200 00
	Repairs	1,500 00	1,500 00
	Furnishings	1,000 00	1,000 00
	Planting and plants	500 00	500 00
	Contingencies (clearing away snow, carting ashes, etc.)	300 00	300 00
	Unpaid water account (arrears)	654 31	557 12
		8,154 31	8,057 12
48	PARLIAMENT BUILDINGS.—MAIN BUILDING.		
	Repairs and furniture	6,000 00	6,000 00
	Fuel	1,600 00	1,600 00
	Gas and other lighting	1,700 00	1,700 00
	Water	600 00	600 00
	Unpaid water account (arrears)	563 25	545 82
		10,463 25	10,445 82
49	PARLIAMENT BUILDINGS, WEST WING.—CROWN LANDS DEPARTMENT.		
	Repairs and furniture	1,600 00	1,600 00
	Fuel	700 00	700 00
	Water	500 00	500 00
	Unpaid water account (arrears)	563 25	545 80
		3,363 25	3,345 80

IX.—MAINTENANCE AND REPAIRS OF GOVERNMENT AND DEPARTMENTAL BUILDINGS—*Continued.*

No. of Vote.	SERVICE.	Expenses. 1889.	Expenses. 1890.
	DETAILS.		
50	EAST WING.—TREASURY DEPARTMENT AND SECRETARY AND REGISTRAR'S DEPARTMENT.	$ cts.	$ cts
	Repairs and furniture	2,500 00	2,500 00
	Fuel	750 00	750 00
	Water	500 00	500 00
	Gas	300 00	300 00
	Unpaid water account (arrears)	563 25	545 80
		4,613 25	4,595 80
51	EDUCATIONAL DEPARTMENT.—NORMAL AND MODEL SCHOOLS, TORONTO.		
	Furniture and furnishings	1,500 00	1,500 00
	Expenses of grounds	800 00	800 00
	Fuel and light	3,800 00	3,800 00
	Water	1,000 00	1,000 00
	Repairs, including museum, etc.	1,000 00	1,000 00
	Carpenter, (formerly paid out of contingencies)	600 00	600 00
	Unpaid water account (arrears)	974 05	600 79
		9,674 05	9,300 79
52	RENTED PREMISES, SIMCOE STREET.—ATTORNEY-GENERAL'S DEPARTMENT, ETC.		
	Fuel, gas and water	800 00	800 00
	Rent	1,200 00	1,200 00
	Repairs and furniture	700 00	700 00
	Unpaid water account (arrears)	41 00	.....
		2,741 00	2,700 00
53	RENTED PREMISES ON WELLINGTON STREET.—PUBLIC WORKS DEPARTMENT.		
	Fuel, gas and water	400 00	400 00
	Rent	600 00	600 00
	Repairs and furniture	350 00	350 00
	Caretaking, etc., Departmental Buildings	200 00	200 00
	Alterations and fittings to building, removal, etc	....	....
		1,550 00	1,550 00
54	MISCELLANEOUS.		
	General Clerk of Works and Repairs for Public Institutions	1,200 00	1,200 00
	Carpenter (engaged in Government buildings)	720 00	720 00
	Plumber and Assistant (engaged in Government buildings)	1,174 00	1,174 00
		3,094 00	3,094 00
55	NORMAL SCHOOL, OTTAWA.		
	Expenses of grounds	400 00	400 00
	Fuel and light	1,600 00	1,600 00
	Water	600 00	600 00
	Repairs and furniture	750 00	750 00
		3,350 00	3,350 00

IX.—MAINTENANCE AND REPAIRS OF GOVERNMENT AND DEPARTMENTAL BUILDINGS—*Concluded.*

No. of Vote.	SERVICE.	Expenses. 1889.	Expenses. 1890.
	DETAILS.	$ cts.	$ cts.
56	SCHOOL OF PRACTICAL SCIENCE.		
	Gas	150 00	150 00
	Fuel	500 00	500 00
	Water	100 00	100 00
	Repairs and furniture	450 00	450 00
		1,200 00	1,200 00
57	AGRICULTURAL COLLEGE.		
	Furniture and furnishings	600 00	600 00
	Repairs and alterations	600 00	600 00
	Fuel	3,000 00	3,000 00
	Light	1,100 00	1,100 00
	Water	650 00	650 00
	Sewage disposal	....	200 00
		5,950 00	6,150 00
58	AGRICULTURAL HALL.		
	Fuel and light	650 00	650 00
		650 00	650 00
59	OSGOODE HALL.		
	Fuel and light	5,000 00	5,000 00
	Salaries of Engineer and Fireman	1,140 00	1,140 00
	Water	500 00	500 00
	Repairs and furniture	2,000 00	2,000 00
	Unpaid water account (arrears)	697 55	357 40
		9,337 55	8,997 40

X—PUBLIC BUILDINGS.

To be voted per Statement (A)..... $526,434,98.

No. of Vote.	A.	1890. Re-vote estimated.	New Vote.
		$ cts.	$ cts.
60	Asylum for the Insane, Toronto	600 00	6,410 00
61	Mimico Cottages	39,000 00	154,404 00
62	Asylum for the Insane, London	1,150 00	17,651 89
63	" " Hamilton	3,273 53	20,550 00
64	" " Kingston	1,575 33	4,298 00
65	Branch Asylum, Kingston	200 00	....
66	Asylum for Idiots, Orillia	15,817 73	124,500 00
67	Provincial Roformatory, Penetanguishene	300 00	6,250 00
68	Reformatory for Females, Toronto	1,000 00	2,465 00
69	Central Prison, Toronto	300 00	9,400 00
70	Deaf and Dumb Institute, Belleville	.....	8,730 00
71	Blind Institute, Brantford	300 00	5,209 50
72	Agricultural College and Experimental Farm, Guelph	.....	5,250 00
73	Education Department and Normal and Model School, Toronto	800 00	4,500 00
74	Normal School, Ottawa	26,000 00	5,200 00
75	School of Practical Science, Toronto	....	37,200 00
76	Osgoode Hall, Toronto	....	4,000 00
77	Government House, Toronto	.....	3,000 00
78	Algoma District	.....	6,600 00
79	Thunder Bay District	600 00	1,800 00
80	Muskoka District	.....	2,400 00
81	Parry Sound District	.....	3,200 00
82	Nipissing District	1,000 00	1,000 00
83	Rainy River District	....	.....
84	Miscellaneous		500 00
		91,916 59	434,518 39
	Re-votes included in above	91,916 59	Voted for 1889.
	Expenditure on capital account (new)	402,373 39	
	Expenditure for repairs	32,145 00	
		526,434 98	581,248 67

X.—PUBLIC BUILDINGS—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890.	
60	DETAILS.	$ cts.	$ cts.
	Asylum for Insane, Toronto.		
	General repairs drains, etc,, re-vote	600 00	
	Furniture and furnishings (Inspector)	2,740 00	
	Carpenters' material	1,260 00	
	Paints and oils	710 00	
	New boilers and Engineers' and Masons' material	1,700 00	
			7,010 00
61	*Mimico Cottages.*		
	Re-vote of unexpended balance	37,000 00	
	To complete cottages, roads, etc	135,000 00	
	Houses for engineer and farmer	3,000 00	
	Cow stable and new piggery (re-vote)	2,000 00	
	Driving house and removal of barn	1,600 00	
	Furniture and furnishings for two new cottages and for Executive Building, Surgery, etc. (Inspector)	6,554 00	
	Farm stock and implements	640 00	
	Drainage and fencing	1,710 00	
	Trees and shrubs	100 00	
	Additions to sheds, etc	1,000 00	
	Fittings for laundry	3,000 00	
	Cooking appliances and fittings	1,800 00	
			193,404 00
62	*Asylum for Insane, London.*		
	Repairs to roofs of buildings, painting, etc	3,000 00	
	Duplicate pumps for water supply	2,000 00	
	Alterations for central boiler house	4,000 00	
	Six new steel boilers, alteration of steam heating	6,000 00	
	Furniture and furnishings (Inspector)	936 89	
	100 iron bedsteads (Inspector) re-vote	850 00	
	Books for library and pictures (Inspector) re-vote	300 00	
	25,000 feet of birch flooring do	925 00	
	Material to repair outside fence, also lathe (Inspector)	185 00	
	do to reconstruct ends of halls, etc. do	605 00	
			18,801 89
63	*Asylum for Insane, Hamilton.*		
	Re-vote of unexpended balance, steam heating, etc	2,000 00	
	do for additional drainage	7,500 00	
	General repairs, drains, etc	1,000 00	
	Furniture and furnishings (inspector) re-vote	1,273 53	
	Barn, stable and piggeries do	5,000 00	
	Root house and coal shed do	3,000 00	
	Refrigerator, fencing and draining (Inspector)	1.000 00	
	Material for floor in female basement "	600 00	
	One carriage and local telephone "	300 00	
	Altering drying rooms at main building "	1,000 00	
	Improvement of grounds, tree planting, tiles, etc., (Inspector)	1,150 00	
			23,823 53

X.—PUBLIC BUILDINGS—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890.	
	DETAILS.—*Continued.*	$ cts.	$ cts.
64	*Asylum for Insane, Kingston.*		
	Re-vote of unexpended balance, pointing, etc	300 00	
	General repairs, drains, etc	500 00	
	Furniture and furnishings (Inspector) re-vote	1,275 33	
	do do do	1,423 00	
	Drying room and dumb waiters do	1,800 00	
	Farm and garden do	575 00	
			5,873 33
65	*Branch Asylum, Kingston.*		
	General repairs, drains, etc., re-vote	200 00	
			200 00
66	*Asylum for Idiots, Orillia.*		
	General repairs, drains, etc. (old building) re-vote	300 00	
	Re-vote of unexpended balance, main front building	13,800 00	
	To complete buildings, steam heating, etc	122,000 00	
	New driving shed, outbuildings, re-vote	900 00	
	Hay and straw barn (Public Works)	500 00	
	Storekeeper's house	1,500 00	
	Furniture and furnishings (Inspector) re-vote	817 73	
	Oil tank for new gas works and fencing	500 00	
			140,317 73
67	*Reformatory for Boys, Penetanguishene.*		
	General repairs, drains, etc, re-vote	300 00	
	To complete addition to engine house, filter, etc	1,200 00	
	Furniture and furnishings (Inspector)	400 00	
	Re-construction of wharf do	650 00	
	Enlargement of school rooms do	350 00	
	Removal of cells	1,000 00	
	New bake shop and oven, sheds and stables	1,000 00	
	New roof for engine room and blacksmith shop	300 00	
	New cooking boilers	300 00	
	Material for repairing guards' houses	750 00	
	Pair of Horses	300 00	
			6,550 00
68	*Reformatory for Females, Toronto.*		
	General repairs, drains, etc, re-vote	400 00	
	Re-vote of unexpended balance for alterations, etc	600 00	
	Furniture and furnishings (Inspector)	690 00	
	Re-constructing lift in centre building (Inspector)	400 00	
	Repairing drying room and new floor in laundry (Inspector)	800 00	
	Painting front fence	300 00	
	Repairs	275 00	
			3,465 00
69	*Central Prison, Toronto.*		
	General repairs, drains, etc, re-vote	300 00	
	General repairs, drains, etc	1,000 00	
	To complete extension of South shop	3,000 00	
	Making road to brickyard	1,000 00	
	Machinery for South shop, driving belt, shafting and fittings	3,550 00	
	Machinery for North shop	850 00	
			9,700 00

X.—PUBLIC BUILDINGS—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890	
		$ cts.	$ cts.
	DETAILS.—*Continued*		
70	*Institution for the Deaf and Dumb, Belleville.*		
	General repairs, drains, etc	400 00	
	To complete addition, for refrigerator, etc	200 00	
	Furniture and furnishings (Inspector)	1,200 00	
	One steam boiler 20 horse power and engine (Inspector)	1,500 00	
	Repainting outside woodwork of buildings do	800 00	
	Rebuilding brick wall of boy's w. c. do	200 00	
	Repairing steam pipes in main building do	1,500 00	
	Lumber flooring, paints and oils	1,000 00	
	Steam kettles, etc., for kitchen	700 00	
	Educational Department—charts, books, etc	650 00	
	Garden and grounds	350 00	
	Engineer's Department	230 00	
			8,730 00
71	*Institution for the Blind, Brantford.*		
	General repairs, drains, etc., re-vote	300 00	
	Reconstruction of drains and tank house	1,500 00	
	Water supply for fire protection, and hydrants	2,000 00	
	Furniture and furnishings (Inspector)	242 50	
	Educational appliances	500 00	
	Repairs and alterations	605 00	
	Grounds and walks	362 00	
			5,509 50
72	*Agricultural College, Guelph.*		
	General repairs, drainage, etc	400 00	
	To complete new farm buildings, sewerage, etc	4,200 00	
	Wagon and wood shed	250 00	
	Furniture and furnishings	400 00	
			5,250 00
73	*Educational Department, Normal and Model Schools, Toronto.*		
	General repairs, drains, etc	2,000 00	
	New conservatory	2,000 00	
	Furniture and furnishings	500 00	
			4,500 00
74	*Normal School, Ottawa.*		
	General repairs, painting, drains, etc., re-vote	800 00	
	Repairs to roofs, fences, planking, etc	3,700 00	
	Furniture and furnishings	500 00	
	New water closets in front building	1,000 00	
			6,000 00
75	*School of Practical Science, Toronto.*		
	General repairs, painting, drains, etc., re-vote	1,000 00	
	Re-vote of unexpended balance, addition to building, re-vote	25,000 00	
	Steam heating for addition and main building	15,000 00	
	Additional storeys to wings of do	4,000 00	
	Furniture and furnishings	2,000 00	
	Apparatus and equipment of physical laboratory	15,000 00	
	Models, drawings, and surveying instruments	1,200 00	
			63,200 00

X.—PUBLIC BUILDINGS—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890.	
		$ cts.	$ cts.
	DETAILS.—*Continued.*		
76	*Osgoode Hall, Toronto.*		
	General repairs, painting, drains, etc	2,000 00	
	Reconstruction of plumbing, w. c's., etc	1,500 00	
	Furniture and furnishings	500 00	
			4,000 00
77	*Government House, Toronto.*		
	General repairs, painting, furniture, etc	3,000 00	
			3,000 00
78	*Algoma Disirict.*		
	Repairs and furniture, gaols and lock-ups	1,000 00	
	To complete addition to gaol, Sault Ste. Marie	1,000 00	
	Fence round gaol yards	2,500 00	
	To complete court room, Gore Bay	1,500 00	
	Lock-up, St. Joseph Island	600 00	
			6,600 00
79	*Thunder Bay District.*		
	Repairs and furniture, gaols and lock-ups	500 00	
	Boring in well for water supply, Fort William	500 00	
	Hot water apparatus, gaol, Port Arthur	800 00	
			1,800 00
80	*Muskoka District.*		
	Repairs and furniture, lock-ups, etc., revote	600 00	
	Addition to lock-up at Bracebridge	2,400 00	
			3,000 00
81	*Parry Sound District.*		
	Repairs and furniture, lock-ups, etc	500 00	
	Furniture for court room, Parry Sound	1,500 00	
	Lock-up at Byng Inlet	600 00	
	do French River	600 00	
			3,200 00
82	*Nipissing District.*		
	Repairs and furniture, lock-ups, etc	500 00	
	To complete addition to lock-up, Sudbury	500 00	
			1,000 00
83	*Rainy River District.*		
	Repairs and furniture lock-up, re-vote	500 00	
	Addition to fences, double sashes, etc., re-vote	500 00	
			1,000 00
84	*Miscellaneous.*		
	Repairs to Brock's monument	200 00	
	do fences round grounds	300 00	
			500 00

XI.—PUBLIC WORKS.

To be voted per Statement (A).....$39,800 00.

No. of Vote.	A	1890.
		$ cts.
85	Public Works....	39,800 00

No.	SERVICE.	Re-vote.	New Vote.
		$ cts.	$ cts.
85	1. *Mary's and Fairy Lakes Works:*		
	For partial renewal and reconstruction of Lock	.....	7,000 00
	To dredge channel below Lock	.....	1,000 00
	2. *Muskoka Lakes Works:*		
	To improve channel from Indian River to Lake Rosseau.....	.....	700 00
	To extend and improve cribwork at Pt. Carling.....	.....	500 00
	3. *Maganetewan Works:*		
	To meet outstanding lock works accounts.....	400 00	
	4. *Gull and Burnt River Works:*		
	To construct dam and slide at outlet of Pine Lake.....	.....	2,000 00
	6. To construct dam at outlet of Missisicua Lake	.....	5,200 00
	7. To meet one-fourth of the cost of proposed bridge and approaches thereto across the Ottawa River at the outlet of Lake Temiscamingue on condition that one-half of such cost is provided for by the Dominion of Canada and the remainder by the Province of Quebec, and that the Province of Ontario shall not in any event be called upon to pay more than the sum now appropriated, and that the plans for and construction of the bridge are approved of by the Commissioner of Public Works	4,000 00	
	8. Re-vote of amount to aid in dredging and removing obstructions in Muskrat River, on condition that the additional expenditure necessary to fully complete the work is provided for by the Townships of Westmeath, Ross, Bromley and Stafford	1,000 00	
	9. To aid cost of construction of Lake Scugog Flats road (original allowance having been flooded by erection of Public Works).....	.....	1,500 00
	10. Maintenance Locks, Dams and Bridges	.....	7,500 00
	11. Surveys, Inspections, Arbitrations and Awards and Charges not otherwise provided for	.....	5,000 00
	12. Superintendent Locks, Dams and Bridges.....	.....	1,200 00
	13. Lockmasters', Caretakers' and Bridge-tenders' salaries.....	.....	2,800 00
		5,400 00	34,400 00
	SUMMARY.		
	Re-vote included in above.....	5,400 00	Voted for 1889
	Expenditure on capital account (new).....	15,900 00	
	" for repairs and maintenance.	18,500 00	
		39,800 00	33,759 00

XII.—COLONIZATION ROADS.

To be voted per Statement..... .....$110,150 00

No. of Vote.	A.	To be Voted for 1890.	
		$ c.	$ c.
86	North Division	22,900 00	
	West Division	24,050 00	
	East Division	37,700 00	
	General Purposes	25,500 00	
			110,150 00

No. of Vote.	SERVICE.	To be Voted for 1890.	
		$ c.	c.
86	*North Division.*		
	Algoma and Spanish River Road—to construct	1,000 00	
	Bruce Mines and Port Lock Road—to repair	500 00	
	Bruce Mines Station Road—to construct one and a quarter mile	250 00	
	Cockburn Island Roads—repairs	500 00	
	Coyne's Road—general repairs	500 00	
	Desert Lake Road—to construct from Bruce Mines northward	800 00	
	Echo Bay Station Road—to construct	500 00	
	Galbraith Road—to continue	400 00	
	Korah Road—construction	400 00	
	Manitoulin Island Roads	4,000 00	
	Mississaga Road—repairs	500 00	
	Murrillo Road—to repair, Municipality of Shuniah to contribute equal amount	800 00	
	Oliver township Roads—repairs	500 00	
	Port Lock and Port Finlay Road—to repair	400 00	
	Port Finlay Road—repairs	500 00	
	Rabbit Mountain and Whitefish Lake Road—to complete and repair	800 00	
	Rainy River Road—general improvement of	3,000 00	
	Rat Portage and Rainy River Road—to extend	2,000 00	
	Rat Portage and Keewatin Road—to grade and improve	500 00	

XII.—COLONIZATION ROADS.—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890.	
		$ cts.	$ cts.
86	*North Division—Continued.*		
	Sable River Bridge—near Massey Station	800 00	
	St. Joseph Island Roads	1,000 00	
	Spanish River Road—to continue to Massey Station	500 00	
	VanKoughnet Road—to continue	750 00	
	Walford and Shedden Road—to construct	1,000 00	
	Whitefish and Arrow Lake Road—to construct between lakes	1,000 00	
			22,900 00
	West Division.		
	Ah-mic Lake Road—to repair	500 00	
	Bordeau Road—to construct on side line between lots 30 and 31, through concession 1 to 4 in Ryerson	500 00	
	Cardwell Junction Road—to repair between Novar and Ilfracombe	500 00	
	Croft Road—repairs, and to open road between lots 25 and 26, Hagerman	800 00	
	Denville Swamp Road—to construct westward	600 00	
	Distress River Road—repairs between Rosseau and Nipissing and Muskoka Roads	500 00	
	Draper Bridge—to renew	1,600 00	
	Eagle Lake Road—repairs between Upland's and South River	500 00	
	East River Bridge—balance	400 00	
	Hillside Road—to open	200 00	
	Himsworth Road—to extend eastward from Powassan	1,000 00	
	Junction No. 2 Road—to repair between Northern road and Edgington	500 00	
	Longford and Oakley T. L. Road—to open about five miles	750 00	
	McDougall Road—repairs	500 00	
	McKellar Centre Road—repairs	500 00	
	Magnetawan River Bridge—between concessions 12 and 13, Armour	800 00	
	Mills Road—repairs from Northern Road	500 00	
	Mills and Wilson Road—to extend eastward	500 00	
	Muskoka Road—to extend northward	500 00	
	Muskoka and Bobcaygeon Road—to open between Dwight and Bobcaygeon Road	500 00	
	Musquosh Bridge—to renew	800 00	
	Northern Road—to complete repairs to Golden Valley Road, with repairs on south end of the latter road	500 00	

XII.—COLONIZATION ROADS.—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890, $ cts.	$ cts.
86	*West Division—Continued.*		
	North Cardwell Road—to continue eastward	500 00	
	North-West Road—to continue repairs northward	750 00	
	Oakley 25 and 26 Side Line Road—to open from north boundary of Oakley South towards Wood Lake	750 00	
	Oka Road—repairs in Gibson	800 00	
	Orange Valley Road—to complete to Broadbent's Mill	300 00	
	Parry Sound Road—bridge renewals and repairs	2,000 00	
	Pringle Road—to construct from Golden Valley Road northward	500 00	
	Rosseau and Nipissing Road—to repair bridges between Spence and Rosseau	500 00	
	Ryerson Centre Road—to bridge Stony Creek and farm approaches	800 00	
	South Bay Road—to construct between Nipissing Village and Campbell's Mill, on lot 18 con. 16 Nipissing	600 00	
	Surprise Lake Road—repairs and extension	500 00	
	Trout Creek Bridge—between lots 30 and 31 con. 2, Himsworth	400 00	
	Watt 4 and 5 con. Road—repairs from Ufford eastward	500 00	
	Westphalia Road—to repair western portion	1,000 00	
	Whitestone Valley Road—to repair and extend	700 00	24,050 00
	East Division.		
	Addington Road—to repair from Cloyne northward	1,500 00	
	Alice 5 and 6, Side Line road—to open from con. 10 northward	400 00	
	Alice 12 and 13 con. Road—to repair from lot 25 westward	400 00	
	Allsaw Road—to improve road in Minden chopped out by Council	500 00	
	Barrie Road—repairs in Barrie Township	500 00	
	Barrie Bog Road—to repair in Fraser	400 00	
	Bobcaygeon Road—to repair north of Peterson Road from lot 14 to lot 30 con. A, and repairs south of Kinmount, $400	800 00	
	Bonfield and Callender Road	1,000 00	
	Burleigh Road—repairs	400 00	
	Booth Road	500 00	
	Buckhorn Road—repairs in Cavendish $500, and to repair southerly portion conditional upon grants of $100 from each, the County of Peterborough and Township of Smith, $200	700 00	
	Callender and North Bay Road to continue west	500 00	

XII.—COLONIZATION ROADS.—*Continued.*

No. of Vote.	SERVICE.	To be voted for 1890.	
		$ cts.	$ cts.
86	*East Division—Continued.*		
	Calvin Road—(7th con.)	500 00	
	Chandos Road—repairs	400 00	
	Clare River Bridge—towards renewal	800 00	
	Denbigh Road—to repair from Addington Road to Hyde's Chute Bridge.	500 00	
	Devil's Lake Road—from Monck Road south as may be located	400 00	
	Eganville and Killaloe Road—three miles of repairs	500 00	
	Ferguson Lake Road—to repair six miles with repair of Constant Creek Bridge	500 00	
	Ferris and Bonfield Road	1,000 00	
	Frontenac Road—repairs between Cole Lake and Plevna	1,000 00	
	Galway and Cavendish Road—to continue East to Buckhorn Road	800 00	
	Golden Lake Road—to open between lots 5 and 6 from line between concessions 8 and 9, South Algona, Southward	400 00	
	Hagarty 2nd and 3rd Concession Line Road—to open from lot 25, Westward	500 00	
	Hagarty and Brudenel Road—repairs	500 00	
	Hardwood Bog Road—to improve in Township of Bedford	400 00	
	Hurd's Creek Bridge on Eganville and Foy Road—to renew	300 00	
	Kennebec Road—to repair from Floating Bridge, Westward	500 00	
	Lavant Road—to complete repairs as set forth in petition	500 00	
	Mattawa and Temiscamingue Road—to continue improvement of	1,000 00	
	Mattawa and Callender Road—to continue repairs Westward	500 00	
	Methuen Road—repairs	300 00	
	Mississippi Road—to repair from Addington Road West through Ashby.	500 00	
	Minden and Gelert Station Road—repairs	400 00	
	Monck Road—repairs West of Uphill with bridge repairs	550 00	
	Monmouth and Glamorgan Town Line Road—to improve from Monck Road, Northward	300 00	
	North Algona and Wilberforce Town Line Road—to continue North from Concession 21, Wilberforce	500 00	
	North Bay and Widdifield Road—to continue Northward and improve.	1,000 00	
	Palmer Rapids Road—to repair to Peterson Road	500 00	
	Pandash Lake Road—in Cardiff to improve	500 00	
	Papineau 12th and 13th Concession Road—to construct between lots 21 and 35	500 00	

XII.—COLONIZATION ROADS.—*Concluded.*

No. of Vote.	SERVICE.	To be voted for 1890	
		$ cts.	$ cts.
86	*East Division—Continued.*		
	Penage Lake Road from Whitefish Lake Station, C. P. Railway—to assist in opening and bridging Vermillion River	1,000 00	
	Pembroke and Mattawa Roads—repairs in Rolph and Head	800 00	
	Petewawa and Alice Road—to open from lot 1 to lot 9	400 00	
	Peterson Road—to repair from McGarvy's Creek in Herschel, westward	500 00	
	Perrault Settlement Road—to improve	400 00	
	Perth Road—to complete in North Crosby	200 00	
	Reid Road—Galway—conditional that the County of Peterborough grants $100, and Municipality of Galway $50	200 00	
	Ross and Bromley—town line road to complete	400 00	
	Rolph Road—to construct from south town line of Rolph, northward, between lots 10 and 11	400 00	
	Rolph and Buchanan Town Line Road—between Wylie Station and Ottawa River	400 00	
	Ryde Road—to complete opening and improvement to Head River	500 00	
	Snake River Bridge—on line between lots 21 and 22, Bromley	350 00	
	South Algona 5th Con. Road—from lot 23, westward	500 00	
	Stafford 6 and 7 side line Road—to complete to 5th concession	400 00	
	Sturgeon Falls Road—to continue westward	1,500 00	
	Sudbury Road—to continue westward	1,500 00	
	Sudbury and Blezard Road—to open	1,000 00	
	Sydenham and Bedford Road—repairs in Frontenac	800 00	
	Waugh Road—to complete from lot 6 to south boundary of Anson	500 00	
	Trout Lake Junction Road—to continue	800 00	
	Westmeath Road—between concessions 1 and 2 Coulonge Front, towards opening	300 00	
	Widdifield and Phelps Road—to continue east between con. A. and B.	500 00	
	York River Bridge—on Monck road in Bancroft—renewal of	700 00	37,700 00
	General Purposes.		
	New short roads and repairs	20,000 00	
	Inspection	5,000 00	
	To pay balances of 1889	500 00	25,500 00

XIII.—CHARGES ON CROWN LANDS.

To be voted per Statement (A).....$115,900 00

No. of Vote.	A.	1889.	1890.
		$ cts.	
87	Expenditure on account of Crown Lands.....	112,900 00	115,900 00

No. of Vote.	SERVICE.	Salaries and Expenses. 1889.	1890.
87	DETAILS.	$ cts.	$ cts.
	Board of Surveyors.....	400 00	400 00
	Agents' salaries and disbursements.....	25,000 00	32,500 00
	Forest ranging, inspection of timber limits and fire protection.....	25,000 00	25,000 00
	Fire ranging.....	15,000 00	15,500 00
	Special timber inspection.....	3,000 00	3,000 00
	Exploration and location of timber in N. W. Territory.....	5,000 00	.....
	Note.—Half the appropriation for fire ranging and the whole of the amount taken for special timber inspection will be refunded by the licensees.		
	SURVEYS.		
	Townships in new districts.....	35,000 00	35,000 00
	Maps.....	2,000 00	2,000 00
	Survey of limits in Huron and Ottawa territory, chargeable against holders.....	2,500 00	2,500 00
		112,900 00	115,900 00

XIV.—REFUND ACCOUNT.

To be voted per Statement (A).....$25,249 04

No. of Vote.	A.	1889.	1890.	Compared with Estimates of 1889. Increase.	Decrease.
		$ cts.	$ cts.	$ cts.	$ cts.
88	Education.....	2,000 00	2,000 00	.....	
89	Crown Lands.....	16,500 00	18,500 00	2,000 00	
90	Municipalities' Fund.....	4,305 62	1,764 07	.....	
91	Land Improvement Fund.....	2,752 04	2,984 97	232 93	2,541 55
		25,557 66	25,249 04	2,232 93	2,541 55

XIV.—REFUND ACCOUNT.—*Concluded.*

No. of Vote.	SERVICE.		To be voted for 1890. $ cts.	$ cts.
88	EDUCATION.			
	Account of contribution to Superannuation Fund, withdrawn.....		.....	2,000 00
89	CROWN LANDS.			
	For payment made to the credit of the Department on account of uncompleted purchase, and afterwards returned to proposed purchasers on purchase not being carried out.		7,500 00	
	For two per cent. of timber dues, payable to municipalities for timber cut on road allowance.....		6,000 00	
	Refund to settlers under the amendment to the Free Grants' Act of 1880.		5,000 00	
				18,500 00
90	MUNICIPALITIES' FUND.			
	Amount collected in 1889.....	3,972 34		
	Less 20 per cent. commission.....	794 46		
	Vide Stat. Can. 18 Vic. c. 2, and 19 Vic. c. 16.	3,177 88		
	To be added to grant to Public and Separate Schools (50 V. chap. 5)	1,413 81		
	To pay Widows' Pensions for 1889		1,764 07	1,764 07
91	LAND IMPROVEMENT FUND.			
	Moneys collected from sale of Crown Lands, subject to the Land Improvement Fund, for the year ending 31st December, 1889...	2,848 33		
	Less 6 per cent. for cost of collection and management.	170 90		
		2,677 43		
	Less 4-5, leaving 1-5 to the Land Improvement Fund, *Vide* Stat. Can. 16 Vic. c. 159, and Con. Stat. Can. c..	2,141 95	535 48	
	Moneys collected from the sale of Common School Lands, subject to the Land Improvement Fund, for the year ending 31st December, 1889	10,423 36		
	Less 6 per cent. for collection and management...	625 40		
		9,797 96		
	To be distributed as follows:—			
	¼ to Land Improvement Fund.....	2,449 49		
	¾ to be added to Common School Fund.....	7,348 47		
			2,449 49	2,984 97
				25,249 04

XV.—MISCELLANEOUS EXPENDITURE.

To be voted per Statement (A).....$110,050 24

No. of Vote	A.	1889.	1890
		$ cts.	$ cts.
92	To cover expenses of collection of revenue for law stamps and licenses..	1,700 00	2,000 00
	To cover expenses *re* Canada Temperance Act	6,000 00	3,000 00
	Industrial School, Mimico	1,500 00	2,500 00
	Marriage licenses	500 00	500 00
	Ontario Rifle Association	1,000 00	1,000 00
	Ontario Artillery Association	500 00	500 00
	Expenses, elections	1,000 00	70,000 00
	Voters' lists	2,000 00	2,000 00
	Gratuities	11,400 00	5,000 00
	Gratuity to Chas. Gibbs on retirement from ill health after 14 years service	.....	933 24
	do G. B. Cowper, chief clerk Woods and Forests Branch, retiring allowance after 32 years' service	.....	5,367 00
	In aid of archæological researches in Ontario	1,000 00	1,000 00
	Telephone services	1,300 00	1,300 00
	Removal of patients	6,000 00	6,000 00
	Prisoners' Aid Society	1,000 00	1,000 00
	Sanitary Investigations and Health Conferences	1,000 00	500 00
	Outbreak of Epidemics	1,000 00	1,500 00
	University College, Ladies' Department	500 00	500 00
	Grant to Vaccine Farm	250 00	250 00
	Factories' Act:—		
	Salaries 3,000 00		
	Expenses 1,500 00		
		4,500 00	4,500 00
	For printing the unrepealed General Acts contained in Revised Statutes	1,000 00	700 00
		43,150 00	110,050 24

XVI.—UNFORESEEN AND UNPROVIDED.

To be voted per Statement (A).....$50,000 00

No. of Vote.	A.	1889.	1890
		$ cts.	$ cts.
93	To meet unforeseen and unprovided expenses	50,000 00	50,000 00

SUPPLEMENTARY ESTIMATES.

1890.

CIVIL GOVERNMENT.

Attorney-General's Office:		
New caligraph	$102 00	
Crown Lands Department—Woods and Forests Branch:—		
Five months' salary to G. B. Cowper	833 30	
Additional Clerk	700 00	
Inspection of Public Institutions:—		
Clerk (to cover amount understated in Estimates)	50 00	
Additional Clerk and Shorthand Writer (10 months)	500 00	
Department of Agriculture:—		
Fireman, Agricultural Hall (7 months)	350 00	
Additional to two clerks—Bureau of Industries	100 00	
		2,635 30

ADMINISTRATION OF JUSTICE.

Salaries of Court Reporters	$10,700 00	
To complete Supreme Court Judges' Library	3,000 00	
Towards outer Counties' libraries (Circuit and County Judges)	1,000 00	
Judge Ardagh's commutation, increase (10 months) under Order in Council	88 37	
Increase to salary of Inspector of Legal Offices for 1890 in lieu of all fees as Referee	250 00	
Increase to salary of Referee in Office of Master in Ordinary, in lieu of all fees as Referee	100 00	
Increase to salary of Assistant Clerk in Office of Master in Chambers (correcting mistake)	100 00	
Salary of District Attorney, Muskoka and Parry Sound	400 00	
Police Magistrate, part Muskoka and Parry Sound, salary and travelling expenses for 1890	500 00	
Administration of Justice in Muskoka and Parry Sound, additional vote	3,000 00	
Township of Ancaster towards their costs re indictment for a road obstruction and being amount of fine received by Provincial Treasury in respect thereof	400 00	
John Cousins, Police Magistrate, District of Thunder Bay, for travelling expenses in 1888 and 1889, revote	200 00	
do for 1890	100 00	
W. H. McKay, formerly Chief Constable and now Gaoler at Rat Portage, arrears, in lieu of rent	500 00	
		20,338 37

EDUCATION.

Poor Schools—additional grant	10,000 00	
		10,000 00

PUBLIC INSTITUTIONS MAINTENANCE.

Hamilton Asylum:—		
Addition to salary, Tailor	$40 00	
Central Prison:—		
Water supply, unpaid accounts 1889	5,000 00	
		5,040 00

AGRICULTURE.

Dominion Sheep Breeders' Association	$250 00	
Ontario Beekeepers' Association, to enforce Act	400 00	
Agricultural College—additional for Experimental Dairy	450 00	
		1,100 00

HOSPITALS AND CHARITIES.

Aid to Nicholl's Hospital, Peterborough	$679 20	
Aid to "Haven," Toronto	328 74	
Aid to General Hospital, Brockville	391 20	
		1,399 14

PUBLIC BUILDINGS.

Toronto Asylum:			
Repairs to outside brick wall, portions facing King and Queen streets (Re-vote of $350)		$500 00	
London Asylum:			
Additional pipes and hydrants, fire protection	$400 00		
New piggery and water supply to same	1,000 00		
To secure right to use for London Asylum purposes any system of drainage constructed by city of London in connection with Carling's Creek or otherwise	10,000 00		
Unpaid accounts for Alterations in 1889	1,169 34		
Furniture and furnishings for new dormitories, unpaid accounts, 1889	1,939 60		
Hot air furnace, Bursar's house	162 00		
		14,670 94	
Kingston Asylum:			
New gas works		2,000 00	
Asylum for Insane, Hamilton:			
Iron pipes and hydrants, fire protection	3,200 00		
Hot air apparatus and gas fixtures, Bursar's house	244 00		
		3,444 00	
Orillia Asylum:			
New gas works	$2,000 00		
		2,000 00	
Institution for the Blind, Brantford:			
Re-vote, improvement of drainage		2,000 00	
Central Prison:			
Additional fittings and machinery for south shop		1,500 00	
Reformatory for Boys:			
Purchase of additional land adjoining the institution		1,500 00	
Educational Department, Normal and Model Schools, Toronto:			
Re-vote, reconstruction of steam heating, three new boilers		3,000 00	
Agricultural College:			
Machinery and appliances for laundry		700 00	
Registry Office, Minden:			
Repairs		100 00	
			31,414 94

PUBLIC WORKS.

To meet outstanding claims *re* Maganetawan Lock	$200 00	
Further aid to Nation River improvements (contribution thereto being also made by the Dominion)	3,000 00	
To aid in deepening and removing obstructions from channel in River Beaudette	1,500 00	
Scugog River improvement—to remove obstructions in channel of river between head of presemt improvements and Lindsay Lock	5,000 00	
Repairs to guide piers at Young's Point Lock	300 00	
Mississippi River improvement—to remove rock obstruction in channel of river below Carleton Place	1,500 00	
		11,500 00

COLONIZATION ROADS.

Burk's Falls Roads—to extend eastward	$800 00	
Current River and Six-Mile Creek Bridges—contributions towards renewal, the Council undertaking to provide remainder	550 00	
Clare River Bridge—conditional that the Municipalities provide the balance required to complete renewal (estimated cost, $3,000)	700 00	
Combermere Bridge—to complete renewal	900 00	
Eau Claire River Bridge and Road	500 00	
Keewatin Bridge—over Portage Bay	4,500 00	
Mississaga Bridge (Township of Wells)—to construct	2,500 00	
Parkinson Road—to continue	800 00	
Rat Portage and Keewatin Road—a further grant, conditional upon the Municipalities contributing an equal amount	500 00	
St. Joseph Island Bridge—conditional on Dominion Government granting an equal sum	5,000 00	
Severn River Bridge—one-third cost of renewal, the Counties of Simcoe and Ontario paying balance	430 00	
Slate River Valley Road	600 00	
Sudbury and White Fish Lake Road	1,000 00	
Monmouth Junction Road	800 00	
North Bay and Trout Lake Road	400 00	
		19,980 00

CHARGES ON CROWN LANDS.

Forest ranging in new territory	$5,000 00	
Additional contingencies to cover in part cost of Returns	1,250 00	
		6,250 00

MISCELLANEOUS.

Retiring allowance to John Morphy	$4,000 00	
Inspection of mines, travelling expenses, etc., (temporary)	1,200 00	
Gratuity to widow of L. T. Greene, late teacher in the Institute for the Blind, Belleville	1,666 60	
Allowance to the family of H. A. Semple, clerk at Osgoode Hall	850 00	
Allowance to Geo. Angus for furniture destroyed by fire, London Asylum	50 00	
Retiring allowance to Mrs. Caroline Fitzgerald, late Matron, Reformatory for Boys	466 66	
Peter Cramb for property stolen and not recovered, the offender having been afterwards discovered through Mr. Cramb's services, and the bail having paid a larger sum in forfeiture of bond	200 00	
Costs incurred in Scott Act case, Jones *vs.* Grace and Rogers	431 77	
Capt. Kelly, Penetanguishene, further allowance	400 00	
Victoria Industrial School	6,000 00	
Printing Legal Titles Acts (1,000)	216 00	
Mining commission—to cover unpaid accounts	500 00	
		15,981 03
		$125,638 78

To defray expenses of Legislation, Public Institutions' Maintenance, and for salaries of the officers of the Government and Civil Service, for the month of January, 1891	$80,000 00

WM. H. MILLS.

President 1868-1869.

TWENTY-FIRST ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION

OF ONTARIO.

1889.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

TORONTO:
PRINTED BY WARWICK & SONS, 68 AND 70 FRONT STREET WEST,
1890.

CONTENTS.

* This matter should have followed on page 68.

TWENTY-FIRST ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION OF ONTARIO,

1889.

To the Hon. Charles Drury, Minister of Agriculture:

Sir,—I have the honor of submitting to you the Twenty-first Annual Report of the Fruit Growers' Association of Ontario, in which you will find a carefully prepared report of the important papers and discussions on fruit culture, floriculture and forestry, which were taken up at our Winter Meeting in the City of Hamilton, and our Summer Meeting in the Town of Seaforth. It also contains an account of the Annual Meeting at Windsor, the president's annual address, and the officers for the year 1890.

You will be pleased to find that the plans proposed for the increased usefulness of our Association are being carried out. Arrangements have been made to send out eleven of our directors to speak at Farmers' Institutes on the subjects connected with fruit culture and forestry, and it is hoped that in this way this important industry will receive a real encouragement.

The *Canadian Horticulturist* has been enlarged and improved, and during the coming fruit season it is proposed to send out a supplement in the shape of a weekly bulletin giving reports of both home and foreign markets.

Hoping that our work may receive your hearty approval,

I am, Sir,

Your obedient servant,

L. WOOLVERTON,
Secretary.

Grimsby, Ont., Dec., 1889.

OFFICERS FOR 1890.

PRESIDENT :

A. M. Smith ..... St. Catharines.

VICE-PRESIDENT :

J. A. Morton ..... Wingham

SECRETARY-TREASURER AND EDITOR :

Linus Woolverton, M.A. ..... Grimsby.

DIRECTORS :

Agricultural Division No. 1 ..... John Croil, Aultsville, Ont.
Agricultural Division No. 2 ..... P. E. Bucke, Ottawa, Ont.
Agricultural Division No. 3 ..... D. Nichol, Cataraqui, Ont.
Agricultural Division No. 4 ..... P. C. Dempsey, Trenton.
Agricultural Division No. 5 ..... Thos. Beall, Lindsay, Ont.
Agricultural Division No. 6 ..... W. E. Wellington, Toronto, Ont.
Agricultural Division No. 7 ..... M. Pettit, Winona, Ont.
Agricultural Division No. 8 ..... A. H. Pettit, Grimsby.
Agricultural Division No. 9 ..... J. K. McMichael, Waterford, Ont.
Agricultural Division No. 10 ..... A. McD. Allan, Goderich, Ont.
Agricultural Division No. 11 ..... T. H. Race, Mitchell, Ont.
Agricultural Division No. 12 ..... N. J. Clinton, Windsor, Ont.
Agricultural Division No. 13 ..... G. C. Caston, Craighurst, Ont.

AUDITORS :

James Goldie ..... Guelph.
J. M. Denton ..... London.

THE ANNUAL MEETING.

The annual meeting of the Fruit Growers' Association of Ontario was held in the Music Hall, Windsor, on Tuesday, the 10th December, 1889, at 8 o'clock p.m.

The President, A. McD. Allan, occupied the chair.

The minutes of the last annual meeting was read by the Secretary, and approved.

The Treasurer's report. duly audited, was read by the Secretary-Treasurer and adopted.

On motion of Mr. J. M. Denton, London, seconded by Mr. Thomas Beall, Lindsay, it was resolved that since it is desirable that the Treasurer's report end on December 1st instead of September 1st, therefore that two auditors be appointed to audit the accounts of the Secretary-Treasurer from September 1st, 1889, to December 1st, 1889.

The President then appointed Messrs. Wm. Saunders, of Ottawa, and James Goldie, of Guelph, as auditors for this purpose.

The President read his annual address, which received the closest attention.

Mr. A. McNeill, Windsor, said that several points in the address should be noticed, for instance, the study of horticulture in our public schools. He thought the Association should express itself in favor of this study being introduced into the schools.

The Secretary stated that a letter had been received from the Minister of Education and read at the Hamilton meeting, to the effect that a book was in preparation for use in the schools which would take up the subjects of both agriculture and horticulture.

Mr. N. J. Clinton, Windsor, said that he once attended a school in which a book on agriculture was introduced, but it took the shape of agricultural chemistry. Such a book is too deep for public schools, and would be more suitable in a high school.

Mr. T. H. Race, of Mitchell, was of the opinion that the best place in which to teach the children horticulture, was in the garden at home. At one time he was in the habit of giving away the surplus fruit of his garden, but of late he had given his children the privilege of gathering and marketing both fruits and flowers, and sharing the profits. By such means, he thought, the subject could be taught much more effectively than by introducing a text book into our schools, whose list of subjects is already overcrowded.

On motion, a committee consisting of A. M. Smith, J. A. Morton and Prof. Saunders was appointed by the chairman to prepare an obituary notice of the Rev. R. Burnet.

The following resolution was presented by them and was adopted unanimously by the Association. :

Resolved, that we the officers and members of the Fruit Growers' Association of Ontario have learned with deep regret of the death of the Rev. R. Burnet, one of the former Presidents of this Association, who during his term of office manifested such zeal in advancing the welfare of our organisation. By his enthusiastic advocacy of the fruit interests of this province, he did much to stimulate fruit culture, while his uniform urbanity and genial bearing in the chair, won him the esteem of all.

We tender our sincere sympathies to his widow and family in their bereavement.

Resolved, that the Secretary be requested to transmit a copy of the above resolutions to the widow of our late lamented President.

J. A. MORTON,
A. M. SMITH,
WM. SAUNDERS.

The nominating committee presented their report, recommending the following elections, viz. :—*President*, A. M. Smith ; *Vice-President*, J. A. Morton ; *Directors*, John Croil, P. E. Bucke, D. Nichol, P. C. Dempsey, Thos. Beall, W. E. Wellington, M. Pettit, A. H. Pettit, J. K. McMichael, A. McD. Allan, T. H. Race, N. J. Clinton, G. C. Caston ; *Auditors*, James Goldie, J. M. Denton. After the names had been voted upon *seriatim* the report was adopted.

At a meeting of the Directors, held subsequent to the election, L. Woolverton, of Grimsby, was re-appointed secretary-treasurer and editor of the *Canadian Horticulturist*.

A fruit committee was appointed by the chair, consisting of A. H. Pettit, A. McD. Allan, and W. W. Hillborn.

TREASURER'S REPORT FOR THE YEAR 1888-9.

Receipts.	$ c.	Expenditure.	$ c.
Balance on hand last audit	665 04	Plant distribution	315 08
Members' fees	2,004 75	Directors' meetings, and Farmers' Institutes	331 37
Advertisements in Journal	200 44	Express and duty	156 19
Back Nos. and bound vols.	18 29	Chromo lithographs	267 95
Government grant	1,800 00	Printing and stationery	103 30
Government allowances for engraving	50 00	Audit 1887-8	20 00
Sale of stock in Beadle Nursery Co.	75 00	Postage and telegrams	106 36
		R. R. certificates	2 00
		Electrotypes	117 60
		Commissions	88 23
		Caretaker at annual meeting	3 70
		The *Canadian Horticulturist*	1,445 75
		Stenographer	52 25
		Salary secretary-treasurer, editor and clerk	800 00
		Books and exchanges	19 75
		Advertisements of meetings	61 79
		Balance on hand	922 20
	$4,813 52		$4,813 52

To the President and Directors of the Fruit Growers' Association :

Gentlemen—We, the undersigned auditors, have gone carefully over the Treasurer's account for the year 1888-9, have compared the vouchers with the items of expenditure,

and find them correct, showing receipts amounting to $4,813 52, and an expenpiture of $3,891.32, showing a balance in the hands of the Treasurer of $922.20. We desire to express our appreciation of the systematic manner in which the Treasurer had prepared his statement for our inspection, and the uniform courtesy with which he gave every information asked for by your auditors.

JAS. GOLDIE,
NICHOLAS AWREY. } Auditors.

SUPPLEMENTARY REPORT FROM SEPT. 1st TO DEC. 1st, 1889.

RECEIPTS.	$ c.	EXPENDITURE.	$ c.
September 1st, Balance on hand	922 20	Electrotyes	20 25
Members' fees, September, October and November	108 00	Advertising meetings	3 00
Advertisements, September, October and November	73 80	*The Canadian Horticulturist*	403 94
Back Nos. and bound volumes, September, October and November	6 79	Plant distribution	5 70
		Russian exchange	29 00
		Books and exchanges	5 00
		Commissions	12 50
		Audit	20 00
		Express and 'duty	6 77
		Postage and telegrams	9 28
		Printing and stationery	23 19
		Directors' expenses	10 30
		Salary secretary-treasurer, editor and clerk	225 00
		Stenographer	105 00
		Balance in hand,	231 86
	$1.110 79		1,110 79

To the President and Directors of the Fruit Growers' Association:

We, the undersigned committee appointed to audit the receipts and disbursements of the Secretary-Treasurer from the first September to the 1st December, 1889, beg to present the following report:

We have examined the vouchers, compared them with the items of expenditure, and find them correct, showing receipts amounting to $188.59, and an expenditure of $878.93, showing a balance in the hands of the Treasurer on the 4th day of December, of $231.86.

JAS. GOLDIE,
WM. SAUNDERS. } Auditors.

REPORT ON NEW FRUITS.

The secretary read a report of New Fruits which had been received by him during the past two seasons as follows:

I think it is very important that a careful record be kept by this asssociation of all new fruits that are originated in Ontario, and so soon as any one is found to possess sufficient merit to deserve a place among our older varieties, that some steps be taken to encourage its propagation for the general good. I would be in favor of the appointment

of a fruit committee of three practical men, whose experience combined would cover the different varieties of fruits pretty fully, to whom your secretary could send samples of fruits in their season as they are sent into him, and who should report through him to this Association regarding the same.

During the last two seasons several new fruits have been sent into me, and in order to present some account of them to you I have prepared this paper.

APPLES.—*Reany's Seedling* is an apple that impressed me rather favorably. It was grown by Mr. S. Reany, a few miles from Port Elgin, who exhibited it at some of the local fairs, where it attracted the attention of Mr. J. H. Wismer, of Port Elgin, and he sent me a sample for my opinion. It is a fall apple of good quality for the table, and may be thus described:

Fruit above medium size, almost round. Skin smooth, slightly uneven. Color, rich golden yellow, sprinkled moderately with small grey and light dots. Stalk three-quarters of an inch long, inserted in a funnel-shaped, slightly russetted cavity. Basin abrupt, even. Calyx partially open. Flesh yellow, fine grained, juicy, with sprightly, vinous flavor. Core small. Quality very good to best.

Keane's Seedling is a beautiful dessert apple which was figured in the *Canadian Horticulturist*, Vol. XI, page 284. The original tree grows about four miles north of the town of Orillia, on the farm of Mr. James Keane, and is a chance seedling of about twenty years of age. Mr. T. Williams, of Orillia, who sent the samples to me, says it has borne every year for the last nine years most abundantly.

At first sight this apple has much the general appearance of Gravenstein, but is below average size, and struck me favorably as a commendable autumn dessert apple. It is below medium size, of even form, roundish oblate, with closed calyx in a corrugated basin. The skin is shaded, splashed and striped with bright crimson, which is deepest on the sunny side. The flesh is white, crisp, fine grained, juicy, and of a rich, aromatic flavor.

Morse's Seedling Harvest apple was sent me by Mr. S. P. Morse, of Milton, who says it ripens with the old Early Harvest, averages larger in size, and is perfectly free from leaf blight, or apple scab. The skin is very smooth, with obscure whitish dots; stem, short, stout, and set in an irregular cavity; calyx closed, set in a round regular basin; flesh, white, tender, juicy, sub-acid. It is an apple that seems to possess especial merit as an early cooking apple.

Two seedling apples were reported on by Mr. Wm. Saunders, in the *Canadian Horticulturist*, Vol. XI, page 13, and I append his description of them.

Robson's Seedling, grown by Mr. T. C. Robson, Minden, Ont.

Size above medium: form, oblate; color, greenish yellow, streaked and splashed with red; stem, slight and short, with a deep smooth cavity; calyx, open; basin, rather deep and slightly ribbed; flesh, yellowish white, fine-grained and moderately juicy, with a faint aroma and a mild pleasant flavor; core, rather large. A fair dessert apple and a good cooker. Its size and appearance would make it a desirable apple for the north. From its form, color and flavor it is probably a seedling of Duchess of Oldenburg. Season, October and November.

Robertson's Seedling, grown by Mr. F. M. Robertson, Minden, Ont.

Medium size, $2\frac{5}{8}$ inch by $2\frac{1}{4}$ inch; form, oblate conic: color, greenish yellow, more or less splashed and dotted with dull red; stalk, short and slight; cavity, rather shallow; calyx, small, closed and shallow, with the basin strongly ribbed; flesh, nearly white, firm, grained, juicy and crisp; sub-acid, not high-flavored, but a pleasant eating apple and a good cooker; core, medium size. It is the type of Duchess of Oldenburg, but smaller in size and later in season. Ripe in November.

PLUMS.—The *Owen Sound Beauty* was sent to me by Mr. R. Trotter, of Owen Sound, who says he believes it is a seedling which has been propagated by suckers in that neighborhood for the last twenty-five years. The tree, he says, is a rapid healthy grower, with thick broad leaves. If this plum is a good bearer it will be a most desirable one for the commercial orchard, both on account of its excellence as a dessert plum and its lateness of ripening.

The fruit may be described as large, nearly globular. Skin, brownish purple with a thick blue bloom on the sunny side, dotted with numerous fawn-colored specks. Suture distinct, dividing the plum into unequal parts. Flesh, orange, very juicy, rich and excellent; separates freely from the stone. Very good. September.

The same gentleman also sent me three fine plums on the 3rd of September last, and which for convenience I will refer to as Nos. 1, 2 and 3.

No. 1 has been grown about Owen Sound for many years from sprouts without name, and is supposed to be a seedling. It is a very fine dark colored plum, obovate, with a broad shallow suture half round; stalk curved, surrounded with a peculiar ring, very good in quality. It much resembles Bradshaw, from which it may be a seedling. Mr. Trotter proposes to call it "Lady Grey."

No. 2 is a seedling from Duane's Purple, a clingstone, with greenish flesh and rather poor quality, and under medium size. The tree is a good bearer and quite hardy.

No. 3 is a seedling from Smith's Orleans. It is a semi-cling of yellowish flesh and very good quality; in size, above medium; and the tree is a very healthy grower, said to be free from black-knot. The foliage is very dense, the leaves are thick, dark green and leathery. It is a most abundant bearer.

The *Early Green* was sent me by Mr. W. Holton, of Hamilton, and seemed to me to be a most valuable seedling. An outline sketch of this plum appeared in our journal, Vol. XI, page 265, which, however, shows it rather under size. It is a delicious plum of most excellent quality, of medium size, roundish in form, with a delicate skin marbled in two shades of green; the pit is small and free. The stem is delicate and about three-quarters of an inch long. The great point which makes it especially valuable is its time of ripening. The sample came to hand on the 3rd of August, and was then in prime eating condition.

Peaches.—I have little to report to you under this head. Mr. A. M. Smith, of St. Catharines, sent me a seedling of his which on account of its time of ripening is worthy of notice. He calls it *Smith's Extra Late*. The sample came to hand on the first of October, and on measurement I found it to be about eight inches in circumference, a fine large yellow flesh and yellow-skinned peach of good quality, and a perfect free-stone.

Another seedling was sent me from Chatham by Mr. J. L. Scott, a magnificent peach, equalling, if not surpassing the Early Crawford in quality, and also resembling that popular variety in size and beauty of appearance. The skin is yellow with an exquisitely beautiful red cheek; flesh, yellow, rich, juicy and melting, and free from the stone; well worthy of propagation. Its season of ripening is about the middle of September.

Small Fruits.—The *Pearl Gooseberry* is a seedling of Prof. Saunders, raised by crossing Downing with an English variety known as Ashton's Seedling. It has been now fairly well tested, and is worthy of especial notice because of (1) its good quality, (2) its size, (3) its great productiveness, and (4) its freedom from mildew. I saw a row of some fifty bushels at Port Dalhousie, on Mr. Smith's grounds there, and every one of them was a surprise on account of the number of berries to the inch of wood, and all of them much larger than the Downing.

Crosby's Seedling is a fine red gooseberry, samples of which were sent me in 1888 by Mr. A. Reeve, of Highland Creek. He says it was raised by M. L. Crosby of the township of Markham, about eight years ago. Fruit very large, roundish, slightly oval; skin, smooth, thin, very dark red, with veins of a lighter red, mostly dotted with small grey dots; stem stout, calyx prominent, quality excellent. The only question concerning this berry is whether its present freedom from mildew is constant or not. It has so much the appearance of the genuine English varieties, that one cannot help being a little fearful of this point.

The King Conn, or Autocrat, has been so well brought before you in other ways, that I do not think it necessary to speak of it here. Nor need I speak of the *Northern Light Grape* which is also well introduced to your notice in our Annual Reports.

I have now completed my list, and hope that out of it may come some fruits that will prove worthy of general cultivation. It is, I think, an important feature of our work to improve the varieties of fruits, both in the interest of the grower and of the consumer, and I do not think we should be hindered from giving our honest opinion of a new fruit, because it may help to make rich the originator or the introducer; nor should we hesitate to condemn a poor thing for any personal reasons of friendship to the introducer.

L. WOOLVERTON.

Prof. Wm. Saunders (Ottawa).—I am glad the subject has been brought forward by the Secretary. Some of the new fruits that have been brought before us of late have great promise; but some of them may succeed in some parts and not in others. I think it is of very great importance to the fruit growers of our country to know just what is being done in this direction. I may add that I hope fruit growers will use the experimental farms in testing new fruits. I assure you that every precaution will be taken to keep the fruits from becoming public property.

THE PRESIDENT'S ADDRESS.

Once more we have met together to render an account of our stewardship for the year, and in council to call from our various experiences such information as combined wisdom concludes to be important, as well as for the advancement of horticulture and the general benefit of our country. Nay, if we possess the true spirit of our profession, our aim will be to reach out to humanity with a desire to do good to our fellow man by upholding whatever store of knowledge we may have been able to extract from Nature's great storehouse of horticultural treasures. We are inspired into effort when we observe the good results of the labors of those who have gone before us; but still the field of research grows wider. The deeper we dig into the horticultural mine the clearer we see our own imperfections, and yet how keenly interest grows in the glorious study. There was a time when organizations such as ours were looked upon by an ungenerous public as a species of ring, working only for individual benefit; but with the spreading of interests, the dissemination of our discussions, and the unswerving persistence, generosity and honesty in principle of our pioneers in horticulture, to-day we find an appreciative audience. Other organizations with similar interests are working in full sympathy with us. Hand in hand we travel with our elder sister agriculture, and so interesting are the consultations we have had together that individual interest gives place to a feeling of duty to our country and interest in a general welfare.

But it is not enough that the agriculturist and horticulturist should foster an interest in our studies—the field is much wider and must include all kinds and conditions of humanity. But how shall we reach the masses? We must look to the rising generation, and in order to reach them we press for a place in common schools, that practical as well as theoretical horticulture may form a branch in the training of children. Our claim, too, is not based alone upon the money value to be reaped in after years from a knowledge of and interest in this subject; we aim higher and crave a hearing from our educational promoters as well as the public. Upon the grounds of morality and social purity in their widest sense, we appeal to a Christian people that in the early training of children the kindling of an interest in nature's charm and treasures will lead the young mind to deeper investigation, and through this channel be led to a contemplation of our great Creator. In itself the study is elevating, refining and pure; we do not see the rough element of the human family taking to flowers; even in the lower walks of life we find those whose tastes are centered in the garden or forest flowers. Find such a man and we see an enchanted home, a kind and loving husband and father, and one whose sympathies are good and pure, whose children will live to bless him. It cannot be looked

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upon, therefore, as unreasonable if we request a higher recognition at the hands of our Government in the best interest of our children, by insisting that the study of agriculture and horticulture be placed in the common school curriculum. By the present system our brightest boys are systematically educated away from interest in rural pursuits, so that now the chief industries of Canada lie languishing for the want of intelligent attention by an educated yeomanry, whereas professions of all kinds are crowded to excess. Everything is done to give prominence to the so-called "learned professions," which in itself is right enough; but why neglect entirely the foundation and backbone of all interests—the arts of agriculture and horticulture? Are they so degraded as to be beneath the ken of educated humanity? Surely it is a feeling long since dead that the tiller of the soil should be recognized as a sort of machine, a clodhopper, a necessary evil, one whose avocation should compel him to hold down the head and remain an outcast from cultivated society. The true aim of education is to fit the pupil for some sphere of usefulness. A grave responsibility rests upon our legislators for so long neglecting, from an educational point of view, this, the greatest economic science in our country, and until this study is placed, as it should be, prominently in our common school system, justice cannot be complete.

The season of 1889 will long be remembered by fruit growers. The unusual and widespread frosts of May, while vine, plant, bush and tree were in bloom, did its work of destruction so thoroughly that in most sections nothing was left to mature into fruit. In some favored sections the blossom was either not far enough advanced to kill, or the fruit formed and so beyond injury from such a degree of frost. Generally speaking the raspberry crop was fairly abundant, but other small fruits were in most sections less than half a crop. The grape escaped better along the Niagara peninsula, especially that portion between the lake and mountain range, and in the water fronts of Essex, than in any other section. Pears and plums yielded enough to satisfy home demand generally in the western part of the province; but the apple crop was confined chiefly to the counties of Kent, Essex, Elgin and Lambton. The loss of the apple crop to this province is a large one, but still we find some grains of comfort that we hope may encourage growers to persevere and put forth greater efforts in the future. While we feel the financial loss here, the consumers in foreign markets feel more keenly than we can the loss of this luxury which they have learned to appreciate more and more every year. Prices have advanced materially, and we observe that this season there is a much greater difference on British markets between prices of Canadian apples and the apples of other countries; that difference being in favor of ours. What fruit has been shipped is better culled and packed than in past years, and as a result our reputation for a genuine article is better. Then, again, there is a change working throughout British markets in favor of the best flavored fruit rather than highly-colored specimens. The Rhode Island Greening that a few years ago had to be sold at a loss, generally on account of color, is now coming into favor. It realises about the same price as the Baldwin this year, with a tendency, I believe, to take its proper place in public esteem several points ahead of the Baldwin; intrinsic worth is sure to come to the front. Is it not reasonable to expect that the codlin moth has been materially diminished by the absence of the apple crop, and that next year we may hope for much less damage by that orchard pest? This must not deter growers, however, from using means to eradicate the pest entirely. Orchards have had in most instances a much needed rest, and if we can arouse growers *now* to give proper attention to their orchards in the way of cultivation, manuring, trimming and keeping clean, it is reasonable to look forward to a new era in fruit culture. We have an opportunity now, bought dearly it is true, but if we take advantage of it the results will be most encouraging I am sure. To produce clean, large, high-flavored fruit, we must see to it that the soil is kept in good heart, that those substances required to produce such a crop are returned regularly and systematically to the soil. If this is attended to we will succeed; if not, failure stares us in the face.

The carrying companies are still to blame for much of the loss on fruits shipped. We can still charge them with rough handling, lack of proper accommodation, and often much delay in transit. The shipments of last spring bear abundant evidence of this. By

way of a practical illustration I will give one out of many instances coming directly under my own notice. A shipper at London, Ontario, sold two hundred barrels of choice apples to a firm in Covent Garden, London, England. This cargo I carefully inspected both before and after the fruit was packed, and I can testify to the fact that the fruit was choice in sample and varieties, and in splendid condition for shipping. Every possible precaution was taken, and the most positive instructions given to the Grand Trunk railway agent at London, Ontario, as to handling, accommodation and despatch, with a request also that these instructions should be sent forward to the agents of the ship. Mark the result: The goods were nearly a month on the way. I quote the report of the Covent Garden firm, Messrs. Pankhurst & Co.:

"When our man arrived at the ship a barge was alongside taking off the steaming dung quite a yard and a-half high on the deck, and immediately over the apples. Of course he knew what to expect, and sure enough when the apples came from below they were half full of juice. It astonishes us that the shipping company, in their own interest, are not more particular, as these were too full of water to go into the dock shed, but stood on the quay literally swimming in their own juice. We enclose a copy of claim we sent in to the company; also their reply." The claim referred to is made up thus:—

	£	s.	p.
Cost of apples	80	0	0
Freight on them	36	15	0
Dock dues	2	6	8
Making a total of	£119	1	8

The sales were

110 barrels, sold at 1/0	5	10	0	
30 " " 2/6	3	15	0	
10 " " 3/0	1	10	0	
10 " " 3/3	1	12	6	
40 " waste ...	..	..	..	
Total sales				£12 7 6
Leaving as loss the balance				£106 14 2

To this claim the Allan Brothers & Co. replied that they could not see why the ships should be held responsible, and could only attribute the loss to *natural decay!* It certainly was most natural that the fruit should decay under such circumstances. The Grand Trunk also denied all liability for negligence. Results similar to this are, I regret to know, but too common, especially where fruit goes forward on London boats from Montreal and New York.

I am glad to be able to report quite a different state of matters, so far as I have personal experience and have heard the same from others regarding shipments by the Beaver line of steamers. In three ships of this line special apartments, supplied with atmospheric blast, are used for fruit, and I understand they will not carry fruit at all excepting what they can thus accommodate. As a result I have not been able to trace any complaints against this line for bad handling or damaged fruit. On the contrary, all reports I have received have been most complimentary, and my own experience fully corroborates these reports. If other companies do not give equally good accommodation, shippers must, in their own interests, seek the channel where they are protected from loss. There is no reason why the other lines should not supply special cold chambers for fruits; indeed there is no encouragement to widen the orchard area unless such accommodation is supplied liberally. I am sure horticulturists throughout the Dominion will be pleased to know that a convention of horticulturists, experts from every province, has been called to meet in Ottawa in February, for the purpose of discussing the present situation, and advising possible means for a more perfect development of our interests. The Dominion Government has acted generously in appropriating a sum of money towards the expenses of this gathering, and a full programme of the subjects for discussion is being prepared under the direction of the Minister of Agriculture. I trust a large delegation from this province will be present.

It has been my privilege lately to examine a newly-patented fruit package known as the "Kerr Ventilated Barrel," specimens of which I have requested the owners to have at our meeeting. From a careful examination of this package I feel satisfied it

possesses several points of superiority over the ordinary barrel for the shipping of apples. The inventor has evidently followed the generally expressed desire for ventilation, and in this particular has succeeded beyond dispute. Time was when, although it was considered necessary to have perfect ventilation in the apartment where fruit was stored, either at home or in transit to market, it was looked upon as necessary to have the barrels containing such fruit as close as possible. It appears reasonable that if ventilation is valuable in the storing department, it must be equally valuable in the packages themselves, and experience has borne this out as a fact, providing the fruit is in proper condition for shipping at all. It is quite unnatural to confine the fruit from a circulation of pure air, and it cannot but be injurious to the fruit when air is confined in the barrel with it until it becomes foul. It is well-known that if we store fruit in an ice-house or pit it will keep well for a time, but so soon as it is exposed to the air decay sets rapidly in, whereas if such fruit had been stored in a more natural atmosphere it would keep longer and retain flavor more perfectly. With the Kerr barrel a packer cannot hide poor fruit so easily in the middle of the package as the sample can be seen from top to bottom through the openings between staves. It is also said to be lighter than the ordinary apple barrel which might make a slight saving in freight. From the method of construction it can be made any size to suit trade, and the cost will vary according to size. Being made entirely by machinery, I persume it can be placed on the market for something less than the ordinary barrel. The staves can be cut of such thickness as may be necessary to give sufficient strength to avoid material damage by pressure when piled in tiers in a vessel hold. It also seems to me that the damage caused ordinarily by the shunting of cars and running vessel shoots may be largely overcome with this barrel, as there is more "give" to it than in the ordinary barrel when striking upon the top or bottom edges. I believe a cargo of apples packed in these barrels, shipped in cars and vessel apartments well ventilated, should arrive in Britain in a perfect condition, and certainly the British broker could not truthfully return an account of sales classifying any as *wet*. A purchaser could see the sample fairly well without opening, and would naturally feel greater confidence in purchasing such fruits on sight. As this barrel can be made as easily with or without bilge, I feel anxious to have it tested in all forms, for after all there is nothing so convincing as actual test.

Members of this association will remember seeing some months ago the prospectus of the "Empire Produce Co." enclosed in the *Horticulturist*. The object of this company is to act as brokers and commission agents for the growers of fruit and general farm and dairy products, disposing of the same to the legitimate cash buyers who sell direct to consumers both in the markets of Canada and Britain.

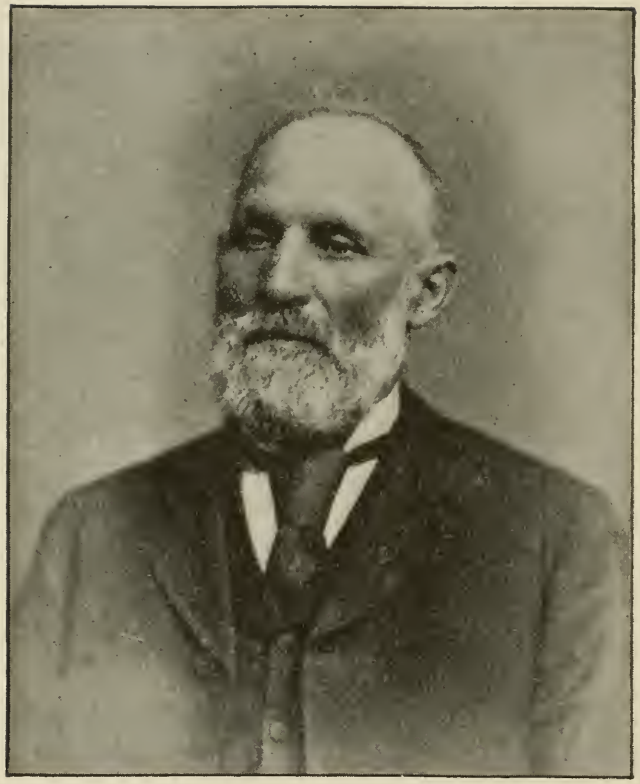
I think we are all agreed that it is unsatisfactory to consign goods to commission men who are also retail dealers or speculators. Self interests under such circumstances must clash with that of the client. We often hear complaints of bad returns, and insinuations that particular consignments of fruit must have been turned into the commission men's own stock instead of being sold in fair and open competition. Working under such a charter as this company has, no such doubts can exist. The company cannot buy a cent's worth on its own account. Its books will be audited and always open to prove the *bona fides* of returns. The precise mode of selling has not yet been decided upon, and I am authorized to ask for advice from this Association on this point, as well as other points that may occur to growers and shippers touching our interests. There is one important reform that this company will endeavor to bring about in time for next season's business, namely, the earlier daily arrival of fruit for sale in local city markets. It appears that the trade, particularly in Toronto, is greatly inconvenienced by uncertain and late arrival. The co-operation of both growers and dealers is invited to secure suitable railway and steamboat accommodation, so that goods may reach their destination at an early hour in the day. I desire members of this Association, as well as others interested, to speak out now plainly, and by advice to assist in placing this most important branch of trade upon a better footing than it has heretofore been. Personally, I have taken a deep interest in this scheme, believing that it is in the interest of producers, and that therefore it will prove to be a strong factor in advancing our industry by the obtain-

ing of prices in accordance with the brands, by assisting to regulate as well as to create brands, and by inspiring more confidence in the growers and shippers here, as well as the dealers and consumers in foreign markets. There is abundant room for such a company to work, also in opening out new markets and introducing into foreign markets fruits that at present are grown only for local markets.

Our Provincial Government has materially strengthened our hands by opening a place for our experts at farmer's institutes, where we are able to reach a class who otherwise paid little if any attention to fruits. If we can succeed in convincing fruit growers, large and small, that it is as necessary to produce the finest samples in order to make money as it is to breed the best animals, or clean thoroughly so as to bring to market the best sample of grain to command the highest prices, then we will have accomplished a great end. Probably few, if any, will deny this, but it seems difficult to get producers schooled up to that point where they will act in everything up to the "golden rule" in its strictest sense. It is an easy matter for a man dishonestly inclined to practice a fraud upon his customer by placing poor fruit in the bottom or middle of the package. It also often seems to be a difficult thing for a man who may have a deservedly good name for honesty in general business matters, to attempt to pack apples for fear the finest samples should rise to the top and inferior fruit settle into the heart of the package. But notwithstanding, every drawback advancement is the order of the day in horticultural circles.

Since our last annual meeting death has removed from our ranks one who often addressed us from the President's chair ; one whose devotion to practical horticulture was remarkable, and whose enthusiasm was inspiring, in language forcible, pure and practical, stern in good principle and Christain worth, and in example becoming his high calling. We mourn our loss in the death of the Rev. Robert Burnet.

ALEX. McD. ALLAN.



P. C. DEMPSEY,

President 1880-1882.

THE WINTER MEETING.

The Winter Meeting of the Ontario Fruit Growers' Association was held in the Court House, Hamilton, on Wednesday and Thursday, the 20th and 21st of February, 1889. The President, Mr. A. McD. Allan, called the meeting to order about ten o'clock a.m.

RUSSIAN FRUIT TREES, WHAT OF THEM?

The following paper was contributed to the Winter Meeting, at Hamilton, by Mr. D. W. Beadle, of St. Catharines:

Some few years ago the Fruit Growers' Association of Ontario became convinced that if our brethren of the "cold north" were ever to enjoy the pleasure of raising their own fruit, they must be supplied with trees much more hardy than those that formed the orchards of Southern Ontario. These had been planted by many who were anxious to have in their more northern homes the fruits that we here enjoy, but their labor ended only in disappointment. Our fruit trees were found to be unable to endure the severe cold of that climate. At the same time our brothers in Quebec, and our cousins in the north-western United States had become convinced of the same truth. The Government of the United States had undertaken to meet this need of their north-western states by importing scions from northern Russia, and this naturally turned attention to that country as a probable source from whence to obtain a race of fruit-bearing trees sufficiently hardy to flourish in our cold north-land. Mr. Chas. Gibb, an enthusiastic cultivator of fruits, residing at Abbotsford, Quebec, learning that Professor J. L. Budd, of the Agricultural College of the state of Iowa, intended visiting northern Russia for the purpose of ascertaining whether the fruit trees of that country were likely to supply the want of American north-land settlers, arranged with the professor to accompany him in his Russian tour. After his return, Mr. Gibb very generously communicated to the officers of this Association the information he had acquired during his visit to Russia; and they, being convinced that many of the Russian fruits would thrive in our cold sections, at once set about importing from north-eastern Russia those varieties which Messrs. Gibb and Budd had found yielding abundant fruit in a climate that, in both its summer heat and winter's cold, closely resembled that of our more northern latitudes.

From the importations made by our Association and those made by Professor Budd, and likewise the importation made by the United States Government, trees have been propagated and disseminated, and the inquiry now is, what is the result?

Are the Russian fruit trees proving to be what was expected? Do they endure the climate of the cold north-land of America, and do they bear fruit of such quality as to make them desirable?

Unfortunately the planting and care of these trees in Canada has not been conducted in such a manner nor for such a length of time as to enable me to point to results in our own northern regions. It becomes necessary, therefore, to draw upon the experiments that have been conducted at the stations of northern Iowa, and gather what information can be gleaned from planters in the Province of Quebec, and in northern Vermont just on the border of our sister Province.

First, then, let us look at the apples. The limits of such a paper will not admit of an exhaustive examination of the varieties that have been imported, and are being tried in various sections, even if I were competent for the task. I shall only venture to name a few, and chiefly those that give evidence of being worthy of attention from Canadian planters.

The Duchess of Oldenburg is already well and favorably known. The bare mention of this favorite autumn apple is sufficient.

The Yellow Transparent has also won for itself golden opinions. Mr. Simon Roy, of Berlin, writes to me that he wishes he had planted a dozen trees of it instead of two. Mr. Chas. Gibb speaking of it at a late meeting of the Montreal Horticultural Society, says that he expects it will be largely planted in the Province of Quebec because of the hardiness of the tree, its early and abundant bearing, the even size of the fruit, its fair quality and extreme earliness. At the same meeting Mr. John Craig said it needs no commendation, it is a favorite wherever tried. Dr. Hoskins residing in Northern Vermont near latitude 45, says the tree is productive, the fruit full medium in size, when dead ripe hardly inferior to Early Harvest, and always as smooth and fair as turned ivory.

The tree of the Hibernal variety is more hardy than the well-known Duchess of Oldenburg. The fruit is large, handsomely colored, ripening late in the autumn, and when grown far enough to the northward will keep until midwinter. In speaking of this apple together with Antonovka, Titovka and other Russian varieties, Mr. A. W. Sias, of Rochester, Minnesota, about latitude 45, says: "We are getting more large and fine fruit at the present time in Minnesota from trees of Russian origin than from all others."

Antonovka is perfectly hardy, has fruited in Northern Wisconsin and is described as resembling a very large Grimes Golden, only more oblong; and when ripe of a light golden color; ripens there in February and March.

Switzer is more hardy than the Fameuse or Snow apple; the fruit resembles the Snow apple in form and color, is juicy, tender in flesh, sub-acid, an excellent dessert apple. The late Chas. Downing said that it was a valuable fruit both for home use and for market.

Longfield has been fruited by Mr. Tuttle, of Northern Wisconsin, who says that the finding of this one variety is worth to him all the labor and expense he has had in testing Russian apples. Dr. Hoskins, of Vermont, mentions it among the fine dessert apples. It has fruited in my own grounds, for the tree bears young and abundantly. The apples were of good size, prettily colored and of good quality, ripening here in autumn.

Borovinka resembles the Duchess of Oldenburg in size, form and coloring, but is finer in flesh, less acid and better as an eating apple. Professor Budd says that the tree is a true Ironclad, and an early and abundant bearer. It ripens about a month later than the Oldenburg.

Saccharine has fruited in Iowa, and proved to be a very richly colored apple of medium size, exceedingly sweet and ripening in the latter part of September.

Enormous is very large in size, somewhat like the Alexander in form, and covered with red stripes. The tree is very hardy, and Professor Budd says the apple is surprisingly good for so large a fruit.

I will not weary you with a further description. These will suffice to show you that there is great variety among the Russian apples that have been imported and fruited in America, and that there is among them apples of excellent dessert quality, handsome in appearance, of large size, and extending over a long period in their time of ripening. The Hon. R. P. Speer, Director of the Iowa Experiment Station, had a bearing orchard of 1,500 trees, consisting mainly of Walbridge, Fameuse, Talman Sweet, St. Lawrence and Pewaukee. The winter of 1884–5 ruined it, so that there were no sound trees in it save the Whitney Crab, the Wealthy and the Russian trees. Such is his testimony to hardiness of these trees in an extremely cold and trying climate. Dr. Hoskins of Northern Vermont says that he has over a hundred varieties of Russian apples growing, many of them sixteen years planted, and that one thing has been demonstrated to his satisfaction, and that is that as a class these Russian apple trees are very much more hardy as against the winter's cold than those previously grown on this continent. Besides this he claims that in productiveness, size, and beauty they are more than a match for those varieties which we have received from Western Europe and those of our seedlings derived from them and quite as large a proportion of them that will rank as of dessert quality. Such is the testimony which we have with regard to the Russian apples, testimony from gentlemen whose statements and opinions command respect; and therefore it

seems to me that we are encouraged thereby to extend our planting of these Russian apple trees, in the firm persuasion that out of them we will eventually obtain varieties that will gladden the hearts and homes of the dwellers in our most extreme North-land.

Further, it is my conviction that we are also to obtain from this source no mean collection of pears that will thrive at least as far north as latitude 44. Professor Budd states that he found pear trees in Russia growing as street trees where the winters are so severe that the Duchess of Oldenburg will not endure the winter, and where the thermometer goes down, down to fifty below zero, and that with but scanty snowfall. Since his return he has imported scions of some of these, and having propagated and disseminated them, now gives us the results of his experiments. He says that Bessemianka, planted on dry soils and sufficiently deep to protect the tender seedling roots on which we are obliged to graft, is doing well so far north as the 44th parallel; that the fruit is of medium size, nearly seedless, tender in flesh, juicy, mildly sub-acid, almost buttery, and very satisfactory for dessert use. Ripe in September.

Gakovska, he thinks, will be hardy enough to plant as a street tree in North Iowa, having never heard of any injury to the trees by winter's cold or summer's heat. The fruit is large and handsome, valuable mainly for cooking, for which use he says it is not excelled.

Autumn Bergamont he ranks in hardiness with Bessemianka, says the fruit is small to medium, nearly sweet, very juicy, and good for dessert use.

In addition to these the Professor mentions Kriskaya Victorina, and Medviedevka as fine hardy trees that have not yet borne fruit in this country, but which are highly commended by Russian pomologists. The Early Bergamont, Flat Bergamont and Saccharine he says are fully as hardy as the Wealthy apple.

I cannot close without saying a few words about the Russian cherries. For our knowledge of these we are greatly indebted to Professor Budd. Although some of them have fruited with me, yet that fact is no evidence of their being sufficiently hardy either in tree or fruit-bud to be of value in those parts of the country where the Early Richmond and English Morello fail. From Professor Budd I learn that young cherry trees which he imported in the spring of 1883 have had very hard usage, having been fully exposed to the recent test summers and winters which literally killed out the trees, young and old, of the grade of hardiness of Early Richmond and English Morello, and have in addition been most unmercifully cut for scions in autumn and for buds in summer. Yet, notwithstanding this, many of them have proven to be as hardy in tree and fruit bud as the native wild plums, and although during the season of blooming in the spring of 1888, they were visited with severe frosts, yet twenty or more sorts fruited, some of them very heavily. I will name some of the varieties that he mentions, those that seem to me most worthy of our attention.

Professor Budd says that Late Amarelle trees from five to six feet in height were, this past season, bending with weight of the fruit; and that, notwithstanding the severe spring frost when in blossom. The fruit is medium to large in size, dark purple when ripe, which was about the 20th July.

Shadow Amarelle, so called from the mirror-like reflection from the shining skin, resembles the Late Amarelle in size, quality and season of fruit. The trees were also laden with cherries the past season.

King's Amarelle ripens with Early Richmond, has white flesh, juice slightly red when fully ripe, pit very small.

Orel is of the Vladimir family, of dwarf habit, coming into bearing when the trees are only from three to four feet high. Fruit larger than Montmorency, nearly black when ripe and very mild sub-acid flavor. I have no doubt but that this will be a valuable sort in our very cold north-land.

Bessarabian, fruit large, dark red, firm flesh, very mildly sub-acid when ripe. Tree exceedingly hardy.

Professor Budd says the Sklanka tree is as hardy as the Manitoba maple. Fruit large, flesh yellow, firm, very mildly and refreshingly sub-acid, pit very small, season of the Montmorency.

These are a few of the varieties which Professor Budd has found to be hardy, productive, and valuable. He advises that the cherry trees also be planted from four to

six inches deeper than they stood in the nursery, because of the tenderness of the mazzard or mahaleb stocks upon which we are as yet compelled to work them. When thus planted roots will be thrown out above the bud in two or three years, so that if the stock upon which it is worked should perish after that, its loss would not be material. He also advises heading the trees low, experience having been shown that sometimes the trunk will be seriously injured when exposed while the twigs show no discoloration whatever. In the Volga region the cherry is grown altogether in bush form, with several stems, like the currant or gooseberry. For nursery propagation the Professor advises most strongly root grafting the cherry, setting the grafts down to the top bud of the scion so as to favor the early emission of roots from the scion.

APPLE GROWING IN ONTARIO.

Mr. BEALL, of Lindsay, read the following paper: During the past ten years I have frequently endeavored to induce this Association to prepare a list of apple trees suitable for cultivation throughout the central and northern portions of this province. Such a list of varieties, if published in the annual report and corrected from year to year, or from time to time as might be required. thereby carrying with it the sanction and approval of the Fruit Grower's Association of Ontario, would be regarded by the public generally as a reliable list; something that could be depended on; and would do much towards giving intending purchasers of apple trees that information which is in greater requisition than any other, and hundreds of thousands of dollars might thereby anually be saved which is now paid for unsuitable stock forced on them by the peddlers; a class of gentry much more remarkable for the amount of "cheek" they possess, than for their knowledge of pomology—persons who profess to have all knowledge of the subject, but who generally know less what varieties would be suitable to the condition of the soil, climate and situation of any given locality than the intending purchaser.

My efforts in this direction were always met by the objection that the labor and expense of preparing such a list was too great for our Association to undertake at present. The necessity and desirability of the work proposed was generally admitted. I was therefore surprised to see in the *Canadian Horticulturalist* of October last, page 220, that the work which had been for so many years regarded as being too laborious and too expensive to be undertaken by the directorate had at last been completed and published. Now, although it was gratifying to find that the work I had so long advocated had been accomplished at last, I must say that the work as executed did not meet with my approbation, and I venture to assert, sir, that it does not meet your approbation or the approval of any other person in this hall. But, I may be mistaken. I will therefore read the list so that all may judge of its suitability to that portion of Ontario *north of Southern Ontario.**

"A List of Hardy Apples for the Cold North—For summer: Yellow Transparent, Tetofsky. For autumn: Duchess of Oldenburgh, Alexander, McMahon's White, St. Lawrence, Switzer. For winter: Wealthy, Scott's Winter, McIntosh Red, Fameuse, Bethel of Vermont."

Let us look for a moment at these varieties separately. For summer: 1st. "Yellow Transparent." A new apple, but little known. Spoken favorably of by many; I hope its present reputation may be established after a lengthened trial. 2nd. "Tetofsky." The most worthless apple ever introduced for cultivation in this province.

For autumn—1st. "Duchess of Oldenburgh." This is one of the best and most profitable of our early apples. But, is it an autumn variety? I prefer calling it a summer apple. 2nd "Alexander." Very good. 3rd. "McMahon's White." A new variety owned by Mr. A. L. Hatch, a nurseryman of Ithaca, Wisconsin. This apple

*By consulting the article referred to, it will be seen that the list was not intended for Central Ontario, but only for "The Cold North," by which we understand such parts as are subject to a temperature of 40° below zero. The list was prepared by a gentleman of ripe experiences in hardy fruits, Dr. Hoskins of Newport, Vt., and for the section of country for which it is intended we doubt if the list could be improved upon.—*Secretary.*

was admitted to the *trial* or second *class* list of the Wisconsin State Horticultural Society in 1885. It might be interesting to learn what means Dr. Hoskins of Vermont—the gentleman to whom we are indebted for the preparation of this list—took to ascertain the suitability of this variety to Central and Northern Ontario where the soil and the climate are so totally unlike that of Wisconsin.* 4th. "St. Lawrence." A first class apple, and, one worthy of more extensive cultivation. 5th. "Switzer." A variety but little known.

For winter—1st. "Wealthy." An apple that is, and probably will be, extensively cultivated for some time to come in this province, yet I think it ought not to be classed as a winter variety. It may be kept a little longer than the Fameuse but it loses its flavor earlier. 2nd. "Scott's Winter." A variety but little known in this country. 3rd. "McIntosh Red." A good apple where it can be grown, but one that has so many poor qualities when removed from where it originated that it is not likely to be used extensively. 4th. "Fameuse." A favorite everywhere, but should be classed as Downing classes it; an autumn apple. 5th. "Bethel of Vermont." An unknown variety here.

Of the twelve varieties named five or perhaps six are of first-class quality and can be as generally grown in *Southern* as in Central or Northern Ontario. The reasons why other varieties, of equal or greater excellence, such as the "The Baldwin, Greening and Northern Spy" should have been excluded from the list, and claimed as being suitable *only* for Southern Ontario cannot here be given.

That the apple growers of Southern Ontario have not a monopoly of the more excellent winter varieties, and that such varieties are not, as stated "wholly unfitted" to more northern localities is fully proven by the samples now on the tables, one of which, Northern Spy No. 2, was grown by James Endicott ten miles north of Lindsay, a district not noted for greater excellence of its fruit products than many other places much further north. The other Northern Spy, The Bellefleur; the large red apple, name unknown, was grown in my own orchard. The R. I. Greening by Jas. Emerson, South Mariposa, and the Russet by Mr. Taylor of the same place.

Mr. Croil reports many good varieties of apples grown in the Eastern Townships of Ontario. Mr. Wright of Renfrew reports good varieties in his district. Professor Saunders when visiting the Agricultural Show at Pembroke last autumn, noted many, "ten or twelve" excellent varieties of apples on the tables on that occasion, and saw abundant evidence to show that, with a little more knowledge and experience, many of the finer varieties may be successfully grown in that locality. In the neighborhood of Orillia and Barrie, and also of Collingwood and Owen Sound and other points along the shores of the Georgian Bay and Lake Huron, many of the finest fruits in the province are produced.

That apple growing is successful at these so called extreme northern portions of the province is only what should be reasonably expected when the soil and situation is considered, and especially so when the summer climate is compared with that of certain well known localities in Europe, where apple culture is successful.

The mean temperature of Berlin, about 600 miles further north than Toronto, for the three summer months is 64.5° Fah. Munich, about 300 miles further north than Toronto 63.6°. Paris, about 350 miles further north than Toronto 64.5°. Each place, it will be observed, has an average of mean summer temperature under 65°.

Now, if we trace the summer isotherm of 65° of mean temperature from Nova Scotia westward, we shall have a better idea of how far to the north apples may be successfully cultivated.

Starting from Halifax north lat. 44.40° it takes a course a little north of west across the Bay of Fundy and State of Maine to the north-east corner of Vermont, where it crosses the 45th parallel of north lat. and enters the Province of Quebec; then passing still more to the north crosses the St. Lawrence river at Montreal, and passes near, but a little south of the city of Ottawa, and soon after again touches the 45th parallel and continuing on that line through the English Land Company's settlement in the County of Haliburton, thence a little more northerly crossing the Georgian Bay and running length-

*Dr. Hoskins' experiments have been made in Northern Vermont.—*Secretary.*

wise of the Great Manitoulin Island, passing just south of the Sault Ste. Marie and along near the southern shore of Lake Superior, and from thence on through the state of Wisconsin, on its western course. The portion of Ontario south of this line contains a greater area suitable for fruit growing—apples, pears, plums and grapes—than can be found in the whole of Europe. Climate, however, depends as much on altitude as on latitude, and here again but little difference exists between the altitude of Europe and Ontario.

But the isothermal line of 65° of mean summer temperature does not mark the northern limit of apple culture. There is good reason to believe that apples may be grown where the sugar maple thrives, and certainly as far north as the northern limit of basswood growth ; an acquaintance of mine has a good bearing orchard several miles north of Sault Ste. Marie. The isotherm of 65° before referred to, passes through the Township of Minden, about 120 miles further north than Toronto, where the apples were grown which were referred to on page 13 of the *Canadian Horticulturist* for January last. Two years ago I exhibited seedling apples at our autumn meeting which had been grown *north* of Minden, which were as large and as well colored as the "Alexander." The town of Pembroke visited by Professor Saunders last autumn, where he found such excellent apples, is about 170 miles further north than the city of Toronto.

If a few varieties of apple trees can thus be grown so far north under the present system of obtaining supplies, when all scientific or expert knowledge is ignored, and when thoughtlessness and personal greed seems to be the guiding motives, what may be expected when more thoughtful, but simple and more common sense plans shall prevail? I believe the time is not far distant when most of our best varieties may be grown wherever basswood flourishes, which is about 100 miles north of the isothermal line mentioned, provided seedling trees be grown from seeds procured from apples from the nearest point where healthy trees exist; varieties need not be considered, healthiness of the tree from which the seeds are obtained must be the only standard. Seedling trees thus produced should be planted out in the ordinary orchard where they are to remain, when two years old, in thoroughly prepared soil, and top-grafted with the varieties required as soon as a good root growth is obtained. By such a plan no tree need be out of the ground for an hour. An orchard will be secured in this manner for less than one-tenth the cost incurred by the present absurd system of procuring budded or grafted trees six or eight feet high from nurseries situated from 100 to 200 miles south, and where the soil and climate are altogether different ; and especially when the trees have been out of the ground for six or seven months as is usually the case.

I venture once more to press upon this Association the necessity of preparing and publishing a list of apple trees suitable to the requirements of the principle apple-producing sections in Central and Northern Ontario. I do this because—as far as my experience goes—this information is required above every other thing in relation to this subject by the whole farming community. Publishing a list of varieties prepared by a gentleman of Vermont, who can have had but little practical knowledge of the requirements of this, the greater portion of Ontario, even when assisted by Wisconsin nurseryman, and especially when it contains so many absurdities, will not satisfy the farmers of Ontario who are taxed for the support of this Association and have a right to expect, and do claim the publication of such lists as are referred to, and also that they be prepared by the best practical talent at the command of this Association.

The following list of apples as suitable for growing in Central and Northern portions of cultivated Ontario, is submitted for the consideration of any person or committee which may be appointed by this Association to prepare such a list :

For summer : Red Astrachan, Yellow Transparent. For autumn : Duchess of Oldenburgh, St. Lawrence, Alexander, Fameuse, Haas, Colvert. For winter : Yellow Bellefleur, Ontario, Wealthy, Northern Spy, Golden Russet, Ben Davis, Canada Red, R. I. Greening. And the following I would recommend to farmers and others who wish to grow apples for their own family use only, viz. : Red Astrachan, Duchess of Oldenburgh, St. Lawrence, Colvert, Fameuse, Yellow Bellefleur, Ontario, Golden Russet. This list will furnish a continuous supply of apples from the middle of August to the middle of the following April.

The SECRETARY—I would take exception to the yellow Bellflower, both for market and home use. I have had most unsatisfactory experience for many years. It is a most unreliable bearer and you cannot depend on its form or size. It should not be commended, unless it grows better in northern Ontario than in southern Ontario.

Mr. A. MORRIS (Fonthill)—What the secretary says is true of the Niagara district; but north of lake Ontario it is one of the best apples that grows. Mr. Beall's list does not give enough winter varieties for the northern section. I would add Seek-no-further, Tolman Sweets, St. Lawrence, and I think the Mann would stand the climate as far as Lindsay; and for the extreme north the new rough apple called Anis, which grows in Russia six hundred miles further north than Quebec. It has fruited with us on small trees, and the quality and size resemble Rhode Island Greening. In regard to seedlings, the bulk of them that are grown from seed will be tender. There are only a few that are any hardier than the ordinary run of apples, so there is nothing to gain in growing them as hardy stock to top-graft. Another objection to them is that some are slow-growing, and if you graft a fast-growing top on that it never makes as good a fruit as a top-grafted or budded tree.

Mr. BEALL—A friend of mine had a yellow Bellflower in his orchard, and liked it very much. He top-grafted three other trees. Two of these trees—quite young—bore smaller apples; the third bore, and continues to bear apples more than double the size of the original or either of the other two. My opinion is that there was some influence from the stock. They have been ruled out at fairs as not being the same apple, although the scions came from the same tree.

Mr. P. C. DEMPSEY (Trenton)—The Cellini is a very superior, very productive, beautiful apple, and with me it is quite as hardy as the Duchess of Oldenburg. They mature in October, usually. I took a yellow Bellflower tree, sawed the top off, and put Ben Davis on, but the Davis was perfectly worthless, and I concluded that the Bellflower was no good to graft other varieties on; but the Bellflowers produced on the tree when the Ben Davis was growing on it were very superior and attained enormous size; so we sawed off the Ben Davis, and finally sawed down the tree. (Laughter.) Can anyone explain why this was the case? The Bellflower, in all places I have seen it growing, to all appearance will produce superior fruit one year, then for three or four years perfectly discouraging, then again give a nice crop. It is a poor apple—not a nice color, and does not open up in good shape. We want a red apple. The La Rue is found in the eastern portion of our Province. Many of them get as large as a large King, and very pretty indeed. I have never seen them growing, but you will find them in all the eastern exhibitions. I believe the best apple seedling cultivated to-day is the Trenton. (Hear, hear.) I have fruited it for six years, and have not seen one killed during the whole time. It is not a winter apple; it comes just a little ahead of the Snow. It is a seedling of the Golden Russet. It is prettier than the Snow. It is a delicious melting, crispy apple. It is destined to take a high place if it succeeds in other sections as well as in ours. There is only one nursery firm has it—the Beadle firm.

Mr. JOHN WATSON (Dixie)—I have been an apple raiser and buyer for twenty years, and can endorse all the secretary said about the Bellflower. You can't grow it on clay land. Wherever you get a good Bellflower it is on a warm sandy loam.

The SECRETARY—I have a sandy loam, and it does not succeed there.

Mr. CASTON (Craighurst)—In Simcoe county, particularly in the northern part of it, the Northern Spy is no use. You have to wait about sixteen years for fruit; and as soon as it begins to bear it begins to die. The Greening is no use at all in Simcoe. Seek-no-further does very well. It is a good keeper, but not much of a bearer. Tolman Sweet will keep as long as most of our apples except the Russet, and is as hardy as the Duchess. You can't get any variety for top-grafting better than the Tolman Sweet. The Alexander is generally classed as a fall apple. I think it will keep about as long as the Wealthy. It is one of the hardiest and best bearers we have in our section. Two years ago the St. Lawrence spotted so badly that it was of no use. They spoiled on the tree. They

were subject to the fungus spot, and very deeply cracked. It is a poor keeper. Its season is so short that it is almost worthless. The fewer fall varieties we plant the better—(hear, hear)—because the equinox generally makes enough "fall" apples without planting fall varieties. (Laughter.) The Wealthy is new in our section, but from what I have seen of it I class it very hardy—almost next to the Duchess and Tolman Sweet; it is an early bearer and the fruit does not incline to spot, but it is inclined to drop from the trees. The Scott's Winter seemed to do very well in our section. I recommend the American Golden Russet as the very best winter apple we have. It is the best bearer, and perfectly hardy.

Mr. Dempsey—What about the Ben Davis?

Mr. Caston—I lost most of mine in the winter of 1884-5, but with that exception it stood the climate very well. That was an exceptional winter. I find the Ben Davis grafted on seedlings produces wonderful specimens that are very good. Years ago, when the nurserymen first sent agents out, the King of Tompkins was very largely planted. I do not know of a single specimen now that is living in our neighborhood. Of course a few miles make a great difference in some parts of Ontario. A certain variety will thrive in the south end of the county of Simcoe that will not thrive in the north; and yet go a little further towards the north-west, close to the mountain near Meaford, and they can grow the peaches where we cannot grow the Rhode Island Greening. The Red Pound I would recommend for the older portions of Ontario. It bears young and regular, is not very subject to spots, keeps well till February or even March, good for eating, and for cooking cannot be beaten.

Mr. Dempsey—I believe the Red Pound, Baxter and La Rue are all the same apple.

Mr. Holden—I have the Red Pound and the Baxter in Barrie. There is a very great resemblance between the two. The Baxter inclines to spot badly with me. The Red Pound that I received from a friend near Barrie seemed to be a very clean and handsome apple. I think for that part of the country it ought to be a very hardy variety, which I don't think the Baxter is.

Mr. T. H. Race (Mitchell)—I have never found in the Colvert any quality to recommend it to farmers or any other class. Buyers coming into Perth county found two-thirds of the apples grown by the farmers were of this variety, and they would not touch them. They objected that they were poor keepers, and they had small spots early in the season. If the apple industry is to be profitable we must get the farmers to confine their varieties to two or three, or four or five, and only those that will stand shipping and will keep; and we will have to try to protect them from the nursery jobbers. The reason the Colvert is so common with us is that it is a free grower and is cheaper than almost any other that the jobbers can get hold of. They will go to the farmers and either recommend it, or sell them other varieties and put in this tree, and the farmer finds that instead of the apples he has ordered the great majority will turn out Colverts. The same might be said of the Tolman Sweet. I value that apple very highly; it is an excellent packer, but a free grower, and a handsome tree when young; and many farmers have been imposed on on that account. I know a dozen farmers that claim they did not order these trees, and that they have been imposed upon by nursery jobbers.

Mr. A. H. Pettit (Grimsby)—There is no demand for Tolman Sweet and Yellow Bellflower in our section, even if well grown. I don't think there is an apple for export that there is much more money in than the Colvert, if properly handled. They are clean and smooth, bear well—in fact, extra well—and always command a good price in the early markets in the Old Country—at least I have always found it so. The Northern Spy cannot be excelled in the southern portion of Ontario; and if our northern climate will just leave us with a few of these choice varieties I think we will grow them and make them very profitable. The King of Tompkins County we find very profitable in our section. It bears and grows very well.

Mr. Caston—The farther north an apple is grown the better it will be in quality, and the longer it will keep. I find a difference in the soil. Apples grown on a warm

sandy loam have a better flavor than those grown on a clay soil. The Duchess of Olden burg comes to greater perfection in Simcoe county, or any place far north. The farther north you can grow it the better. There is a variety that has not been mentioned—the Pewaukee. I cannot speak positively it regard to it, because it is young.

Mr. Dempsey—If I were going to grow extensively I would start the list with Duchess of Oldenburg; I have seen a greater amount of money taken from it than any other. Next to that is the Colvert. A man in our section sold $400 worth of Colverts from an acre; but he did not get that next year. It was an exceptional crop, and he handled them right, and sent them to the English market, and they brought a fancy price. I would not put the Colvert in my list for central Ontario; but for us I would plant Trenton next to Duchess to fill the gap, and you might depend upon a fancy price. I would then plant Fameuse and Wealthy—the two come in about together with us, and they both command good price. We got more money for Fameuse than any other variety this year. For winter we have nothing to compare with the Ben Davis, that we have tried to any great extent. The Pewaukee is as pretty as the King with us. It will produce two barrels to one King and fetch just as much. I don't think I could recommend any apple higher than the Pewaukee. I don't think there is much money in Golden Russets of late years. There is a lot of picking to the bushel, and with us the tree is liable to canker, gum-scald, and pass away something like the Northern Spy; still they are a hardier tree than the Spy. Any man that has pigs or cows cannot grow any fruit for them cheaper than Tolman Sweets. I don't object to them ground up in the hay. The Tolmans are also good for cider.

Dr. Burgess (Hamilton)—It seems to me the only practical plan that would be of benefit to growers of apples would be for this society to publish a list of apples suitable for each county. It would cost very little more than the other plan—drawing the data from actual growers in those counties, and if necessary draw a distinction between those grown for market and for home consumption.

The President—There is no such thing as a division of varieties for northern, central and southern Ontario. It is purely a local matter. If we are going to get a correct list we must go to each section and get the list from the actual growers in that section. You will find a difference in the growth and productiveness of fruits in a very few miles. It has always appeared to me as a purely local matter, and as a matter very largely of experiment in the different sections. You have not only to consider heat and cold, but there is the grower himself—how is he going to cultivate that land? What kind of soil is it? is it drained or undrained? and what is he himself as a fruit-grower? does he understand anything about it or does he not? If he understands fruit-growing, are his principles proper, and will he carry them out? It is a very difficult matter for any body of men to sit down and attempt to frame a list for any particular section, and I think the more the matter is discussed the clearer we will all see that. The Colvert is just an instance of this point. In some sections we find it very profitable, in others they think nothing of it. In my opinion it is not an apple that I would care to keep for my own use, or that is esteemed as a local apple; but for export it stands high; it comes in at a season when prices are usually fair to good: it is a good producer, and you can generally rely on a very good crop. The matter of selection by seedlings is one that I have always taken a good deal of interest in, and always felt like encouraging. In the Algoma district they are talking that matter up very strongly. Their idea is to get the seeds of the best varieties, and by planting those seeds produce apples for their own use. I visited an orchard of that description. They had about thirty trees in the orchard, and about twenty trees in the field bearing. The crop was a grand one. It was about eight miles from Sault Ste Marie. Some of them looked very superior. They were mostly late varieties of seedlings, whereas they had Northern Spy, American Golden Russet, Ben Davis. The trees themselves looked very well then; but as the orchardist himself told me, some of them would kill back a little in the winter. Some of them would escape; but he nipped the wood back towards the end of the growing season for the purpose of preserving. However, they seem to have great faith in the production of apples in a cold section like that from seedlings. The Yellow Bellflower I do not care to

grow in my section, because it is so very variable. Sometimes you would get very fine specimens, but as a general rule the crop is indifferent, and they bear so much on the tips the tree is after a while very much out of shape; but for sections where it will succeed, and other varieties will not, it is a good apple; and the best apple for sections of that sort is the apple that will succeed in all, independent of quality or flavor. If they cannot produce an apple of the highest flavor, if they can produce one of medium flavor, then that is the best for that section; there is no use in attempting anything else —you are losing time. I believe we have come down to a time when we must look at these matters as specialties, and grow those varieties in the various sections to the highest state of perfection.

Mr. Wellington (Toronto)—I understand this to be a discussion of varieties fitted for the central and northern portions of Canada. Now, while the Colvert and King, and certain other varieties that have been mentioned, may do well in the south, we should not drag them into this discussion at all, because a great many may think, from favorable remarks made, that they may be suitable for those sections. I would also protest against the list as furnished by Mr. Beall going out as being endorsed by this society. The fact of the Rhode Island Greening succeeding with one or two men near Lindsay is no data to go by to show that it is a hardy variety. We all know to the contrary, and if we allow that variety to stand in his list unchallenged, a great many people, taking our report, may plant a variety only to meet with misfortune. Many varieties named are very good, but there are other varieties that have been sufficiently tested that are better for northern sections. I do not speak of the south, where you can grow the Northern Spy, and the King, and the more tender varieties, but I speak of the central and northern sections. Your remarks I fully concur in regarding the selection of varieties for localities. It must be tested there, and we must go by the actual experience of certain sections. We want a list that will stand generally. We can give a list that have been tested and proved hardy. The Magog Redstreak, Scott's Winter, and Longfield and Anis are varieties that are certainly hardy. They are as hardy, if not hardier, than the Duchess, and that is the class we must recommend for the north, if we undertake to recommend. The Tetofsky Mr. Beall classes as worthless. I object to that. It is a valuable apple in the north. It is a good cooker, and is hardy. It will stand where the Red Astracan will not stand. For that reason it should not be set down as worthless. Yellow Transparent is certainly good, but the great trouble is that it will overbear, and unless thinned out it will disappoint on account of its size. That is the experience of those who have raised it. Dr. Hoskins, of Vermont, I consider an authority on hardy varieties. He has tested them as thoroughly as anyone living in a cold section, and the varieties I have named are varieties that he has thoroughly tested, and that he recommends. I have seen them tested, and seen the fruit from them grown in our own section, and I believe that they are very desirable varieties for the northern section.

The Secretary moved, seconded by A. M. Smith, that a committee be appointed by the chair to make out a list of desirable fruits for cultivation in each county in Ontario.

The President thought that committee would have a hard job. He thought the work could be done best by local men, who have had experience in the various townships.

The Secretary—I will not press the resolution.

Mr. A. H. Pettit—I suggest that it be divided into three sections—north-eastern, north-western, and southern Ontario, and that a committee be appointed to recommend four best varieties for summer, four best for autumn, and eight best for winter, and that they report at the next meeting. (Hear, hear.)

The President—That is in the right direction, but go a little further. I would suggest that this committee should frame a list, after taking evidence in the various counties as to the varieties. Confine the division to counties in the meantime, and perhaps after a while we can come down a little lower.

Mr. Morden—The county farmers' institutes could do something in the matter.

Mr. J. A. Morton (Wingham) then moved the following motion, seconded by Mr. Woolverton, that the matter of the preparation of lists of apples for cultivation in this province be referred to a committee consisting of the directorate.

BLACK HEART.

WHAT VARIETIES ARE MOST SUBJECT TO IT, AND HOW CAN IT BE PREVENTED?

Mr. Morris—The varieties most subject to it are those that are most tender. I have seen it in all varieties in different parts of the country. I account for it by a very severe winter, which freezes the sap in the trees, and when they get a little aged it turns black. I have seen whole nurseries ruined by trimming young trees in the winter time—cutting the limbs off close to the stem. That part freezes there, and kills the wood to the heart, and that will extend downwards the next summer. Perhaps the black sap will ooze out of that and run down the body of the tree, and the tree may be easily detected by the bark being dark from this sap.

Mr. E. Morden—All the farmers in our section are pruning in the winter, and I have not heard any complaint.

Mr. Morris—I don't think it would injure large trees much to cut off small limbs, but large limbs it would. I have noticed trees sent out by nurseries that have not been properly grown, quite brushy up the stem. That brush being cut off just before being sent out, the tree when planted by the farmer would not make much growth for a year or two, and the winter winds would turn that tree black-heart and kill it, although quite healthy when it left the nursery.

Mr Morden—Do they prune trees in winter in Perth or the Collingwood district?

The President—They generally, I think, in our section begin pruning in March.

Mr. Bartlett (London)—Pruning in winter caused destruction of a nursery in London of fifteen or twenty acres.

Mr. Morris—I was there when the men were trimming the trees. They had a fire in a shed to warm themselves by. I told the young man he was ruining his stock, but he laughed at me, said his father and grandfather had been nurserymen all their lives, and they knew. I visited that nursery the next fall, and found all the trees black-hearted.

Mr. Caston—Black-heart is not so likely in the Duchess of Oldenburg on account of the close wood. I found trees I pruned in February bled all the next summer, even though I tried grafting wax. Trees pruned in June never bleed.

Mr. Morton—There would not be the same tendency in thoroughly ripened wood that there would be in trees consisting of half-seasoned wood, because the amount of moisture is greater and the matured cells form a better conduit pipe for the sap.

The Secretary—I do not see any objection in southern Ontario to pruning in winter in mild weather, when the wood is not frozen if the wound is immediately protected in some way from the influences of the atmosphere. That is not so necessary in June, because it will grow over before the part becomes dried out.

Mr. Morris—In June the bark is very subject to become loose. You cannot step on a limb or put a ladder on a limb but what it will loosen the bark from the tree, and do a great deal of damage. That is the danger of June pruning.

HORTICULTURAL SPECIALTIES FOR THE CANADIAN FARMER.

The following paper on this subject was read by Mr. Woolverton, Secretary of the Association:—

This is an age of specialties. The time was in the history of our country when every farmer had of necesssity to be a "Jack-of-all-trades." He was an agriculturist in the broadest sense of the term. Every variety of produce that was needed, either for his family or for his stock, was grown in his own fields. He bought no fertilizers for his soil

but depended wholly for his supply upon the annual clearing of his barnyard, be the stock sufficient for his crops or insufficient. He was a horticulturist, giving high culture to a small garden near the house, in which grew both the vegetables for the kitchen and the flowers for the parlor table. He was an apiarist and kept several hives of bees to furnish his own table with honey, and occasionally to furnish a surplus for the market. He was a dairyman and a stock breeder, having always a comfortable supply of butter and milk for home uses, and as much for market as, united with the eggs from his poultry department, could be exchanged for the prints and ribbons necessary for the adornment of his wife and daughters. He was also a carpenter, and when a new barn was needed he hewed the timber, constructed the frame, shingled the roof, and completed the building. He was a wagon and sleigh maker, and many an hour of winter leisure was well spent in making a woodsleigh, or in repairing his wagon. He made his own ropes, he tanned his own cow-skins, he made his own brine and butter tubs, he patched his own boots, and he even ground his own flour. In short the Canadian farmer of a hundred years ago knew little of the advantages of division of labor, but found it absolutely necessary to know a little about all the branches of work.

But now the circumstances have wholly changed. We have advanced in wealth and in culture. Specialties rule. A man of to-day must be a devotee of one idea if he would succeed. The post-office is no longer combined with the grocery, and the shoemaker has removed his bench from the dry-goods store.

Agriculture is the wide word; horticulture the narrow one. The former refers to the field, to the broad acres devoted to grain or stock; the latter to the garden, with its fruits, its flowers and its vegetables. So extended, however, has the culture of these become in the more favored portions of Ontario, that the word horticulture has become in some parts almost co-extensive with that of agriculture, and several large sections of the country are competing with each other for the title of "The Garden of Canada."

The aim of the writer of this paper is to indicate the pathway to practical success for the agriculturist who wishes to take up some horticultural specialty, and to engage for profit more or less, according to his means, in the culture of some kind of fruit, flower or vegetable in addition to his ordinary round of farm work. This he may do judiciously and make it serve his best interests; and in like manner might the fruit grower do a certain amount of farming, and make it serve to advance the profits of his proper business. But it is by no means necessary that the fruit grower should be also a farmer, nor that the farmer should also be a fruit grower, any more than it is essential to his success that he be a shoemaker, or a blacksmith. The day is passed when a man can profitably engage in many lines. Each of the subdivisions named above has grown into a science. Books and papers innumerable, written by men of practical experience, are now published on stock breeding, bee culture, horticulture, etc. Men are finding out in this year of 1889 that they must make a special study of that line of avocation which they intend to pursue, or others will surely surpass them in it. It has now become just as necessary for the gardener or the fruit grower to be trained to his profession if he would succeed as it is for the doctor or for the lawyer. I do not mean that he should be trained by the study of books alone, but by the study of books and journals relating to his life work, united with constant daily practical experience, under the guidance, if possible, of one who is himself a professional. In this way only can a man hope speedily to gain the acquirements needed for success. If it is too late in life for a man to become thus equipped himself, by all means have the boys thus prepared for their life work. The plan of living out for a year or two with a gardener, or a fruit grower, a stock breeder, or if he can afford it, at such a place as the Ontario Agricultural College, until the young man has learned the best methods of doing each thing, cannot be too highly commended.

At all events the time has come when our Canadian farmers must leave the old ruts if they would prosper, and turn their attention and thoughts and study to some one special branch. I do not say that horticulture surpasses every other and that it is the most profitable of any, but to me it is a charming pursuit, and I have faith in it as a reliable source of income, providing it is pursued with the same determination as that which characterises men in other lines of business.

A good apple orchard pays the farmer. But, says one, I know a farmer right there at Grimsby who cut down a good apple orchard only last winter. True enough, but did you never know of a man giving up stock breeding or bee farming in disgust? There are always men to be found who grow impatient and give up, just at the point where they are within reach of success.

I do not think that we, as members of this Association, should go about the country advising farmers generally to plant out their farms to apple orchards, or even to plant large commercial orchards. The expense connected with raising a large apple orchard to bearing size is far greater than some people are willing to admit. A writer in *Popular Gardening* figures out very carefully on paper the cost and value of an apple orchard and makes out that one acre would bring $313.15 over expenses during the first ten years. He plants 100 trees per acre, and by seeding down to clover estimates his expense for cultivation during the ten years at about $10. He placed the cost of the annual pruning at 50 cents and the rent at $50 per annum, considering that three-quarters of the acre may be profitable cropped. Now if any one here has cleared $300 per acre from his apple orchard during the first ten years, I think he is a notable exception. My apple trees may be stubborn, but they seldom bear any fruit worth gathering before they reach the age of ten years, and my Northern Spy orchard is seventeen years old and it is only during the last two years that it has yielded me any returns worth speaking of. Baldwins and Greenings may, under exceptional circumstances, yield some returns within ten years, but even these varieties do not as a rule, and indeed should not, because for the first ten years after planting the orchard should be encouraged by frequent cultivation and manuring, to make as much wood as possible and not be expected to bear fruit. Neither do I think that we are wise, as members of this organisation, which holds so high a position in our land, and whose utterances are looked upon as worthy of public confidence, in following the habit of many who now-a-days picture only the bright side of fruit culture, giving glowing statements of its profits and concealing its losses. I am prepared to make free confession here to day of both sides with regard to my apples. I can show fancy figures received from my shipments as good as anybody's. I have here account sales of my apples sold in 1887 and 1888, from which you can see that my choice Gravenstein and Kings have sold in London, England, as high as $5 and $6 per barrel. And I can tell you of further fine sales that so encouraged me that last season I shipped my whole crop, some twelve hundred barrels, to that market; but the last sales took all the gilt off the season's business, for they reached the metropolis when the market was glutted and one car load was sold for the freight; another, containing russets and other prime varieties, sold so badly that a claim was made upon me from my English salesman of $35. The provoking part of all was that a week after mine were sold at $1.50 to $2, or about the amount of the charges, prices suddenly jumped to $3 and $4. Now I have no doubt many others here present can relate a story of similar unfortunate experiences. Mr. J. B. Osborne, of Beamsville, once shipped 1,300 barrels of apples to England and lost $1,300 on them; and a neighbor of mine, Mr. C. S. Nelles, shipped all his prime winter apples to London, England, last December, packing carefully and well, and might as well have tossed them over the bank in lake Ontario. Let us speak out, gentlemen, on these points. Confess our failures. Men in other lines of business do not talk constantly about their enormous profits, it would not be politic: and if we are found constantly magnifying the profits of fruit culture, we will be placing ourselves in a false position before the public; they will get the idea that we are nurserymen who have fruit trees to sell, instead of fruit growers who have fruit to sell.

But does all this discouragement frighten us out of our business? By no means; for while it is unwise to advise everyone to rush into apple culture for profit, the specialist would be a fool who would give up because of one or two season's failure. And I think also that the farmer who has a good orchard of fine varieties, just in bearing condition, and who is disgusted because of the difficulties and low price of apples, and who cuts down such an orchard and grubs it out for the purpose of devoting the ground to some farm crops, is assuredly "penny wise and pound foolish." He is throwing away invested capital and reducing the value of that land from $100 to $200 per acre. Why an apple

orchard of twenty years standing, of productive varieties, will surely average one hundred barrels per annum, and most farmers can sell these at home at $1 per barrel for the fruit. What else would yield that sum? This is not more than the acre should produce when you consider the time and expense that has been put upon that orchard to bring it to its present condition.

But many will say, "My apple orchard does not yield that amount of fruit." No, probably not; unless you are making it a specialty. Nothing pays, now-a-days, without special care. An apple orchard, *neglected*, certainly does not pay. How could it yield crop after crop without culture, without manure, and withal, receiving in place of judicious pruning, an annual butchering with the saw and the axe. Would any crop pay under similar treatment?

The apple needs potash. It is year after year extracting this element from the ground, and, if you do not supply, and other fertilizers besides, such as phosphoric acid, nitrates and lime, according to the requirements of the soil, the orchard will soon cease to bear fruit in any quantity, or of any degree of excellence. One-half of our Canadian orchards are starving to death. No farmer would expect a good crop of wheat or potatoes, without the use of manure; why then does he expect fine apples without it, and cut down his trees because, neglected, they will not do what no other crop could do? Do you advise cultivating an apple orchard? asked some one. You may as well ask a farmer "Do you advise cultivating your corn crop? Unless your orchard is vigorous and presents a healthy dark green foliage, by all means work it up, plowing the ground shallow so as to disturb the roots as little as possible, sowing to buckwheat, or keep the ground cultivated any way until you have developed a good healthy growth of the trees. Then you may seed down for a few years at a time. The orchard must have special care, and if a man has not time to give it special care, he may as well be rid of it. Insects must be fought. Large numbers of orchards in this Niagara peninsula are infested with the oyster-shell bark louse, an insect so small that it passes unnoticed; it hides itself under its shell, and there seeks the health and fruitfulness out of the trees. The writer has experimented with soapsods, kerosene, caustic soda, washing soda. The latter is the most economical. A strong solution may be made in a barrel, and about the first of June the trunks and as much more of the trees as appears to be affected, must be thoroughly washed with the solution at which time the insects are almost microscopic in size, not yet covered by the scale, and are very easily destroyed.

The Codling moth must be fought, and conquered with Paris green, hence this insect will destroy one-third of the finest of the crop; and the Canker worm may be destroyed with the same preparation. The mice must be guarded against every fall and winter, the tent caterpillar must be hunted out and diligently destroyed, and many other important precautions thoughtfully attended to.

And after all, when at last a bountiful crop rewards such patient labor, the same careful attention must be paid to the matter of gathering and marketing, or else all previous industry will lose its reward. Eternal vigilance is the price of success. It pays to use a good ladder, and a swing handle basket with a hook attached, and to gather every good apple with a gentle grasp of the hand, taking care that not even finger marks shall show upon the fruit when housed. It pays to spend time enough over the packing to look at every single apple and to properly assort them into at least three grades. It pays to pack carefully the finest in clean new barrels, lining head and tail end with white paper, and then the grower may hopefully consign his crop to some honorable and responsible salesman. But failing in all this careful attention, is it any wonder that many of our farmers, who find poor sale for the scrubby products of an uncared for orchard, should declare apple culture unprofitable.

I should include, among my remarks on apple culture, the importance of a judicious selection of varieties. The Early Harvest, the Fall Pippin, the Rambo, and the Snow, are subject to the spot. The Spitzenburg no longer produce a crop with any certainty; therefore discard these varieties in southern Ontario and plant Yellow Transparent, Red

Astracan, Duchess of Oldenburg, Gravenstein, Cranberry Pippin, Baldwin, Spy, King, Roxbury and Golden Russets. Such varieties as these will pay for the most careful attention, and not prove a source of disappointment as the other varieties have done of late in so many instances.

Strawberry culture frequently pays the agriculturist, but not unless he has the time and the means to give it more than ordinary attention. Many a man has already more irons in the fire than he can attend to, and he will surely get burned with one of them, if not with several. But, given the conditions necessary, and success will surely follow. They are such as, a good rich loam soil; plenty of nitrogenous manure from the barnyard in the autumn—the late Mr. E. P. Roe advised 60 tons per acre; a mulch of straw in December as soon as the ground is frozen; constant cultivation all summer, both before and after fruiting season; and careful gathering and marketing. Now if any agriculturist is prepared to make a specialty of strawberry culture in this way, let him try the Crescent, the Wilson, and the Sharpless, and go to work with confidence, and he will succeed. Four and five thousand quarts per acre are reported as among the possibilities, especially with Crescents fertilized with Captain Jack.

The same advice may be given with reference to the culture of raspberries and blackberries. Grown as many people grow them, without sufficient cultivation, without manure, without pruning, they cost more than they come to. Any specialty which the agriculturist undertakes beyond what he has time, money, and knowledge to care for in the best manner, will prove an eyesore to him, and a certain loss. The berry patch, of which one-half the produce is thistles, and which is inseparable on account of numerous unpruned straggling branches is a disgrace; but our experience is that where a plantation of Cuthbert red, or Gregg black raspberries, or Kittatinny blackberries, has received proper treatment and attention, there is money in them, even at the low prices lately prevailing. The day is passed when we could get from 17 to 23 cents per quart for our large Kittatinny berries, and from 15 to 20 cents for red raspberries. A fortune might have been made out of them in those days; but even now good returns may be counted upon by giving them careful and thorough culture.

A fine specialty in the horticultural line is the currant. "Bah," says some one, "the worm! it will destroy the bushes." My friend, that is one reason for planting them freely—you will have less competition. Plant an acre of such varieties as the Cherry and Fay's Prolific, on good rich clay loam well drained; give them the best of cultivation and manure as you would for a good crop of potatoes; prune back in spring one-third of the last year's growth to induce branching, and to keep the stems stocky; give a good sprinkling of hellebore and water whenever the currant worm appears; and ship your crop to market in twelve-quart baskets or strawberry crates, and you will succeed.

In short, our country has advanced beyond the time when it pays to be a Jack-of-all-trades. Our agricultural friends must now be specialists—they must in short be professionals in the lines they pursue. Division of labor must be more and more the habit of the age among our farmers. The rule must be, not to follow in the line of one's neighbor, and do just what he does, so that when one man devotes his attention to some specialty, every other man in the section rushes into the same thing until there is a surplus of that article, and no profit in it; but on the other hand, to chose each a separate line of his own, and to persevere in it. Let him make a study of his subject, reading those books and magazines which treat of it, talking with those who have experience, and in this way let him pursue with confidence his chosen line of work.

Thus, I am convinced, shall days of greater prosperity dawn upon our agricultural community, and less hardship result to our country at large from a general failure of any one department of industry.

On assembling in the afternoon, the question box was opened and the following subjects considered, viz.:

A NEW FUNGUS.

Q—Has any member present noticed a disease in the suckers of the Northern Spy?

Mr. A. W. Peart (Nelson)—I have just cut off some suckers that were covered with blisters—like spots of yellowish tint. Later on they seem to take on a darker color, more like the wood. [Mr. Peart produced the suckers].

PLANTING PEARS.

Q—Would it be wise to plant pears on a gravel loam rich and abundant in organic matter, with a sub-soil also of gravel containing large quantities of soil to a depth varying from five to eleven feet, based in the first place upon rock and next upon clay? The field does not require even surface drainage. If not wise, why?

Mr. Dempsey—There are pears that succeed in such soil. It is necessary that we should grow them and cut the top root; but by thoroughly manuring them we have succeeded. This year we have succeeded with Beurre Hardy. We grow very nice Bartletts on soil like that. It does not do for us to neglect the manure every year, and thorough cultivation; and we want to be very cautious about the roots going too far down.

Prof. Saunders—I have had experience with both kinds of soil, and I found that pears planted on lighter soil—not as good as described in the question—had less blight than those on the heavier soil, and I thought they did as well as regards fruiting. That disease which Mr. Peart has brought specimens of is something quite new to me. It is evidently a fungus growth, and in cutting through one of the black spots it is clearly to be seen that the ramifications of the fungus in striking into the substance of the bark has caused the death of the bark immediately under where the spot occurs, and that the older spots have under them the previously healthy bark completely withered and perished. If such a disease as that were to be very prevalent on any of our trees it would certainly seriously interfere with their growth and productiveness; because trees with the bark so injured, and with so many dead spots as these twigs have, would not be able to carry on their functions properly and mature their fruit. I know nothing about the disease, and could not suggest any remedy. I would be happy to take samples with me.

Mr. Peart—The other apples in the orchard are not affected in this way at all. In my neighbors' orchards I found some places diseased, but not to any great extent.

The President—Has it been confined to the one variety in your orchard?

Mr. Peart—I can say that, and the trees themselves are healthy, vigorous trees; it does not seem to affect them.

COLD STORAGE.

Q—Is the cold storage of fruit and vegetables fully worked? How is the temperature best regulated in the storehouse?

The Secretary—Very little experience has been had in cold storage in Ontario. It is done a good deal in the United States, and I believe there is a process by the use of anhydrous ammonia, by which cold storage is better effected than by any other means yet tried.

Mr. Rice (Port Huron, Mich.)—In Wayne county, N. Y., they practice it a good deal, and they do not approve of ice in the cold storage of apples. The idea seems to be to put your apples in a shed and keep them as cool as possible, and have it arranged to admit the cold air at night. If it is too cool, shut it off. They prefer about 28 to 30 degrees if they can keep it at that point.

Mr. Dempsey—I have known Flemish Beauty pears kept perfectly till Christmas in an ice apartment formed with boards in an ordinary cellar; but when parties opened the

door connected with the furnace room all were spoiled. We have had no difficulty in keeping fruits any length of time, but they perished as soon as we took them out; so we abandoned keeping with ice. A gentleman in Michigan, named Baldwin, succeeded in keeping Duchess of Oldenburg apples nicely till July in a building above ground, sawdust walls, a confined air chamber between the two sawdust walls, or one might be a paper wall. When sawdust was difficult to get he used straw only much thicker. He had treble doors and windows, which he would throw open on opposite sides of the building on cold nights, and reduce the temperature to 25 degrees if possible, and then he closed the doors and depended on the cold air remaining, by having the apartment as perfectly sealed as possible. A temperature of 40 degrees he told me was quite sufficient so long as it was even.

Mr. Gouinlock—We opened thirty barrels last week and they are keeping very well, in D. D. Wilson's ice storehouse where he keeps his eggs. Two years ago my son-in-law kept six hundred barrels till spring, and only lost twelve barrels. We have some there now and they seem to be keeping well.

The President—Where there is ice storage the fruit seems to decay very rapidly when it is taken out of that storage.

Mr. A. M. Smith (St. Catharines)—At the horticultural meeting in Rochester, N. Y., a short time ago, this matter was discussed, and a building was described such as Mr. Dempsey mentions; and from those buildings, leading out underground some eight or ten feet, either on to a side hill or into the wall, were some six or eight inch pipe to let the air in, after being reduced to the natural temperature of earth; and then there were ventilators to let it out or to create a draft, if necessary, to draw it in, and these could be shut off or opened. Fruit can be kept in that way nearly as well as on ice, and it did not perish as quickly when exposed to the air.

Mr. Rice—The objection to that is that the sawdust produces dry rot in the building, and our people prefer to use paper and make separate air chambers. Then the draft through the ground does not give sufficient cold, so that whenever the nights are colder than the air would be coming through the ground, it is better to open the doors to give ventilation. Forty-eight degrees is the degree they get by the air coming through the ground; and then the pipes were not considered large enough for giving sufficient ventilation.

Prof. Saunders—At a recent meeting in Wolfville a number of samples were brought which showed that a fungus or black growth had developed at a furious rate on apples after they had been barreled in a cellar. It was due no doubt to the presence of moisture, with a sufficiently high temperature to promote fungus growing. Apples shipped from Nova Scotia this year have been returned as almost absolutely worthless, because the spots have grown to such an extent that they have been disfigured so as to be unmarketable; and in connection with this apple spot or fungus another mould has shown itself so as to make the apple more unsightly.

Mr. A. M. Smith—We frequently found in packing among Snow apples and sometimes Northern Spies, that the spots were enlarging, and another fungus made its appearance in the form of a white mould, and the apples soon decayed.

Mr. Alexander (Hamilton)—I had some Pippins affected in the way Prof. Saunders speaks of—each apple having a dozen or score of black spots. The cellar was perfectly dry, but I put it down to the high temperature—50 degrees sometimes.

The Secretary—If the apple-spot spreads after the fruit is packed, it is very important for us to know it, so that we may the more carefully keep out the affected ones. I had not thought of the possibility of sound apples being affected after they were put away, but I have seen it said within a few days, by a scientist, that the spores of this fungus would germinate and spread the disease, even after the fruit is packed away in the cellar.

Prof. Saunders—In Nova Scotia a gentleman brought samples of apples that had been binned and barreled, and you could see very small spots on those that had been

kept in bins; and on those that had been kept in barrels these spots appeared greatly enlarged. It seemed to be a development of the fungus growth that had begun in the apple—the spots not being any larger than pin-heads, or perhaps not as large as that. I think this difficulty could be got over by fruit growers putting their apples either in barrels or bins under the effect of sulphurous acid gas, which could be made very easily in the cellar, and that would permeate and kill the fungus that was on the apple, and I think prevent the spreading of it. It is a remedy so easily applied that any one could try it.

Mr. MORTON—Have you any data whereby you could fix the temperature at which the fungus would not grow?

Prof. SAUNDERS—No.

THE BAKER GERMAN PRUNE.

Q—Does any member know anything of a plum or prune called the Baker, said to be successfully grown near Collingwood?

The SECRETARY—At our meeting last July at Collingwood we found we were in a great plum country, and this plum was shown to us. It is simply a variety of the German prune which has been propagated from seed, and is grown very largely in that vicinity, and they consider it one of the best prunes that they have met with. It was highly commended and noticed in our report, but I do not think any of our nurserymen have propagated it.

The PRESIDENT—There was some fruit of it sent, after ripening, to me, and the quality was superior to the German prune. Growers told us that they make more money out of that local plum than anything else on the list that they have, and they have most of our varieties.

NORTHERN OR SOUTHERN GROWN TREES.

Q—Is the climate of New York better for raising nursery stock than Ontario, to such an extent that many Canadian nurserymen really import what they are selling? Are such imported trees as long-lived as native growers?

Mr. MORRIS—I claim that the climate of Niagara peninsula is fully as good for raising nursery stock as New York state: and nurserymen of Niagara district grow the bulk of what they sell. There is no nurseryman in Canada or the States that can grow all they sell, because they will run short in some varieties. The fashions change. There will be a run on a certain class of plants in four years that they are not expected to meet, and no matter how extensive the nursery they will have to buy to keep the assortment up.

Mr. MORDEN—There is a good deal of quackery in this matter. There is an idea abroad that it makes a vast difference as to the particular climate in which a tree is raised. My idea is that you get the best article from the place that is best suited to produce it—it may be north, and it may be south. As a general rule, it is safe to get our stock in the same latitude as we wish to plant in. Sometimes we can get a better article grown south of us than any where else.

Prof. SAUNDERS—Mr. Morden's doctrine may be safe for Niagara peninsula, but I think outside of that it would not be. Where climatic influences are unfavorable, it is very important that we get trees, grown from similar climates; and if you take them north you want to get the trees grown as far north as possible; and therefore Canadian-grown trees are very much better for the northern section of this Province than those that come from as far south as Rochester, although it may be admitted that trees may be grown easier there—grown with less cost to the nurseryman, where the climate and soil are favorable to that growth; but to argue that we should go where the trees grow best for the tree that we want to grow best, is an argument that would not stand. For the Ottawa district the trees that grow best are the trees that have grown as far north as we can get them.

Mr. MORRIS—To make healthy trees they must be grown while they are small, in a mild climate. Niagara peninsula is particularly adapted for nurseries on that account. I have known nurseries started north of London failures nearly every time, from the trees becoming all black-hearted while they are young.

Mr. RICE—In Michigan we cannot grow apple trees when they are young without getting them black-hearted, even as far south as Toledo, but we go down to Rochester and get good healthy trees, and we can raise good orchards.

The SECRETARY—I got a 1,000 trees from Xenia, Ohio, once, and planted them in Niagara district, and only about one-tenth grew well; but they were entirely different from the Ontario trees. They were a long, succulent growth, and far more tender than those from our own raising.

Q. Do not nurserymen represent that their stock is home grown when they are really imported?

Mr. MORTON—No.

The PRESIDENT—We might talk all the afternoon about this subject. It is not supposed that travelling agents are all honest. They are like the rest of humanity, and while I like to indulge in a little healthy abuse of a tree agent now and then, I have a good deal of sympathy for them, because if it were not for them we would not be as advanced in the science of horticulture as we are. (Hear, hear.) They have introduced varieties into different sections that we never would have known anything about otherwise. As far as we have discovered, there is no respectable nurseryman that desires to misrepresent, but these things will occur sometimes.

FORESTRY.

The following paper, contributed by I. C. Chapais, St. Denis, Quebec, was read:—

In our Dominion of Canada some boldness is necessary to speak of forest preservation and restoration. In vain we show that countries once covered with forests as luxuriant as ours are now suffering for want of firewood and timber; the settler who has yet his axe in hand to fell the trees growing on the piece of land he intends to sow, answers us with a sneer. For him the tree is still an enemy, and you cannot make him believe that a day may come when he will regret having treated it too long as such. On the other hand, the lumber merchant who owns forest limits apparently inexhausible, wants to make a fortune as quickly as he can, and turns a deaf ear to economists who try to make him take forethought for the coming generation.

And yet many districts covered with forests thirty years ago contain now no more firewood nor timber. Very often even agriculture has derived no benefit whatever from a clearing of the trees so foolishly made, because it was made on land quite unfit for cultivation now that the beneficial influence of the ashes of the wood burnt during the clearing is no more available. I know whole regions which were cleared in that way by settlers who had to desert the land soon after, because it was worth nothing. Such districts would have been as many inexhaustible wood reserves for future generations, who during an almost endless period of time would find on them all the wood they want. To-day these same districts are quite useless in every respect.

As I am invited to set forth before you to-day my ideas on the forestry question I beg you to allow me to express the opinion that if we wish to be listened to by the farmer who is always prejudiced against ideas quite new to him, we must, for the present, speak only of what is the least apt to run counter to his prejudices. If this is admitted I think we must specially insist on what follows:

Let us request our Governments to give directions to their land surveyors chosen to fix the boundaries of the new townships opened every year to colonisation to point out with precision in their reports the regions unfit for agriculture, in order that they never be granted for agricultural purposes.

Let us further urge that the wood reserves thus created, as well as the forest limits e n ted for the manufacture of timber, be protected against a systematical and complete devastation to which they are subjected by too greedy limit owners, and against fire. Forests can be protected against the aforesaid devastation by enacting regulations to prevent the useless destruction of young trees and the ill-timed felling of trees not having yet reached their full growths. As to protection against fire, the most effectual would be the promulgation of a regulation to compel woodmen to free the land from boughs, chips, shavings, branches, and other wastage, which tend to increase in a very large proportion the number of bush fires. I know that this proposal will be called an impossibility, specially by woodmen; but "the word impossible does not belong to the French language," said a famous French general, and I don't think it belongs any more to the English language.

As to the question of replanting in places where the forest has been destroyed blindly, it is still more difficult to interest the farmer about it than it is to speak to him of forest preservation and protection. His forestry education is yet too superficial to make him apt to understand that there is not only a benefit, but that it is a necessity to replant in denuded regions. In vain we mention the fact that there are foreign countries where, by the complete clearing of mountain slopes, fearful periodical floods are caused, which put under the obligation of being banked up the towns situated on the banks of rivers taking their rise on these slopes to prevent them from being overflowed. Such is the case for many towns situated on the river Loire, in France. We begin even to see the same occurrence in our own country. The river St. Lawrence is now subject to much more considerable floods than it was formerly, and we have to-day the sight of the town of Montreal protected by a dike, the same as the towns of France; yet for us this is only the beginning. But all that is insufficient to convince the farmer that replanting is necessary.

Nevertheless, replanting is necessary. As I just said, the farmer egotistically says that he won't plant trees, the shade of which he will not enjoy. A good farmer told me once: "You want me to plant trees; I am not green; I would be dead a long time before the trees that I would plant now would be large enough to shade my grave." Vainly I tried to convince him that he was young enough to enjoy the fruit of his toil; that trees grow quicker than it is generally believed. None so deaf as those who won't hear. Happily, there is another way of restoring forests, besides the mode of replanting which is so repugnant to the farmer. Almost always in the regions deprived of wood it is an easy matter to bring the land to produce by itself a good growth of trees. It is what I would call the natural restoration of forests, and please allow me to quote here a short part of a chapter I wrote on this subject four years ago in my book, *The Canadian Forester's Illustrated Guide.*

Extensive districts, long cleared of their forest growth, frequently cover themselves again with wood, if care is taken to aid nature in her operations. Generally speaking, plains and damp marshes, where a few wretched stunted trees show themselves here and there, are susceptible of this treatment. Drainage, by means of deep open ditches, of sufficient frequency to admit of the tree growing, if not of perfectly drying the land, is the only thing necessary. The moment that this has been done a multitude of little trees will spring up, which were only waiting for this amelioration to show themselves, and the new growth is usually so prolific and so rapid that we should be inclined to call it spontaneous, did we not know how long seeds would lie dormant in the ground, until all things necessary for their growth were present. The same thing occurs on certain hill-sides, where, protection being afforded against the teeth and hoofs of cattle, their hoary heads soon become crowned with a wreath of luxuriant verdure.

I must state that to-day this natural restoration is well understood by our farmers, and I can prove it by an example. The tourist who travels by the Intercolonial Railway from Quebec down to Rimouski, in the Province of Quebec, goes through a region of one hundred and eighty miles which forty years ago was far the greatest part in forest. This forest has been felled, burnt, and has made place to numerous settlements. But the land forming the slope of the mountain's range at the bottom of which runs the railroad, right through the aforesaid region, having been found unfit for cultivation, has been left by itself to make a second growth of wood. The new trees have been thinned, well taken care of, kept uninjured from the teeth and feet of animals, and now, from Quebec to Rimouski, if you travel through that region during the month of April, you will hear

everywhere the gay French songs of *A la claire Fontaine*, *En Roulant ma boule*, and *Vive la Canadienne* sung to the top of his voice by the young farmer making sugar in the fine maple bushes grown on the land once wrongfully deprived of its trees by his father.

I dwelt, perhaps, too much on my subject, but I will offer as an excuse that it is so wide and so attractive that I always find it difficult to be concise when I treat it. I hope, however, that I have not been too annoying.

FORESTRY ABROAD AND AT HOME.

Mr. R. W. Phipps, Clerk of Forestry for Ontario, addressed the convention as follows: I have no doubt that you all who are so much interested in fruit growing are to a certain extent interested in general tree growing, which is a matter very similar, and which has a great bearing on the other. We will go for a moment into the consideration of first principles in this matter, and we will look at what have been the effects in other countries—for there is very little use in general speculation without we have some facts to go on. We find that in the Old World the whole basin of the Mediterranean, the countries bordering thereon—Syria, Palestine, and all those ancient countries which formerly produced such magnificent armies, which flourished so greatly—we find them to-day to a very great extent a desert. We ask the reason why principalities which formerly poured forth their legions could not produce a company. It is a waste of sand. It is a desert. We find but one reason, and that is, these countries have stripped the land of the forests which formerly in every direction embowered the soil. Nobody would make any objection to a proper clearing of forest, for farms are as necessary to us as anything else; but in these examples which I am quoting they have cleared too much. They have cleared not only the arable land, fruitful for food, but they have cleared the side of the mountain; they have cleared the useless swamp; they have cleared the rocky precipice, which might well have been left in the trees with which nature planted it, and which would forever, with their natural habits of reproduction, have continued themselves in strength and beauty. Had this been allowed, had the useless parts of the land—useless except for forest—been allowed to perpetuate themselves in forest, the fruitful soil would never have lost its fruitfulness, and never have ceased to yield its proper return. We find the contrary. We find in this country, where all has been cleared, that a very great proportion now is desolate and yields no longer that return which formerly it did. It yields no more the men, the oxen, the wheat, the great ships, the armies, the navies—nothing is there.

Now, applying the principles of science to this, we find the reason: that the tree, that the forest, that the grove, is necessary to give us the proper returns of the summer rain, of the spring showers, of the gentle influence of moisture over the land. To examine more minutely into this, perhaps we will spend a few minutes in considering the manner in which the tree joins with the atmosphere above in producing and perpetuating rain at the time when it is needed. I would ask you to consider with me, the moment that the tree draws its nourishment from the roots, and partly from the atmosphere, that that nourishment brought up from the roots is carried up by the very large amount of water which passes up to the leaves; that this nourishment is there joined to the nourishment the atmosphere affords, and then the food for the tree passes back to where it is needed, while the water which carried it up, which is the vehicle, passes away from the leaves—very little water going down to the roots again. From this cause we have the reason why forests sent up very large amounts of moisture to the air. The quantity has not been properly estimated as yet; we cannot get at it exactly, but we know that a large forest is calculated to send up what is called millions of tons of water to the atmosphere above in the shape of vapor. This vapor, being cool, as it necessarily is, being produced in the forest which is always cool, passes into the clouds above, and joining with them there, the clouds above bringing each a stock of rain from the southern regions, from the equator, the junction of the two naturally occasions precipitation and occasions rain nearer or farther away. Now the very opposite of this takes place on a sandy desert, or a country covered with mere plowed land—a country destitute of herb-

age—because the atmosphere drawn up from these—the evaporation—is drier than the clouds above, and instead of occasioning precipitation by joining with the clouds above, it occasions the opposite, and if there be a cloud above it would dissipate it and change it into the atmosphere so that the cloud would not be seen. That is the result of the fact that the air holds, when heated, a certain amount of water, which when cold it cannot hold. When the cold air from below rises to the heated air above, the heated air above containing moisture, that moisture must to a certain extent fall out, that is, as we are well aware, precipitation.

Now, I would like to suggest to you what I have observed in my summer journey this year to England and through the Highlands. We are all aware that in England the fields will give forth, in grass and grain, a far superior return to what they do in Canada. I was astonished in hearing the average of grain and noticing the average of grass produced by these English acres. It is something infinitely superior to ours. I passed through that country, going up and down through England and Scotland, and crossing the country again, till I should think I covered about two thousand miles in these examinations; and everywhere I found that that country, being subdivided principally by hedges, and here and there always having a quantity of trees interspersing, and every here and there also a plantation or a pleasant little bit of wood or copse—I found that wherever I passed through that country it may be said to be sheltered; and I take it that that shelter which they preserve there is the very thing which, joining their geographical position, gives them the large crops they enjoy.

I would give you my own experience to bear out this idea. Having been an old clearer of the forest myself for many years, and knowing many townships formerly with woods which are now in farms, I have invariably found that when we went to clear the forest the land was full of little rivers, springs, creeks—full of moisture. You could get water at two or three feet. Afterwards, when we had half cleared the forest, a good many small creeks had disappeared; you would have to go down fifteen, perhaps twenty feet, for water; and when we had cleared the township too much, or again, when leaving it to about one-tenth in wood, by that time I have known us have to go fifty or sixty feet for water; our little saw-mills had long stopped; and where we formerly had pleasant little creeks every here and there most of the summer, they were dry, sun-baked and muddy.

And then I will point out to you a remarkable thing which I have noticed in many parts, and which has a close bearing on our fruit-growing ideas, and that is, that when at the first commencement of clearing we could plant a tree anywhere and it would grow, but when we cleared a good deal of the township we found that we might plant a good many trees along the roadside, and the ground seemed hard, its natural power of growth was gone, and we would lose a good many out of the trees we planted alone, where as formerly we would certainly not have lost one.

In going throughout England and Scotland I went to three large forests—the Forest of Dean, the New Forest, and the Forest of Windsor. Now they are in England, where land is dear, where land is valuable, every corner; nevertheless they perpetuate these three large forests, having, as well as I remember, from 50,000 to 100,000 acres of forest in each. They will not cut them down. They are kept inviolable; and when you are in London, in the greatest metropolis in the world, surrounded on every side by noise of business and multiplicity of business affairs, you are nevertheless within two hours of forests—two hours travel by railway—where you may wander for days and never imagine that there was such a thing as a town, or such a thing as a farm.

We pass on to Scotland again. There I found immense forests covering the country in all directions, and I found that the great Scottish hills, great barren wildernesses and precipices, are being continually covered to-day with young trees by the forests they are there planting in all directions, until, as you pass along by railway, you see the great mountain side—which you could notice has been a mountain side bleak and barren for centuries—you will see half of that covered with beautiful young trees perhaps two or three feet high. You go on through and you will find that they are taking great care of their forests, perpetuating them in all directions; and they find profit in it.

Now, I would give my experience in the border counties. Passing through the old border counties, both on the English and immediately on the Scottish border, we see immense hills there, large fields, great valleys—very few farms, however; very few cattle; very few farm-houses—all apparently a barren wilderness; and the reason, one may very well see, is that long ago they have cut down the trees; you can see no trees there. When I was in the forest of Athole, talking to Mr. McGregor—he is the Duke's chief forester there—he told me he could well remember having been engaged in planting for the Duke this twenty or thirty years; that many of the pieces of land which he has planted were utterly barren. They grew nothing but heather, which was useless; but once he planted trees, and allowed them to grow for a few years, the heather was changed into grass, and plenty of good pasture existed where formerly nothing but black heather and barren rock was.

I went to Dr. Cleghorn, of St. Andrews, who was the chief forester of India for years. He gave me his Scottish experience. He says: "You must not suppose here that we grow timber because we can sell it. I can't sell my timber. I could go and buy cheaper at the saw-mill some timber brought from America. But I grow my trees and plant my forests because all the land adjacent there gives me a far better revenue, either for plowed land or for grazing land; because once it is sheltered, then vegetation begins."

Now, gentlemen, I compare that with the great stretches of land I pass through frequently in Canada, and I look over much of our country quite destitute of trees—a country where I once well remembered passing through a magnificent forest. I look over it all now, where I can hardly see a tree in sight, and I think that this is much the reason why we now gain such small crops compared to the magnificent ones we formerly had. I remember, myself, in clearing one township, when that township was not one quarter cleared certainly we sent double away to market which now that township does, when it is quite cleared, because there was then a richness in the soil.

Now I shall pass from that topic a moment and mention something which may suggest the value of planting trees. Considering the scarcity of wood now—and I can tell you from my communications with many furniture makers and wood workers throughout the country, I have every reason to believe that good timber—valuable timber—is getting very scarce in all directions throughout Ontario, and that we have not in the forests in the rear that valuable reserve of timber which we formerly had in the place where we stand and all surrounding us; it is not the same class of forest, and it will never give that class of timber. I am told by wood-workers that nothing in their idea, will pay so well as to plant some acres of valuable trees. If I were on a farm clear of its timber I should, the very first thing, plant a few acres across that farm, in a place where they would best shelter it, of good trees valuable for wood-working. Now, as you all know, those trees are expensive; but there is a variety which are cheap and easy to grow. I would take our own maple—of course, as you are aware, the hard maple for the dry land, the soft for the wet; and I would put four maple trees to every one of a more valuable nature for wood-working; and I would leave a good tree in the centre, so that I might plant just enough very shortly to shade the land, and then as the trees grew up I should cultivate them for two or three years probably—not more—and then as they grew up I should be able to cut out my maples and use them for fire-wood or anything I liked, and I would have my centre trees growing up for valuable timber.

A great wood-working firm down to the east wrote me that they would be willing to pay for a farm covered with hickory from six inches up, or even six inches in the stem, a greater amount than they would pay for a whole crop of several townships near it, because that wood can hardly be got anywhere.

People speak of planting walnut as if they could get it immediately; but that is a great mistake. There are other trees which they had better plant, Over in Illinois I saw a beautiful field of walnut, ten acres, forty years old. The owner considered it worth $200,000, but said: "It is not worth a penny to cut now; look at what I am cutting;" and he showed me what he was thinning—logs perhaps twelve inches through,

but they were no good for walnut—they answered him very well for his bridges, his rough work about his farm. "You must wait," he said, "for twenty-five years more before you get large walnut trees that will give you the good boards you formerly got from the forest; for forty years it is all young wood; but when it gets to 60 or 65 years old then you get your great timber.

Now there is a sort of wood we can get in half that time—that is our own cherry, which will give us in thirty years a very good return.

There is a larch which I found largely planted in Scotland and England yields an excellent return; and for our shade trees, for our wind-breaks, I may mention that I have gone through all this country, and I find nothing better than the Norway spruce; but I would advise people to plant that around their orchards—not to attempt to cut it around too closely with their shears to make a hedge of it, because I have noticed it frequently turn brown and partially die. The spruce is really a tree, not a hedge plant; and when it grows big enough to want to be a tree it does not want to be a hedge any more. I should suggest that that distinction be always observed.

I may mention, before I close, some things that have been suggested at farmers' institutes should be done. In the first place, as we all know, we have immense pine forests. The great difficulty with these was that when the lumberman went in it was rather his interest to cut down this forest, because if he cut down the mature trees alone, he would leave a quantity of rubbish, which would catch fire and burn down the young trees which he would like to preserve. Now, those fires were preventible, and were caused largely by people with pipes, by camp fires, by careless sportsmen and by different methods sometimes but very seldom by lightning. Now, we have in the Province of Ontario—and I believe of all the States and Provinces of North America we are the only one that has done anything of the sort—we have in Ontario within the last two or three years got out a company of "fire rangers" throughout the summer months, when there is danger of fire. These men are paid half by the Province and half by the lumbermen; and wherever they see a smoke they travel towards it, put it out. If they find a camp that has left its fire, they put it out, follow up, and sometimes talk to the people; sometimes, where they are obliged to, prosecute them. They leave word in all the villages, "If you set fire carelessly you will be prosecuted." They speak to farmers and say, "When you are going to burn fallow we want you to take some precautions; we want you to warn your neighbors; we want you to tell us"—or something of that sort. So, gentlemen, we are taking much more care of fires than we did two or three years ago. It costs the Government some thousands of dollars yearly, and the lumbermen as much; but I see by this year's report that it is considered that last year alone they saved an immense amount of money, and I have no doubt they did; for in my wanderings through the forest I have seen small fires, which had been left by campers three weeks before, burning yet, and quite ready, when the wind sprang up, to involve the forest in ruin. Ontario has taken a great step in advance in this matter. (Applause.)

It has also been advised by some of the farmers that large nurseries be established, as in Europe—in Prussia especially—where they give away seeds and young trees of certain quality, and thereby encourage farmers to plant them. Of course it is always understood that reasonable bonds would have to be entered into, to take care of these trees, and plant them properly.

The third course that has been suggested is that the Government, in giving out wild lands, should always require that the hill slopes must be retained in forests. I was talking to Mr. George Allan, of the Canada Company, and he says that now in their deeds they always compel the settlers to retain ten acres in every hundred perpetually in forest; and I should like to observe that if that be done, a clause should necessarily be added that this be fenced, so that cattle be kept out; for if cattle be allowed to go into the forest they will certainly in time destroy it. They will bite down the young trees, and after that is done it is only a question of a short time when they old ones will cease to grow.

Other methods have been suggested, to the effect that Government should give away seeds and trees. That is not so effective here as on the borders of sea coast, where

there are great expanses of sand. I have found them, however, growing great forests by simply scatterings seed over sand or over grass fields. But there is another course suggested, and that we have followed to a certain extent of late years—that is, that forestry literature, such as pamphlets, and letters in newspapers, should be promulgated throughout the country. That we have done for the last two or three years, and I think with very fair effect; so that I think we may say in forest preservation Ontario is as far in advance as any State or Province in North America; and in some points to a considerable extent ahead of them. That is a gratifying consideration for us..

I believe every reasonable and thinking man among us must believe that the great need of Ontario is to have some better system—some more energetic steps taken—to preserve some portions of forest, and to plant more trees here and there. Now, there is no better way for this than for individuals here and there to add their voice to it, both in public and in the newspapers, and to agitate a system which was suggested by a great philanthropist in the United States—"If you wish to improve the course of tree planting," he said, "I should advise to do one great thing, and that is, to plant some trees." I think we should all add our voices, our influence in the press, our efforts in every direction, to advance this great object for this country. There is nothing will give it more benefit. There is nothing will add more to its agricultural power, to its stock of beautiful moisture; and when I say that I may add—which means the same thing—that there is nothing will add more to its general wealth; for countries have been impoverished by this simple method of destroying the forest; and countries have been re-invested with their original wealth by the simple process of re-establishing the forest. That is the point I wish to press upon you to-day; and I have no doubt you will agree with me; and that I may depend upon your efforts to assist me in this great object. (Applause)

The President—What kind of forest trees are most profitable to grow on waste places?

Mr. Phipps—The Conifera, that is, the pine in its varieties, the fir, etc. The pine, if tolerably cultivated, will grow mostly anywhere. Then our own maple grows very well anywhere—always putting the hard maple on dry land, and the soft on wet. Then the ash in many localities will grow very well, and is a very valuable wood too. Of all others I think I should prefer the pine, and I do not know anything better than our own white pine.

[Mr. Phipps had to leave at this point to catch his train.]

Mr. Morris—This matter is of greater importance to the country at present than fruit growing, and this society should take more interest in it. Hickory is so difficult to transplant that it could not be recommended for forestry. Norway spruce is a very nice tree for ornament, but not for forestry. The wild cherry is a much more profitable tree to grow than the black walnut. The timber is worth almost as much, while the tree grows much faster and is not so poisonous to the soil or other trees in the neighborhood as walnut. One of the most valuable trees is the Catalpa Speciosa; it is hardy; grows well in Minnesota, and for fencing or posts is almost equal to cedar for lasting. We have two acres of Catalpa; they have been out about six years and will measure six to eight inches in diameter now. For near lake Ontario or the Niagara district the Tulip tree is recommended. It is very valuable for carriage-makers—carriage boxes are made of it.

Mr. Morris—The Linden is also a very good tree. European larch is very rapid growing, and better for wind-breaks or posts than spruce. The maples are too slow growing to be valuable. Catalpa is something like the sweet chestnut—you can cut it down as often as you like and it will sprout up from the root again, which is a great advantage. Elm I don't consider valuable, not even white elm; I think these others are better.

Mr. Caston—Pine is too slow-growing; it takes it half a century to make a smart saw log, and then it is very rough. They do not reproduce themselves. You don't find the young ones among the larger ones. In our section you can scarcely see a single pine.

We will soon have to import all the timber for buildings. They have struck into hemlock now, so that soon all the soft timber will be gone. Lumbermen strip the land, and don't pay taxes on it, and it has to be sold over again, and it brings very small returns. If the Government would take that land back again and make it Crown lands, and plant it with timber it would pay in the long run. Butternut grows rapidly, and gives a valuable timber for furniture. The Catalpa is hardy, and seems to flourish north.

Mr. MORDEN—I have a good deal of faith in tree planting for shelter, and I believe before many years we will be able to use good land to produce timber. I believe it has its effects on the streams. But here is a nut for Mr. Phipps to crack: In the summer of 1887, right through the centre of this continent, from the Gulf of Mexico to Algoma, we had a drouth extending for months in the temperate region that affected the crops very much. In the same summer, on the Atlantic seacoast and up the valley of the Mississippi, clear up to the North-West, where it is prairie for thousands of miles, we had abundance of rain. Now, if the forests are going to produce the rain, and if the prairies are going to banish the rain, how can we account for that? It sounds very well as a matter of theory, but I think it is a pretty large undertaking to make climate by planting trees. I think the chief benefit of the forests in this respect is their effect as wind-breaks. Would it not pay to plant cedar? They grow rapidly. It is not necessary to go to wet ground. They will grow nicely on dry ground. Cedar is a valuable timber, and I fancy before many years we will see it planted by the acre, as well as other varieties.

Prof. SAUNDERS—Mr. Beall, what has been your experience in growing walnuts from seeds as to the size they attain in ten years?

Mr. BEALL—I should say in ten years they would be from five to six inches in diameter, and 12 to 15 feet high; that is from measurement of mine. I have about fifty trees, about 21 years since they came up, and they are from ten to sixteen inches in diameter and from 30 to 40 feet high. The diameter is reckoned from about two and a half feet above the ground.

Mr. JAMES GOLDIE (Guelph)—Many parts of our country have been so denuded of the forests that it is suffering very much. The Government should be memorialized. When public land is sold there should be a reservation, either on each farm as it is sold off, or else reserve a portion of the public domain in small tracts through the country. That apparently, has never been taken into consideration by the Government.

Dr. BURGESS—I have seen walnut timber cut, said to be about thirty years' growth, which cabinetmakers pronounced very fair for use.

The SECRETARY—There is here a specimen of black walnut, sent by Hon. Mr. Joly, of Quebec. It is eight years from the nut. There are also some seedlings here, sent to us to show what size seedlings would grow in one year.

The PRESIDENT—Have we anyone here who has planted an experimental plot of forest trees?

Mr. MORRIS—We have planted about five acres in forestry, besides long lengths of strips around the borders, perhaps twenty feet wide. These strips are mixtures of trees, but the five acres contain Catalpa, American ash, and wild black cherry. I would recommend, in planting, that these trees be mixed, because the roots of some will go downward, while some will spread near the surface, and in that way they will occupy all the ground. Black cherry goes very well with black walnut. Trees are much more profitable than a farm crop would be if a person can wait ten or fifteen years.

Prof. SAUNDERS—Mr. Phipps has given us an admirable address, and in a very practical manner pointed out methods by which tree-planting may be encouraged. He went too far, however, in saying that it would take 60 to 70 years to get a crop of black walnut trees that would be merchantable. I saw a grove in Champagne, Ill., some years ago, which had been planted out twenty years ago, and they would go from 12 to 16 inches. I measured several, and I think they would have averaged 14 inches, taking them all around. I think if you add twenty years more to them they would be

merchantable. About 18 years since I planted some black walnut, butternut, and hickory, and the last time I saw them the walnut and butternut had made fully twice the growth in the same time that the hickory had. It took three or four years before the hickory seemed to do anything at all, and then the advancement was not at all rapid. They have a very long tap root, and they are exceedingly difficult to transplant and made to grow, even if you take them two years from seed. Last year in Ottawa we put out some 300 or 400 trees of that age, and I expect in the spring to find that at least two-thirds of them are dead. They were in a very doubtful state in the autumn. Yet the timber is very valuable, and we should not be easily discouraged, and if we could arrange to plant the nuts where the trees are to grow we could do a great deal better than by buying young seedlings and planting them out. The same remark would apply to the black walnut and butternut. Both of them we know to be valuable for timber, and also for the shelter they afford. We have had only two season's experience at Ottawa, but there are nuts that we planted the first season; I noticed quite a difference between those that were transplanted on the new plantation and those that were planted in the original plot. They are nearly double the size where they were left, not transplanted; and I feel certain that the trees that make so strong a start as they at the outset would make a much greater growth afterwards than we should anticipate when we see them at the end of two years. With regard to pines, the Scotch pine has impressed me more favorably as a tree likely to be useful as a timber tree for planting in this country than the white pine, for the reason that it seems to be a very rapid grower. I have had some Scotch pine out for 15 or 16 years, and they have certainly made a larger growth than the Norway spruce in the same time, and I think if I were planting a plantation, looking forward to the wood principally, I should expect to get better results from the Norway pine than from the spruce—better, probably, than the white pine. I think there is no doubt that forests have a great influence on rainfall, and also that they have a considerable influence in inducing local showers; and yet it is a point that is very difficult to prove, and such circumstances as Mr. Morden advances show that there is no rule without an exception, and there are a great many exceptions in regard to this question of forests inducing rainfall. However, I think we may take it as a well-established fact that land that is not influenced by trees—supposing the climate to be the same—does not, as a rule, get the same amount of rainfall that land will where it is adjacent to large bodies of wood. It is not fair to compare Ontario with the maritime provinces; for instance, on the Atlantic seaboard, where they have a large amount of evaporation from the ocean right at hand to give them an abundance of rainfall there. I would imagine they would have plenty of rainfall where they had trees around. The same is the case on the Pacific coast. There they have too much rain—almost every year too much rain, although they have their dry periods occasionally in the summer time, notwithstanding the enormous wood growth there is there. It shows it is a question it is not well to be too dogmatic about; and there is another aspect of that question of evaporation which Mr. Phipps did not touch, and that is the enormous evaporation that goes on from a field of growing crop. It would be a difficult question to answer how far the evaporation from growing crops should be held to counterbalance the evaporation from trees; but the question of shelter is a very important one, and I think that was very fairly put. Mr. Phipps said not to plant soft maples on high lands, but I have seen soft maples growing as fine on high, dry soils as in the wet soils. [A delegate—"Correct."] And although we commonly find the tree growing in wet lands, yet it stands transplanting on dry soil, and does very well. (Hear, hear.) And as a tree being particularly valuable for shelter I think we should not hesitate to plant it on high land. Indeed, for shelter, I think it would make better shelter in summer, and more of it than the sugar maples, because it is a more rapid grower, and especially as it would attract the winds more fully on account of its growing of a more bushy form, and not generally growing so high. At Ottawa we have accumulated about 100,000 forest trees, and these have been planted out, some in sheltered belts and some in plots. I was glad to hear that remark from Mr. Morris about planting mixed clumps rather than undertaking to grow any one particular kind of tree. That is the way with nature; you find ten or twelve different trees in one clump. Those who have tested forestry in different parts of the world find

that many varieties will grow better than a single variety. One reason is that some strike deep roots and some are shallow-rooted. Another reason—very important—is that all our forest trees are infected at times by insect enemies, and sometimes you have seen trees entirely stripped of their leaves. As a rule, the insects that feed on one tree do not feed on another. If you have a tree stripped in that position where it is sheltered by surrounding trees, it is not apt to be so much injured as if surrounded by trees stripped like itself; and in immunity from insects it is very important to have trees planted in mixed clumps. In Ottawa we have planted out across one end of the farm a number of clumps of trees, and it is proposed to continue it all across the end where we are planting the trees in clumps of one kind, a plan to which, as I have said, there are many objections; but on the other side we are planting mixed clumps, so that we shall be able to demonstrate what the difference actually is, or the advantage of one plan over another by taking the measurements of the trees and by having these living examples to show to farmers in the future. Having plenty of trees there, we shall be able to extend this forest planting in clumps and plots and hedges and belts in such a manner that in a few years we shall have some interesting objects to inspect. We have a farm at Indian Head, in the North-West Territories. There was not a tree or bush anywhere in sight when we took hold last spring. Twenty-thousand young forest trees, of some forty or fifty varieties, were sent up last spring, and were planted out, and most of them were doing well when I last heard. If any fail I do not think we should give up the growing of those particular trees that fail from one experiment like that, because you all know it is a great advantage in planting trees in the shelter of other trees; and in order to provide the conditions that are favorable for testing other trees, a large number of native trees are being grown on the same place from seed obtained last autumn of what is known as the Manitoba maple, the *Negunda aceroides*. From trees grown in Manitoba we raised something like 40,000 young trees, which will compare very favorably with this sample here of Catalpa one year old. The young trees would average a height of ten to twelve inches, and strong-rooted; and with a start there of about 40,000 trees upon the farm we hope in a few years to get sufficient shelter to give other trees a good chance. Besides that, we have found a nursery plantation near Brandon where there was a number of these same trees from six to eight feet high, and we secured about a thousand of those and planted them out so as to make a greater show in the near future, so that the monotony of the farm may be broken in on, and to provide shelter for these other trees to be tested. The same course will be taken on the farm in Brandon, which was began last July. Then with a view to ascertaining how far the black walnut and butternut may be grown to advantage throughout the entire length of the Dominion, I am at present preparing for distribution of black walnuts and butternuts, somewhere about fifty bushels altogether, putting them up in small bags so that we can send those to some four or five hundred points in the Dominion, from Prince Edward Island to Vancouver, taking in the North-west Territories, and while it is not to be expected that these trees will succeed everywhere, yet we shall find, from the great diversities of climate, many localities where both will thrive. I was surprised to find the basswoods growing on the district of the Pembina mountains, a district they are not supposed to reach, and I also found them growing on the Riding mountains, a distance north of Winnipeg, and where basswood will succeed so well I don't see why butternut will not succeed, for it is supposed to be the hardiest.

Mr. MORRIS—Yes, considerably the hardiest.

Prof. SAUNDERS—We know the butternut succeeds in Lindsay, and in Nova Scotia a few weeks ago we found it. I hope in a few years we shall have some good reports from this distribution we are now preparing to send out. It is a very difficult thing to make much impression upon a subject so vast and important as this in a year or two, but if we can once satisfy the people on the North-west plains that trees can be grown to advantage, there is enough energy in the people themselves to buy out almost all of the seeds that can be had, and plant them out with a view to beautifying their homes and modifying the climate, giving that shelter around their farms which is so desirable. We must depend on the people themselves more than our Government help, for whatever

Government will enact in this matter, very little will result from it unless individuals put their shoulders to the wheel and help along the subject by planting trees, and planting them plentifully themselves. (Applause.)

Mr. WELD—Will young walnut trees succeed by cutting the top off? will they re-bud and form trees? and will the horse-chestnut?

Mr. MORRIS—The black walnut will sprout if it is not large, perhaps not over couple of inches. I would say the same as to the horse-chestnut, while the latter are small, say up to an inch at the bottom, there are generally buds near the surface, or below the surface, that will sprout. Of course after they get large, and these buds disappear, they will not sprout.

Mr. J. M. PETTIT moved, seconded by Mr. A. D. LEE, That this Association do memorialize the Ontario Legislature, and urge upon them the necessity of enacting such laws as would encourage the protection of existing forests, and further assist farmers and others in planting shade trees and wind-breaks.

This resolution was carried unanimously.

FORESTRY IN INDIA.

The following paper was contributed by Mr. R. S. Dodds, Conservator of Forests in the territories of the Nizam of Hyderabad in India :—

For some years I held the appointment of Conservator of Forests in the territories of His Highness the Nizam of Hyderabad. Forest conservancy had been in existence about fifteen years previously, but the department had been presided over by native element entirely, and, partly on this account and partly from a grasping wish to realise an unduly large revenue, the system introduced was lax and unsatisfactory and the forests themselves were depleted to an alarming extent.

Apart from the destruction caused by the axe, each year many miles square of valuable forest land were devastated by fire, which every year crept in and which when once fairly alight, it was almost impossible to extinguish. These fires were sometimes the result of accident, but more frequently they were set going by the natives themselves so as to destroy the old dried-up grass and improve the village pasturage in the following year. The ashes of the burnt grass forming an excellent manure, and, stimulated by copious monsoon showers, bringing up a fresh succulent crop the following spring.

Besides the trees actually destroyed by fire, through the intense heat many others were gnarled and stunted in their growth, thus greatly lessening, if not totally destroying, their commercial value. In British India forest conservancy is carried to high perfection and although the working expenses are very high a large revenue over and above expenditure is realised each year from this source.

To minimise the loss from fire, in British India the more valuable forests are demarcated and are protected most carefully. All access on any pretext is forbidden, except of course to departmental subordinates ; to check the ingress of fire a broad space a couple of hundred feet wide is cleared of undergrowth and all other combustible matter, right ronnd the limits of this demarcated forest—this is called a "fire line." To carry out this work, of course incurs considerable outlay, but it is found to pay.

By far the most useful and valuable timber in the forests of India is "Teak" (*Tectyra grandis*). but the demand for this has been so great that at the present day it is rare to find a tree of exceptionally large growth. I remember seeing a table made of a single teak slab 8 feet in diameter ; such would now be simply unprocurable.

The other valuable timber trees are the "Deodar" (cedar of Lebanon). The habitat of this is principally on the Himalayan range. It is called the oak of India, the "Sal" (*Shorea robusta*) ; "Satin-wood" (*Chroroxylon swietenia*), which gives a very ornamental wood ; "Black-wood" (*Dalbergea latifolia*) ; "Ebony" tree (*Diospyrus melanoxylon*).

These two last work up into very handsome furniture, and the fruit of the last named is greatly eaten by natives; "Unjun" (*Hardwickia binata*). The sap-wood of this is quite white but the heart, in a matured tree, is 8 to 10 inches in diameter, in color perfectly black and as hard as iron. The natives dislike cutting it down as it turns the edges of their axes. The "Dhamin" (*Grewia elastica*): this is the lancewood of India and is very useful for gig-shafts, bows, etc.

Besides these there are the following economic trees, which are more useful for their products than for their timber: The "Babool" (*Acacia arabica*), which yields the firm, clear gum-arabic of commerce; the "Kheir" (*Acacia catechu*), the bark of which gives a fast red dye and is used in tanning; the "Bael" (*Œgle marmelos*), which yields an apple-looking fruit, the pulp of which is invaluable as a never-failing specific in bowel complaints; the "Mhowa" (*Bassia latifolia*), the fruit of which is greedily eaten by the natives in times of scarcity, its principal use however is in the preparation of an intoxicating liquor; the "Olibanum" (*Boswellia thurifera*), this yields plentifully a fragrant gum-resin much used by the people; the "Kaweet" (*Feronia elephantum*), fruit edible and slightly astringent; the "Mango" (*Mangifera Indica*), when well cultured, this yields, in my opinion, the only fruit worth eating in India; the "Serdi," or date palm, which supplies the "toddy" largely consumed all over India; when fresh this toddy is harmless, but when fermented it is very intoxicating. By Europeans it is used instead of "barm" in bread-making. The "Tamarind," of which both the timber and fruit are much prized.

The two principal sacred trees of India are the Banyan and the Peepul; the former has a wonderful manner of extending itself by dropping down roots from its branches which, entering the ground, take root, grow and in time throw out branches on their own account. I saw a single tree which was capable of sheltering a regiment of soldiers!

I must not omit to refer to that giant grass the "Bamboo," which is to be found slim and slender, when it is very useful for basket-making; also growing to the height of 70 to 80 feet with a diameter of 8 to 10 inches. These last are used for making rafts, for building-scaffolding, and, when split in two, for roofing houses of the commoner sort. Of course these gigantic bamboos are hollow, otherwise when growing they could not support their own weight. As ducts for water for irrigation and other purposes these bamboos are also very useful, There is a small description of "male" bamboo (in contra-distinction to the "female," which is hollow,) which rarely exceeds three inches in diameter. This is used almost exclusively for spear shafts, useful in warfare and also when hog-hunting.

In the State of Hyderabad it was the custom to lease out the inferior timber in the forests yearly to the highest bidder. This was done by the revenue authorities in whose charge this inferior timber remained, but the anomaly existed that the better descriptions of timber, *in the same forests*, were under the care of the Forest department. Thus each forest had two masters, which we have the best authority for knowing is not a good arrangement. Too often the lessor of the inferior timber took up his contract as a cloak to cover thefts of the better sort. The Forest department in Hyderabad sold all timber standing, the cost of cutting and carting away falling on the purchaser. In British India a different and a better system prevailed: Government established timber depots at different places through the forests and held periodical sales.

The most popular and successful sales of this description were of Sandal-wood, which grows to great perfection on the Western Ghauts. The fragrance of this wood is well known. In Bombay the best billets of it are used for ornamental carving into card cases work boxes, glove boxes, etc., while the roots and the inferior sorts are readily bought by rich natives to be used when burning the dead bodies of their relatives.

One great drawback to successful forest conservancy in the independent native states of India is the great number of "jaghires" scattered over the country. These are grants of land which have been made over to certain individuals, in perpetuity, for various reasons; it may have been for meritorious services to the state, or it may have been on condition that a certain number of armed men were properly equipped and maintained

for the public service; anyhow these "jaghires" are regular stumbling-blocks to progress; criminals take refuge in them, and while within the boundaries are free from arrest. Too often the officials are in league with thieves and grant certificates, falsely declaring that timber has been cut in private forests which really has been taken from government land.

As an effectual preventive of these malpractices I recommended His Highness' government to resume all forest land in the various jaghires, paying the owners by way of rental a sum annually, equal to the average of what had been realised in the ten years previously. They did not see, however, how to carry my suggestion into effect. The times were not ripe for such a *boulversement*. To do their duty thoroughly forest officers should be on tour eight months out of the twelve. Their duties take them into most dismal and deserted parts of the country, where the only living creatures met with were the denizens of the forest—wild beasts, and small tribes of people (Bheels, Gonds, etc.), in intellectual capacity only one degree higher. When the forester is a sportsman this loneliness is amply compensated for by the splendid shooting to be got—comprising all animals from the lordly tiger to the graceful gazelle. I cannot conclude this paper without paying a tribute of praise to His Highness the Nizam of Hyderabad and his government. His Highness has acquired a knowledge of English, and having been brought up under European tutelage has a taste for manly sports. He is quite an expert at driving a four-in-hand. In the administration of his country he has gathered round him men of genius and talent, conspicuous among whom is Nawab Moksin-al-mulk, and it is His Highness' earnest wish that all details of government should be assimilated as closely as possible to the English model. We know that imitation is the sincerest form of flattery. As Conservator of Forests he has now got a European, lent to him by the British Government, and who was specially selected on account of his industry and his superior knowledge of those details which go to the successful working of the Forest department. Improvements have been introduced but still much remains to be done, and it is only a question of time when the forests of the Hyderabad state will be on as satisfactory a footing as in any other province in India.

APPLE GROWING AND EXPORTATION.

Q.—Is apple-growing profitable? Does it pay to export our apples? What are the drawbacks to exportation? And as regards transportation of fruits to home and foreign markets, what complaints have we to make against the railway, express and steamboat companies?

Mr. P. C. Dempsey—I fail to see why the prospect for apple growing is less bright than it was fifty years ago. Nearly fifty years ago my first marketing of apples was at five cents a bushel—and we thought the price very remunerative. It was mostly common fruit, and I have repeatedly gathered fifty bushels from a tree. To-day, upon the same soil, there is growing a finer quality of apple, and people seem to think if they only get a dollar a barrel—forty cents a bushel—they are doing nothing. If people could afford to grow apples at five cents fifty years ago, I fail to see why they are not profitable to-day at forty cents a bushel. The trouble is with ourselves. We make mistakes in selecting varieties. Apples can be can be grown at a profit for ten cents a bushel, if they are properly cultivated and productive varieties cultivated, and will pay better than any farm property, if they can be grown even at those low rates. Our submitting to low prices is our own fault. I have seen good varieties of apples, well sorted and well packed, in Ottawa in October, sold at $3 a barrel. I saw at the same time the same varieties of apples, that had been badly handled, badly sorted and badly packed, only bringing $1 a barrel. It is only a question of profit and loss, whether it would pay us to properly select our fruit, pack and ship nothing but the best. Again, by our selecting just the best, and sending no other to the market, we not only make a good profit, but we are constantly increasing the demand. I find, too, that the reputation of one person, spoils

the reputation of an entire neighborhood. I will give you an actual fact, that I saw in Ottawa this winter. A gentleman was looking at some apples. He said—accompanying his remarks with some rather rough language—"There's the greatest set of schemers in the Niagara district that there is in the known world!" (Hear, hear, and laughter.) Well, I wanted to know why. He replied, "Well, here were men employed at $1.50 a day to pick and pack apples; they have no reason to defraud at all; and I want to show you a lot of Kings I have got." He opened a barrel of Kings. I said: "My dear sir, you have no reason to complain." He said: "See there! out of a carload, that is the first one I have found that was a King." He opened that; what was that? It was a cull! He opened another; that was a cull—Rhode Island Greening—never been hand picked either, and very well seasoned with worms. He opened another; it was Roxborough Russet. And he never found another barrel of Kings in the lot? That man was disgusted with the stock. He had been defrauded, and he was laying it on the whole Niagara district. I saw another man in the fall. I had some pears then I was selling. This fellow was a good natured Frenchman. He asked me where I was from. I told him "Prince Edward." "Well," says he, "In the County of Prince Edward, they are the greatest set of schemers that I ever saw." Well, it was quite a compliment, and he went on to show me where he was defrauded, and how he was defrauded, by some man from Prince Edward who had been packing fruit for him. I felt that upon a man who would perpetrate a fraud like that we could hardly inflict a remedy as severe as he deserved. Now, I know some parties that have realised some good results from their honest labor in years past. The lowest I have known one of them to sell their fruit at, even in the fall was $1.75 to $2.50 a barrel, delivered at the railway station. I fail to see why we can't all be honest in the packing of our fruit. (Hear, hear.) If we will all look well after the packing and selecting of our own fruits ourselves, and not trust to a man that is liable to be fixed with a little whiskey or cider, or something of this sort, I fancy we will find some day that apple culture is more profitable than it has been this year. As to the over-production this year, I was reading a speech the other day by Mr. Barry, in which he says we have not had such an over-production for over twenty past; that it only occurs in about once in twenty years. If that is the case we have nothing to fear. Men in our section submit to a poor crop of barley nearly every year, and still go right on with their barley; and some of those same men I find digging up their apple orchards this year, because they have not made it pay.

The Secretary—I don't think we would find much profit in apples at ten cents a bushel. When we count the expense of gathering, and of barrels and packing, we find even at the prices that we are averaging of late years, there are no very immense profits to speak of. I think we need a little caution in this matter I think we have been in the past speaking rather too highly of the profits of our business. We need a little moderation on this subject.

Mr. Dempsey—I would ask the Secretary if he thinks that common varieties of apples would not pay the producer at ten cents a bushel, to manufacture into cider? It is not a question of profits that I was talking about, or large profits. The finer varieties of apples we cannot produce in such abundant crops. We cannot get forty or fifty bushels for example, from a single tree.

The Secretary—I don't think it would pay to plant an apple orchand, and wait ten or fifteen years for a crop, and then sell the crop, even for cider at ten cents a bushel. Of course if a man has an orchard and gets a very heavy bearing, it might pay him to take ten cents, rather than cut down the orchard.

Mr. Geo. E. Fisher (Burlington)—Is it allowable to put an apple having a worm hole in, no matter how small, or whether it be in the blossom end, or where it is?

The Secretary—As No. 1 fruit I don't think it is.

A Delegate—Do you ship wormy apples at all?

The Secretary—No, not as No. 1 fruit. I have shipped them as No. 2. I always, very carefully, and after a good deal of expense, separate all the apples that I ship into

three grades. I make a class of "extras," that are large and highly colored. I mark them "extra selected," or xxxxx, that is my best grade. I do that with great care. I have a large packing table, and the apples are emptied out on it. I then have one person selecting out these "extra selected" apples, which are put up in barrels by themselves. Then all the sound ordinary medium sized apples, that are free from scabs, or specks or worm holes—perfect apples, are packed carefully, and marked No. 1 grade. The third class is one I seldom ship. I am able generally to dispose of these in some other way —either by evaporating, or trading them off with farmers who do not grow fruit, for ashes or fertilisers that I can use upon the orchard. But upon some occasions I have put up a third grade of apples to ship. I always very carefully mark them upon the head as second-class apples. All the fruit I ship I mark with my own name, and the grade, upon the head of the barrel.

Mr. Dempsey—Don't you think it would be better for us if we never shipped No. 2 apples?

The Secretary—Of course it helps to fill up the market. In that way it is not profitable; but I shipped No. 2 apples to Montreal a year ago this fall, and had them sold there—a car load—for $1.90 a barrel; and it is rather a temptation to ship them when you can get that money for them. Of course knotty, misshapen ones were not included in the No. 2. These are kept for stock feeding. I have never shipped mixed apples—never put a poor grade in the centre of the barrel—and I hope it is not the habit of any of the members of our association to do that.

Mr. Fisher—The explanation is very satisfactory to me, I am much obliged to you for it.

Mr. T. H. Race—The first thing to do is to educate the farmers up to growing only a few varieties that will stand shipping, and a sufficient quantity of those varieties to encourage buyers to go in. Then you want to encourage farmers to believe that if they will do this, there will be a market at paying prices. The city papers deal very little with this fruit question. The Government should help this association more, so that it would be able to reach the farmers more fully and educate them on this question.

The President—A commissioner has gone to Britain to look into the question of their methods of handling fruit, making returns, etc. One of the largest and oldest houses in Liverpool has been perpetrating upon shippers what appears from the evidence we have to be a perfect fraud. There is also a case of the same sort in Glasgow. I am satisfied that their method of handling fruit stands as much against the interests of fruit growers in this country as anything I know of. The brokers there receive cargoes and sell immediately, without regard to market, or the division or selection of those fruits from that cargo for special markets. We have discovered also that they make false returns. A great many of those firms have pamphlets or lists published, giving sales. We have taken the precaution of employing persons to attend those sales, taking a note of the buyers of various cargoes, and the prices they buy at. On one cargo alone we find there is a shortage of a little over $2,000 as between the actual amount the fruit was sold at and the return made by the firm to the shipper. It is a very great evil, and it is a question how to overcome it. One method is to make it known over there that we know it, then we will alarm the markets there to a certain extent; and as they are bound to get our fruit—for they want it, and must have our apples even if they pay a higher price than they pay any other country—then we will find that parties will come here and buy our fruit, were we can see that we are not imposed upon. Another evil is the freight rate on fruit; it is too high. It is a clean freight, and one that all railways and steamship companies desire. The present rate averages about the value of the fruit as we buy it. When you come to add that to the purchase price it makes the fruit expensive as landed over there. Yet it is difficult to know how to remedy this. It is a pretty hard thing to approach the railway and steamship companies under their present laws. We have tried to get reductions, but they absolutely refuse, on the ground that there is a law governing their rates. However, we know that they do break the law.

Mr. A. H. PETTIT—If we could get our markets in the Old Country in such a position that we could get confidence in the handling of them there, then our growers would become packers and shippers, and handle our fruits in the proper season. There is no preparation for the apple season—no arrangement for handling them, and in a season like the last one, this is a very serious mistake. The shippers are certainly to blame for being behind hand and shipping their fruit when it should be in the cellar, and having such large quantities frozen in transportation. If our attention were devoted to picking, packing and handling and shipping our apples, instead of discussing varieties, it would be more profitable to apple growers.

The PRESIDENT—I always received the top market price—and sometimes considerably over—in being careful as to the purchase of my apples, in this way: I paid in proportion to the method that the grower adopted in producing the apples. Where I found that the grower took a great deal of care with his orchard—fine, clean, healthy trees, not overloaded with fruit and therefore good samples, the soil in good heart, and all these circumstances perfect—or as nearly perfect as we could find them—I always gave that man the highest possible price I could afford. Thus, if I was paying $1 a barrel for Baldwins in an ordinary orchard, I would pay for the like of that $1.25 a barrel. I found it paid to do so.

Mr. T. H. RACE—I am to speak on fruit-growing before one or two farmers' institutes within the next four or five weeks. Could I go before them with the authority of this association and tell them that there will be a probability anywhere within the near future that a market will be opened up for Canadian fruits whereby the farmer can sell his fruit at a paying price to himself?

The PRESIDENT—I would not like to say that altogether. If we could only adopt some scale by which the grower would be responsible for the selection and packing of that fruit, there is no reason whatever why the grower himself should not forward that fruit into the market. I don't care how that market may be glutted. Take this year, at the time it was glutted the most you would find an odd parcel now and then drawing a high price. You found, even at the worst season of the year, that fine, well-selected samples brought a good price. Everything depends on that. The trouble that shippers have had is that when they go into the orchards the grower is so anxious to get rid of every individual apple he has there that he uses his influence to force off all the fruit he can possibly get rid of from that orchard; and a packer that is not thoroughly well posted, and working on a straight rule will be induced to take them. We must make both grower and packer responsible, and their remuneration must depend upon that responsibility.

Mr. PETTIT—If our apples could be packed by each grower and shipped and sold at a price subject to the buyers' inspection at the wharf at Montreal, then, being properly tried and found properly packed, there should be no risk in the handling of them further forward. If the buyer sees them on board the ship there is no risk to undergo. This plan would give us a satisfactory way of handling our fruit.

The PRESIDENT—I am satisfied it is quite possible. I know, from conversation and dealings with them, that there is a certain class of dealers from Britain that would prefer buying that way.

Mr. CASTON—If the facilities and steamers were all right it would do to have an inspection at Montreal; if not, it would be necessary to have the inspection on the other side. As to educating the farmers, the trouble is they don't come to our meetings or subscribe for our journal.

Mr. DEMPSEY—The way to educate the farmers is to reach their pockets, by the buyer refusing all varieties except such as the market requires. If the buyers could be induced to buy and pack nothing else but the very best varieties for shipping, the demand for our apples would increase so that half the quantity would fetch more money than the whole.

Mr. RICE (Port Huron, Mich.)—I attended the Western New York Horticultural Society, and heard the statement that Canadian apples brought more in foreign markets

than western New York apples. As western New York was always said to be ahead of the world, you may consider that you Canadians stand at the head of the world. (Hear, hear). Further, it was stated, on the authority of that society, that western New York buyers marked their apples, in shipping to Europe, "Canadian apples." (Hear, hear). That is a fraud that might be avoided by putting your names, your town, and everything on the head of the barrels.

Mr. J. M. Denton (London)—The Zavitz family in Lobo have planted out 2,000 apple trees, and are going to plant out 2,000 more; and they hold that if they can get 25 cents a bag for their apples it will pay better than growing cereals. The English people will pay the price for an honest article, and I believe they would rather send their buyers here than run the risk of being deceived at Liverpool.

Mr. Patterson (Grimsby)—As a rule the barrels are very carelessly treated by the growers. They are left in the orchards exposed to frost and rain and sun, and they can't stand as well as those kept under cover. Shippers have told me that barrels that had been kept under cover reached England in much better condition, with fewer slacks, than those apparently packed in the same manner sent at a later period. I divide my apples into three grades. No. 1 I ship myself, or sell to shippers. No. 2 I generally sell on the Hamilton market. No. 3 I feed to stock for fattening, or to milch cows. From experience in the last three years I cannot find that there is any difference between a bushel of apples fed to steers, and a bushel of turnips.

Mr. Ed. Smith (Winona), asked: Do you have any diameter as to Baldwins you pack? also, is it correct that in England they are finding out they can grow apples of as good quality as ours?

The President replied that the article referred to on English apples had been admitted to be a mistake. In the newspaper correspondence, apple growers in Kent, England, had admitted that they had given up growing varieties they formerly had grown largely, because Canadians grew the same varieties to a much higher degree of excellence. (Hear, hear). And after using every method in growing that they possibly could think of, and doing justice to their orchards in every way, they could not produce the fruit equal to ours. As to the quality of fruit, we judge by the quality of flavor very largely. An apple grown farther north has greater points of merit than the same variety grown farther south. The farther north you can grow an apple, the better it will be in points of merit, especially in quality. That is why Canadian fruit stands about three shillings a barrel higher than American in the English market, on clear points of merit. Our fruit arrives at English ports in much better condition than American fruit, notwithstanding bad packing and all that, because its intrinsic points of merit are much higher. It carries better; it keeps longer in that climate than the American fruit.

Mr. Pettit—There is a little difference in the size of the barrel?

The President—Yes; I am more and more in favor of a smaller package than we have had; and while I believe in a half barrel I am not altogether satisfied with it. I believe the day is coming when we will have something, perhaps not quite as large as the half barrel, that can be handled easier. I will acknowledge this, if you take a large lot of fruit of one grade, so many in ordinary size barrels and so many in half barrels, lay them open in the usual way that they exhibit them at the fruit markets, and you will at once decide, by a casual observation, that the fruit in the half barrel is certainly one grade higher than the other. It is simply the size of the package has deceived you—nothing else; and that may account to some extent for the fact that we get higher prices in smaller packages—but only to some extent.

The Secretary asked whether our apples were carefully inspected in England by buyers before purchasing?

The President—The method in all the markets is very much the same. They will select out a few barrels of each variety in the cargo and they will open the tops, and sometimes, if they are suspicious in any way, they will dig down a little way. If they are

still suspicious they will close that up and open the other end. If they are still more suspicious, they will turn that out into a large basket or sack and see what the quality is all through. But they always exhibit some and allow buyers to go and handle them, dig down and see what the character is. The character of a shipper is soon found out. You will always notice the buyers going around with their note books, taking note of the brands; and you will see buyers that will pay so much just to buy that brand right out. They will take that at sight. They will not require the agent to open that out. This shows the necessity of placing your brand on every barrel, and being very careful that your brand is correct. If you are perfectly honest and careful in that, I do not care how that market is quoted, you will get a price that will pay for apples that are shipped in good order.

Mr. Smith repeated his question as to standard size of Baldwins.

The President—I would place, as No. 1 of the Baldwins, the largest apples, high-colored and perfectly clean, without spot or a worm hole. You will find on the inside of the tree large Baldwins that are not high-colored. If you pick those at the proper season and let them lie on the ground for a certain time they may gain color and become No. 1, otherwise they are No. 2. Each apple should be handled in order to get No. 1, and it certainly pays for the time of selection to select and grade your fruit. You will find a difference in price between a select and a mixed brand which will pay admirably.

Mr. Smith—Where seven-eighths of the orchard are under size you would mark those "No. 2?"

The President.—Not necessarily No. 2. You can select some mark by which they will know them. I used to select small fruit and mark them as "XXX Dessert," and they were taken very well that way; they liked them, and I have often received a better price for my "XXX Dessert" than for my "XXXX Green."

The convention adjourned at six o'clock.

EXPERIENCE WITH THE FUNGUS FUSICLADIUM.

Mr. J. K. McMichael, Waterford, read the following paper on this subject:

In the spring of 1873 we planted a pear orchard, consisting of 100 Bartletts, 25 Flemish Beauties, 6 each of Osband's Summer, Sheldon, Buffum, Belle Lucrative, Clapp's Favorite; 4 of Belle D'Anjou and 2 of Seckel. The trees were remarkably thrifty, and it required a great deal of pruning to keep them in a proper shape. The fruit was all that could be expected, being large and well developed. A number of the trees suffered severely with the fire blight, but the orchard in general was prospering until the spring of 1881 when it was attacked by this fungus. This disease apparently commenced at the east end of the orchard on the Flemish Beauties, entirely destroying the fruit for that season, and for the five following years there was not a perfect sample of fruit on any of the trees. Upon the Bartletts the first year the malady was not quite so fatal to the fruit, but each succeeding year it grew worse until, in beholding the orchard you would be reminded of a lot of neglected natural fruit apple trees which had been left in the sod for fifty years. All of the other varieties were more or less affected. We experimented with ashes, sulphur, copperas, an emulsion of soap, balsam and kerosene, etc., but none of these remedies were satisfactory. In the spring of 1887, as soon as the buds began to swell, we applied hypo-sulphite of soda and repeated the application every two weeks until the fruit was about half grown. The sulphite was prepared by pouring it in a large kettle of hot water to dissolve and then diluted with ten gallons of water to one pound of the sulphite and showered on the trees with a force pump, hose and sprayer. The fall of 1887 the Flemish Beauties were fine and well developed and free from scab. The Bartlett trees made a fair growth and had on a small crop of fruit free from spot. Last spring we applied the sulphite as the buds commenced to develop and then did not

give another application until the fruit was nearly as large as hickory nuts. At that time the fungus was well developed on about half of the fruit, but was not very noticeable on the leaves. We immediately gave a heavy showering of the sulphite and another in a week. Apparently there was no further development of the disease and we picked a large crop of fruit, about half of which was a fair sample of first-class fruit.

The SECRETARY—I have used the same formula viz: One pound of hyposulphite of soda to ten gallons of water; but both the two years in which I applied it to my Early Harvest apple trees the fruit was mostly clean whether sprayed or not.

Mr. DEMPSEY (Trenton)—Two years ago we were bothered with fungus spots on our pears, but last year it failed to make an appearance.

Mr. MCMICHAEL—For six years in succession the fungus was very bad each year on the Flemish Beauties especially. I put the solution on at the beginning of the season, then I did not put it on for six or seven weeks, then I applied it very strong, so that the leaves were browning up with it, and I did not see any further development of it that year; but other years the fungus went on growing till the leaves and fruit were spoiled.

The SECRETARY—Mr. F. L. Scribner has a most exhaustive article on the fusicladium in one of the last reports of the Department of Agriculture at Washington, and he proposes a copper solution as a remedy. He thinks that eau celeste would be even more effective than hyposulphite of soda. We should begin applying it before ever the buds begin to develop. The spores, it seems, remain alive through the winter upon even the scales of the buds, and upon the young wood; and in order to prevent its appearance on the fruit, the apple-tree should be sprayed early in the spring before the leaves have developed at all—the first application should be made then. Then, again, when the fruit is quite small; when the very first beginnings of the fungus spot are observable.

Mr. MORTON (Wingham)—Hyposulphite will act on a fungus that grows on the human skin when no other sulphite that I know of will affect it.

Mr. DEMPSEY—I find it is very little use to apply any remedy if the fruit has got the size of an ordinary thimble.

Mr. GEO. E. FISHER (Freeman)—How can you account for an orchard of thrifty trees on very good land being attacked by this fungus while other orchards escape wholly? We had that occur in our neighborhood.

Mr. DEMPSEY—I have seen that in my orchard this year.

Mr. MORTON—Would a remedy that would kill one fungus kill others?

Mr. DEMPSEY—Said he had found sulphate of iron effectual when applied early.

Prof. SAUNDERS—Both these substances are antiseptics, and would destroy the life of all those very low forms of vegetation which are known as fungus growths. Sulphate of iron is not as effectual as sulphate of copper on the grape fungus. If a solution of hyposulphite of soda answers every purpose, I think it is a little cheaper than the sulphate of copper, and it is not poisonous or injurious in any way, There would not be any taste from its use at all—in fact it is decomposed to a large extent by the action of the sun, and the sulphurous acid is eliminated during the process, and that is the reason it is effectual.

MARKETING FRUITS.

Q. Is it not time for the Fruit Growers' Association of Ontario to take up the question of marketing our fruits? Would it be wise to have a fruit inspector appointed, or what means could be adopted to induce growers to put up good, straight, honest packages of fruit? Could not the members of this Association act unitedly in marketing fruit through its own agents, instead of dealing with commission men, who often make more than the growers?

Mr. Dempsey—If you have a good article, go with it yourself, and sell it yourself, and then you will know you have got all that the fruit brought.

Mr. E. D. Smith (Winona)—Even if we wish we cannot avoid supporting the commission men, for they have the market in their own hands, and it is impossible for the grower to go there himself or to send some one there to do it for him. The only practical way now is to not encourage commission merchants in those places where they are not already established. In New York they are passing a law that each commission man must report to the man for whom he sells the fruit, as a check on the honesty of the commission man. We want to get into the habit of handling our fruit at both ends of the string.

Mr. Dempsey—Growers might send one of themselves to attend to the selling. I have gone into markets a total stranger and sold fruit just as well as the commission men. They will try to boycott us at first, but almost invaribly they will come out at the worst end.

Mr. Morden (Niagara Falls)—Fruit growers make a mistake when they patronise men that speculate in fruit, or retail it. A large proportion of those commission men are absolutely without any commercial rating. If we could know the rating of these men, and then ship only to reliable men we should meet with less disaster.

The Secretary—The difficulty is to find men who are purely commission men. I have dealt with some who represented themselves as such, but when the temptation came they would buy for themselves. I shipped fifty barrels of Bartletts to Montreal once when prices where $8 and $10 a barrel ; and after waiting a long, long time I got returns at $2 and $3 a barrel. It is very evident that they had been held over until the market had been eased—until these commission men had sold the stock they had purchased. In shipping to cities we should select some one house and ship continuously to it ; because if we ship to many we have our own fruit bidding against itself ; and I think one house regularly patronised will look more closely to our interests, than if we shipped to several.

The President—The matter can be settled in markets near at hand by sending a man to watch over the circumstances and look after the commercial standing of the different firms. In England some of the commission men are actually partners in business with fruit dealers, and our agent actually stands there selling our fruit to his own partners. He may be in silent partnership with half a dozen firms ; he may be selling our fruit to himself. They will try to boycott any man the fruit growers send. In Covent Garden they tried to boycott me, and wrote me down in newspapers in every way. But still a man with some sharpness and persistence about him, going in there, will succeed in spite of all that, and they are afraid of any one breaking up their system of the commission man selling to the wholesale dealer, and he to the retailer, and he to the consumer. That system has been broken through pretty well now ; but no doubt it worked ruin to our profits—there had to be too many profits before reaching the consumer. I believe that proper men, going over there and persisting and selling in the face of the commission men, would tend to break that system down one way or the other. I tried to break it down for the purpose of compelling these men to buy our fruit here free on board, so that we would be face to face and know how to deal ; and it would pay us better, I consider, to sell on a small margin here, so that we would know where we stood, rather than run the risks such as they are now.

Mr. E. D. Smith—Is it possible for a good man to go to the Old Country a month or two in advance of the season and take orders for apples ?

The President—I sold cargoes in advance to a man I had known years before, at 32 shillings, guaranteed brands ; but except in isolated cases I found it a very difficult thing to do that. They wanted to see the fruit first. They were suspicious. It was all very well to guarantee the brand, but they would rather see it. We might be very honest, but they wanted to look after us a little.

Mr. Goldie (Guelph)—Is fruit all cash when you sell there ?

The PRESIDENT—It is all cash to the shipper; but they sell on credit to some extent. Of course we lose on that. The commission men who sell our cargoes give a month to three months' credit. That is a point against us again. We should try and pass by some of these middlemen. Where I made the best sales I made them direct to the retail dealers. I had no trouble in large cities in selling direct to the retail dealer 500 and 1,000 barrels; and if I dealt fairly with him on one cargo, and gave him a brand that came up to the representation, I was perfectly prepared to sell to him again. That is why I impress on you to establish a brand and be particularly careful that you are never under that brand. Let it be a little better than your representations, if possible, but never under. Once they have established confidence in you they will buy here free on board; they are willing to trust you then because they have tested you.

Mr. A. ALEXANDER (Hamilton)—In a conference of fruit growers held in Crystal Palace, London, last September, this point was taken by Mr. Rivers—son of the celebrated Mr. Rivers—that the fruit should be graded in three classes: choice, fine and ordinary. They referred to the brands on butter, and the confidence they gave dealers at a distance in ordering. The members of this association should come to some understanding about this matter of branding. The dealers and merchants who sell the fruit will then know exactly what they are getting when they order, and by the publishing of fruit lists and prices they know exactly what the prices are. Then, would it not be possible for our fruit growers to have some co-operative agency in one or two of the principal centres in Britain where this fruit might be sent, with this brand upon it—put under the supervision of an inspector appointed for the purpose? The fruit growing interest of Ontario is of sufficient importance for this association, even if they asked Government aid for it, to have three or four inspectors to brand fruit as marked by the growers. At a conference held in Cheswick in connection with the Royal Horticultural Society nearly all came to the same conclusion in reference to this matter of fruit. As to farmers growing too many varieties, they suggested that the farmers or growers should combine and furnish the same kind of apple, so that it would be worth while for buyers to go into the district and buy. Let every grower be his own inspector, like Mr. Woolverton, until others are appointed, and brand their fruit so as to inspire confidence of British buyers.

Mr. DEMPSEY—We never need fear English competition, because the varieties of apples they are compelled to grow in their orchards are, strictly speaking, the most hardy varieties, and generally the variety that is inferior in quality, and they calculate on Covent Garden market about a shilling a bushel. The high prices—eight to ten shillings—are generally for apples grown in gentlemen's gardens by their gardeners. I have seen English apples sold for one shilling a bushel, and ours right beside them selling for 21 shillings a barrel. The English buyers admit the great superiority of our fruit over theirs.

Mr. SAMUEL BRIGGS (Hamilton)—I was over in England at the time of the Colonial Exhibition, and I don't think the English people were more astonished at anything that we showed than the fruit. Mr. White, of Covent Garden, a commission agent, told me: "I must tell you one thing, that you Canadians and Americans make a great mistake in sending fruit over here sometimes. We can't depend on it. Sometimes we get a good lot; sometimes we get a very inferior lot. If we could only impress on the shippers of Canada not to send anything over here but good, first class, A 1, we could always get good prices for it, and there would be no difficulty in selling any quantity."

CHRYSANTHEMUM GROWING.

Mr. J. A. MORTON (Wingham) gave the following address:

In the absence of the gentleman whose name appears on the programme in connection with this subject, I feel constrained to make a few remarks; not that the subject will be better treated by me, but in the hope that in the relation of my experience some hints of use to those who may have attended this evening's session in the expecta-

tion of hearing something upon this topic may be gleaned. My experience has not been that of invariable success, and the "rocks upon which I have split" as well as the success that has attended my efforts I shall endeavor to point out, as what not to do is as essential to know as what to do. The matter will be treated from the standpoint of the amateur possessed of but few appliances for special propagation of plants, and the chrysanthemum of which I speak is the perennial sort, not the annual one.

Cuttings can be made from February till April—good healthy shoots about two inches long. Division of the roots is not so good; strike the cuttings in wet sand with a gentle bottom heat. For the purpose of striking cuttings of various plants I erected in the spring of 1888 a hot-bed greenhouse substantially according to the plan illustrated in the *Canadian Horticulturist* of 1888, page 52. We prefer, however, the building not so high; 3 feet 6 inches suits us better. Previous to building the hot-bed greenhouse cuttings were struck in the dwelling house which answered very well. Care should be taken that the sand does not become dry. Just as soon as the cuttings have sent out roots of half an inch long, pot into 2-inch pots using ordinary potting soil. It is better to pot cuttings when roots are less than half an inch long than to leave them until they have grown much longer. To such as cannot be bothered with the preparation of the regulation potting soil, I would say use ordinary clay loam garden soil, mixing therewith one-third good well rotted manure, and one-third gritty sand; this makes a good substitute for potting soil. The after treatment of the young plants consists in pinching back the shoots to induce a branching habit of growth; you will find some varieties, such as the Japanese, are more inclined to an upright habit of growth than are others, such as the Chinese varieties. Never let the plants suffer from drouth, and shift into larger pots as their roots fill the ones they are in, not allowing them to become pot-bound. Pinching back should not be continued later than the middle of July. After that the plant should be allowed to prepare for the formation of its flower buds at will. Some plant out in the garden when danger of frost is past, taking the plants up in the fall. Others keep them growing in pots set out in the garden, and a third way is to keep them in the greenhouse throughout the summer. After a trial of all three ways, I use the last one, having better success that way than with either of the others. The principal objection I found to the first way is the check which the plants necessarily receive upon being taken up in the fall. The fault found to the second plan is the liability of the plants to dry out in the pots, even when bedded in the soil, and the black aphis is a much more troublesome pest, and more difficult to control when the plants are out of doors than when they are under cover. But whichever plan you adopt the plants should have plenty of sunlight. They enjoy it, and it is essential to their vigor and health. The aphis and allowing the plants to wilt for want of water were the causes of a failure of bloom one year. I had only four flowers from about a dozen plants, and none of those flowers would be exhibited at a chrysanthemum show. Not very encouraging that, was it? The plants must be taken under cover before there is any danger of frost. A low temperature approaching the freezing point will materially affect the flower buds. One year my plants were fine, noble specimens of vegetation, with many flower buds formed, and were a source of self-congratulation to me, but alas, through inattention to the temperature of one evening late in fall, or laziness, I am not sure which, these plants of promise, although under the light cover of a protecting shade, received a check from a light frost, with the result of many stunted and imperfect flowers. The plant itself will recover from a pretty hard freezing, but buds and bloom will not stand even a light frost.

To obtain extra large show flowers, pinch off all the buds but the terminal one on each shoot, and you will be surprised at the results if your plants are well fed. Manure water twice a week gives good effects. Cow manure is recommended in preference to either horse or fowl manure, as being safer to use; not so much danger of an overdose.

What varieties to grow will be left to your own judgment. There are now so many good ones in the plant catalogues of dealers, and so many of real merit being added each year, that you can hardly go astray in an intelligent selection.

If the flowers are cut as they are fully expanded, or a little before, they can be kept in water in a cool place three weeks or more, which is much longer than they would remain in perfection if left on the plant.

The only insect pest which is troublesome is the aphis. Tobacco smoke is the most effective remedy. A handful or two of tobacco stems placed over live coals in some confined place where the infected plants are will do the business. Before my hot-bed greenhouse was built, I used a very large packing case as a smoke house. By papering inside, and with a close fitting lid it was made smoke tight. In this the plants were placed, and through a small hole in the top enough smoke could be blown through the stem of a tobacco pipe—the reverse way in which smoking is usually practised—to destroy the enemy. Leave the plants there two or three hours before removing them.

If any of you ladies do not smoke, and cannot get some one to do it for you as directed, use in the same manner, instead of tobacco smoke, pyrethrum powder, or better still, Bubach, blown in by a small powder gun such as is in common use. Syringing with strong tobacco water is also effective, and I have used coal oil emulsion with advantage. Other insect destroyers could be mentioned, but I have mentioned enough for choice.

The parts pinched off in June, or even July, can be placed in a box of light rich soil, two inches apart each way; they will strike readily, and make fine individual bloom.

Mr. Morden—You can make a water solution from burned tobacco or Scotch snuff and apply it without the difficulty of the smoke in the room. Pyrethrum is also a good insecticide, but not so efficient in its action as tobacco smoke. The trouble with it is that it loses its efficacy by keeping.

Mr. Morton—I tried Myrtle Navy smoking tobacco. I boiled it.

Prof. Saunders—I am afraid you spoiled it. Nicotine is very volatile. There is one thing about tobacco water, and that is in distributing it over the whole plant. It does not permeate the plant as smoke does; but I believe if water is sufficiently strong and made from as good tobacco as you can get, and not boiled but infused, it would kill the insects as well as smoke. It should be applied in a spray.

WORDS OF GREETING.

The President introduced Sheriff McKellar, who greeted the association. He said he had been brought up on a farm, and had worked his way up till now he occupied the position of—hangman. (Laughter.) He was glad to see the importance of fruit and agriculture recognized by the appointment of a member of the Government to look after their interests. When he was in parliament he opposed the opening of the House in the fall, as it would interfere with the farmers fall plowing. He was laughed at throughout the country, but the point was carried. There are too many lawyers in the Legislalature. He would like to see more farmers there.

GARDENS IN CITIES AND SMALL SPACES.

In the absence of Dr. W. C. Adams, of Toronto, who was to have given a paper on "What can be done with a city garden of say 20 feet square in producing supplies for a family?"

Mr. Thomas Bengough (Toronto), having been a near neighbor to Dr. Adams, told about his garden a few feet square, wherein the doctor grew squashes, pumpkins, grapes, tomatoes, lettuce, and other supplies His vines were trained "up a tree" that grew in the yard, and the novel sight was shown of big yellow pumpkins among the branches of a poplar. The squashes were trained along the fence, and supports were nailed on when the vegetables grew large enough to require them. Dr. Adams had carried out suitable plans in his new premises, and two years ago grew sufficient in one season not only to furnish his family but to net about $30 in addition.

Mr. Dempsey had seen a little spot where pumpkins were planted, which ran on a wood pile, and some of them weighed a hundred pounds. He himself had taken seventeen bushels of onions off seventeen feet square—a bushel from each foot. A man could take off twenty feet square a crop of lettuce, of radishes, of cucumbers and a great many other things before the snow was off the ground, just by having some convenient glass and a stove. It is surprising how much could be grown off twenty feet square by the time you occupied the ground all the year.

Mr. Morden—You could get on a hundred acres about 10,000 pieces of such land That will keep about 10,000 families and make $3,000 besides. All that can be done in one year.

The President—There are many spots in cities—especially in front of the house—that might be beautified, and give the children an interest in growing plants. It would be very interesting for people engaged in commercial pursuits to indulge an hour now and then in a little spot of ground. They would be benefited in every way. There is something particularly refining in the cultivation of the soil for any purpose.

Mr. Dempsey—What I am worth to-day I made off three acres of my farm—and I have supported my family and lived pretty well, and paid some other folks' debts. I have seen on a small spot—I won't say it was 20 feet square—a crop of grapes carefully cultivated, something immense, on the east wall, and on the west wall the most magnificent apricots and peaches that I ever saw. You could nearly fill a peach basket at one scraping down—they were so thickly set on a tree that was trained against the wall. You can grow very nice pears against a southern wall with a northern exposure; and there are some fruits that will grow on a northern exposure. Then that leaves the whole of the ground free for the plants. I have sold four dozen peaches at ten cents each that were grown in a ten-inch pot. Now, figure out the inches if you like. (Laughter.)

Prof. Saunders—I had a garden plot 66 by 110 feet, on which I put 120 fruit trees, and grape vines along the borders and around the fences, and strawberry vines about three feet from the grapes, bordering two paths, and I carried on that garden for 17 or 18 years, and in that time got an immense quantity of fruit off it. I might have realised a good deal more than $30 a year from the pears I got from those trees. I began by planting them out about eight feet apart each way, and as the trees grew large if they did not die I had to cut them out here and there so as to make room. I have had as much as 1½ to 2 bushels of plums off these trees—had to prop them up in all directions. I can corroborate all that has been said about getting a great deal off a small piece of land. No matter how small the piece is, by a little ingenuity and management you can make it useful, and make it contribute to your comfort and happiness.

Mr. Denton—It is true that many people make more money out of their gardens than other people do out of their farms.

Mr. Rice—In Rochester I noticed a Dutchman growing grapes up his house. The firm of Curtis Brothers, of Rochester, paid to a man $81 for the fruit of two cherry trees in front of his house. The man paid $1,000 for the lot with the trees on, and this $81 constituted the last dollars of $1,000 that the firm had paid to that man for the fruit off those two trees. (Applause.)

The meeting adjourned at 10:15 p.m.

SECOND DAY.

The SECRETARY read a letter from the honorable the Minister of Education, referring to resolution passed by this association at Ottawa respecting the study of horticulture in public schools :

HORTICULTURE IN PUBLIC SCHOOLS.

The Secretary read several letters, received since the last session, among which was the following from the Minister of Education :—

MY DEAR SIR.—I beg to acknowledge the receipt of a copy of certain resolutions adopted by the Directors of the Fruit Grower's Association of Ontario, respecting the study of Horticulture in our Public Schools. In the new text-book on Agriculture, which is in course of preparation by Principal Mills, of the Model Farm, I expect that the subject of Horticulture will be discussed, and as the book is intended for the Public Schools, the study of this subject will be systematically taken up throughout the Province. By means of "Arbor Day" established three years ago, we are cultivating native plants and ornamental trees in all the school grounds. From the reports received by my Department we have planted already 73,000 trees. I shall consider what is prudent to do in regard to the question respecting first class teachers.

Yours truly,

GEO. W. ROSS.

L. WOOLVERTON, Esq.,
Secretary Fruit Growers' Association, Grimsby.

THE RUSSIAN APRICOT.

Q—Would some one give his experience in regard to the fruiting of the Russian apricot ?

Mr. WELLINGTON—The apricot is one of the handsomest lawn trees that has ever been put out. It is perfectly hardy, as I know from experiment. Some of the seedlings that have been put out have borne good fruit. Nurserymen are offering some half dozen varieties that have been tested, and that really bear good fruit. One is named after Prof. Budd ; and people who know him know that he would not countenance anything that was not reliable. You cannot depend on the seedlings any more than you can on the seedlings of any other fruit ; but if a man does not get good fruit from a seedling apricot he has certainly got a very fine ornamental tree, and one that will stand this climate well.

WANT OF A TASTE FOR AND KNOWLEDGE OF HORTICULTURE AMONG FARMERS.

Mr. A. M. SMITH read the following paper :

MR. PRESIDENT AND GENTLEMEN.—One would naturally suppose that if there was one class above another that would be interested in horticulture and its pursuits it would be the tillers of the soil—our farmers—surrounded as they are by the beauties of nature, trees, plants, fruits and flowers ; that these would be a constant study for them and that they would seek to develop them and bring out all of their beauty and utility. But I am sorry to say that any one familiar with Canadian farming will have to acknowledge that this is not the case—but that Canadian farmers as a rule (I know there are some honorable exceptions) are far behind our professional men and even our tradesmen or

mechanics in their interest *in* and knowledge *of* horticulture. I need only to refer you to our annual list of membership to show you that more than one-half of the members of our association belong to towns and cities instead of being farmers, and if you need any further proof of my assertion I might take you around among the farmers of the country and let you see their surroundings. The trees, shrubs and plants on their farms (or the want of them)—their neglected orchards and fruit gardens. Their unmown lawns covered with burdocks, Canada thistles and other noxious weeds, ornamented with chicken coops, wood piles and broken down farming implements, instead of trees, shrubs and flowers, and compare them with the gardens, trees and lawns in our towns and cities. Our farmers, as I have intimated, have all the surroundings that should induce them to have a taste for horticulture and all the advantages for cultivating it; but how seldom do they improve them. Take the opportunity of selecting a building site and the advantages for laying out lawns, planting trees and shrubbery, and making home attractive in general, to say nothing of fruit growing, that farmers have, and how do they improve them? Are the best sites selected? Are the standing forest trees, if there are any, so left as to present the finest aspect? Are other trees planted with the same end in view? Are lawns laid out and carefully kept? Are other farm buildings located so as to make the least obstruction to the views from the dwelling? A majority of our farm houses in Canada look as though they had been built so as to be as close to the barns and pigpens as possible, instead of being located so as to command the finest views and prospects, and the approaches to them are oftener through narrow lanes and barnyards, covered with their accumulations of filth, than they are through fine avenues of trees or over grass covered lawns, decked with flowers and foliage, and as for conservatories or even plants and window gardening, which brighten so many homes in towns and cities, how little of them do you see among farmers! And come down to the growing of fruits, even for home consumption. I will venture the assertion that the majority of town and city people who are in as good circumstances financially as farmers, are better supplied with the fruits of our country than the majority of farmers are themselves, though they have every facility for growing them. Why it is that farmers do not supply themselves with these luxuries, when they can so easily do so, I could never understand. Take the farmers of Ontario as a whole and there is not over one in fifty, I will venture to say, who grows strawberries and raspberries enough for their own consumption—and what is there to hinder them? They will grow readily in any part of the province; and further, there is not one farm in fifty outside of the Niagara district that has a grape vine on it except it may be a wild one, and the same might be said of plums and pears and some of the other fine fruits. I know a man, right over here in the county of Haldimand, who has recently gone to growing grapes and pease, and he told me a few days ago that his best market for his fruit was right around among the farmers in his own neighborhood; and there is no better soil and climate for growing these fruits in Canada than there is in that locality. Is it any wonder that any community, who are so blind to their own interest, are badly afflicted with politics? Take forestry. How little judgment and foresight has been exercised by the farmers in removing the forests from their farms or in planting out forest trees. Tree after tree has been cut down indiscriminately, no attention being paid to wind breaks being left or shade for the flocks and herds on the farm, or in replanting these where needed, to say nothing of preserving the beauty of the landscape; until to-day the winter winds are sweeping over vast sections of our country which are almost treeless, removing the snow from the white fields and strawberry beds—where there are any—and from the roots of other plants and trees—robbing them of their natural covering and protection, letting the frost in to destroy their roots, pinching and blasting the fruit buds, sweeping through the barnyards among the shivering cattle, penetrating the dwellings of the farmers themselves, necessitating an extra supply of fuel (which they find is now getting scarce) and the putting on of extra storm doors, blinds and windows. Is it any wonder that the boys, and girls, too, want to leave the farm and get into the city, out of the wind in the winter time, or that the extra attractions of fine trees and lawns, fruits and flowers, should entice them to stay there in the summer. It seems to me if farmers want to solve the great problem which we hear so much discussed, "How to keep the boys on the farm," that they have got to go

to work and make their farms and farming more attractive; that they must make their farms something more than mills to grind out dollars and cents; that they must interest their children in the products of the farm and in the beauties of nature around them; that they must give them trees, plants, fruits, and flowers to cultivate, and teach them how to adorn and beautify their homes and make them attractive. Make them to feel that they have an ownership and interest in these things. I believe that every true Canadian, whether he be a farmer or not, has an interest in this subject—for the wealth, yea, the very existence of our nation, depends upon the products of the soil and if our farms and farming becomes so unattractive that our young men can not endure to stay upon the land and till it, what is to become of us as a nation? I am glad to see that our Minister of Agriculture has taken an interest in horticulture among farmers and sent out missionaries to the farmers' institutes throughout the Province to discuss and agitate this subject. I should now like to see our Minister of Education take this matter up What is there to hinder the introduction of text books into our common schools teaching the principles of horticulture in connection with botany and chemistry? Would not a knowledge of the construction of plants and flowers and how to hybridize and produce new varieties of fruits and grains, how to propagate from cutting and bud and graft trees, be as interesting and useful to farmers' sons as a knowledge of ancient history, or geography or algebra would? I doubt if there is one farmer or his sons in one hundred that knows anything about these simple principles; yet how useful they would be to them and what an incentive they might become to the young farmer to develop and bring out the fruit and other resources of the country, besides interesting him in and attracting him to the labors of the farm, and I am not so sure that these studies might add something to the knowledge of some of the students in our higher schools, who, though their heads may be filled with Greek and Latin, don't know all there is to be learned between the house and barn yet. I have not introduced this subject to cast any reflections on farmers, but with a sincere desire to awaken them to a realization of their own interests and responsibilities and a hope that they may in the future become more interested in horticulture.

Mr. MORDEN thought the farmers' lawns and surroundings would compare with those of other people. (Hear, hear). He had never failed to visit a town in Canada or the United States that he was not disgusted with the surroundings of human habitations. It is a great astonishment that people will live with those surroundings. It is a common thing in our towns to find the vilest weeds growing in the streets and yards. If we could reach the city people as well as the farmers it would be very desirable indeed.

FERTILIZATION OF PLANTS.

Prof. PANTON gave the following address:

1. *Definition.*—Fertilization may be defined, as the process by which a plant has the pollen of the stamens, applied to the stigma of the pistil, so that the elements which it contains, reach the ovule in the ovary, and so influence it that it becomes a seed containing an embryo.

2. *The Parts of a Flower.*—To understand this process, we require to know something about the parts of a flower. These are: the outside whorl of leaf-like structures termed the Calyx; its parts are called Sepals, and as a general thing, these are colored green. The next whorl is called the Corolla, and the separate parts Petals, and are usually colored.

It is possible for a plant to produce seed without either of these, and hence the Calyx and Corolla are sometimes spoken of as the non-essential organs, in contrast with the Stamens and Pistils, without which it is impossible for a plant to produce seed, and hence the term essential organs applied to them. Stamens are usually distinguished by having a slender thread-like stalk, the *filament*, on

the upper end of which is a round or oval body called the *Anther*, which contains the *pollen* grains. Under the microscope pollen grains present a great variety in form and general appearance, though to the naked eye pollen appears like dust. Some are perfectly round, others oval, some smooth, others rough. So marked is the difference in the pollen grains of plants, that an experienced observer can identify the plant by merely seeing some of the pollen. Few species show a more beautiful form than the Cuphæa (cigar plant). A close examination of a pollen grain shows that it is composed of two coats, an outside covering (extine) and inside of that another coat (intine), and yet the whole microscopic. Consequently whatever contents are inside of these must be of an exceedingly minute character.

The pistil usually occupies the central portion of the flower, like the stamens, there may be several on the same flower.

The upper part, usually more or less sticky, is called the *Stigma*, from that down, especially where slender, is the *style*, and the enlarged portion at the base is the ovary; in this you find the unfertilized ovules, which, after fertilization has taken place, become seeds. Now an ovule, under the microscope, shows several structures; the central portion nucleus (better nucellus because we have the term nucleus applied to a structure in the cells of plants), a part of this develops into the *embryo sac*, and a portion of this, exceedingly small, forms the *embryonal vesicle*, which becomes a very important factor in fertilization for here, after that process takes place, the embryo is developed.

The nucellus is surrounded by two coats; at one place there is an opening between them known as the micropyle—the use of which will be referred to afterwards.

3. *The process of Fertilization.*—The pollen grains reach the stigma of the pistil, and soon after the outer coat of the pollen bursts, and the inner develops a tube, which begins to penetrate its way down through the style, and finally reaches the embryonal vesicle of the ovule, by passing through a small opening (micropyle) between the coats of the ovule. You will remember I spoke of the ovule as consisting of nucellus, embryo sac, and embryonal vesicle, the last a very minute portion; but when it is reached by the pollen tube, which lies alongside of it, an interchange of elements takes place, and the process of fertilization is effected. At once changes commence in the ovule, and it develops into a seed possessing an embryo.

Sometimes the pollen of a flower fertilizes its own ovules, and, in fact, this was once thought to be the regular way; but close observation and thorough investigation seems to show that this is more exceptional than otherwise. Experience seems to indicate that plants fertilized in this way, are likely to produce weakly plants from their seeds. This method is known as self-fertilization. Where pollen fertilizes the pistils of others flowers of the same species, the term cross fertilization is applied. In such cases seeds are produced, which give rise to strong, healthy, vigorous plants. Viola (violet), oxalis (sorrel), stellaria (chickweed), euphrasia (eyebright), are some examples of the few, that seem to be favorable to self-fertilization.

If cross-fertilization seems to be the common method adopted by nature, there must be some means by which pollen is transferred to the pistils of plants. The study of this becomes one of the most fascinating pages in botany. Time will not permit me to enter this interesting field further than to throw out a hint or two that may lead readers to follow up the subject when opportunity presents itself.

4. *Aids to Fertilization.*—The following aids to fertilization may be referred to here:

(1) Wind. Such plants are usually crowded together, (grasses) unattractive, and some bloom before the leaves appear (soft-maple).

(2) Insects. Flowers aided in this way possess attractive colors, perfume, and supply shelter in some cases, and food (honey) in others.

(3) Birds. Especially in the case of the humming-bird.

(4) Water. This is in the case of some water plants whose pistillate flowers are in the upper part and float above, while the staminate are below. At the proper time the staminate ripen, rise to the surface and bear pollen to the pistillate through the agency of currents.

5. *Nature of Flowers.*—We shall now examine the form and nature of flowers, and see to what extent they seem favorable to cross-fertilization.

(1) Monœcious flowers. These have the staminate and pistillate flowers on the same plant. Staminate refers to those bearing stamens and pistillate to those with pistils. In some cases they are near each other, while in others (Indian corn) far apart. Good examples of monœcious flowers are seen in the begonia, corn and pumpkin. Many a one looking forward to securing a fine crop of pumpkins, has been much disappointed to find autumn come without the golden fruit. Had he examined the plants in flower, he would have seen that they were nearly all staminate flowers and hence useless to bear fruit. No plant is more liable to cross than corn, no doubt on account of its wealth in pollen and the elevated position it occupies at the summit of the stalk, while the silken threads (portions of the pistil), indicate the pistillate flowers below. It would seem that monœcious plants are naturally to a considerable extent favorable to cross-fertilization.

(2) Dicœcious. In this group you have some plants on which all the flowers are staminate, and others on which all are pistillate, consequently the source of pollen (stamens) is much removed from the pistils, and it would seem that cross-fertilization must take place. Willows, poplars, and often in the soft maple we see trees of this character; some with none but staminate, others pistillate flowers.

(3) Hermaphrodite. Here we have flowers each having stamens and pistils, and apparently fitted for self-fertilization, but even in this case you will observe conditions that seem adapted to prevent self-fertilization and be favorable to cross-fertilization.

(*a*) Dimorphic flowers are such that the stamens are much longer than the pistils, or the reverse, and consequently not well adapted to supply the pollen of a flower to its own pistil. Examples: Primula (primrose), Sinum (flax), Mitchella (partridge berry) and Houstonia.

(*b*) Dichogamous flowers have the stamens of a flower ripen before the pistils of the same, or the pistils ripen before the stamens. Examples of *Protandrous*, those on which the stamens are matured before the pistils, and consequently the pollen of such can only be of use in fertilizing the pistils of other flowers mature at that time:—Campanula (bell), Gentiana (gentians), Verbena, Lobelia, Epilobium (willow-herb) and flowers in the orders Compositæ and Umbelliferæ. *Protogynous*, those in which pistils mature first: Plantago (plantain), Scrophularia (knotted figwort), Anthoxanthenum (sweet vernal grass), the interesting plant Aristolochia and the apple.

(*c*) Herkogamous flowers, those in which there is a peculiarity in form or structure favorable to the prevention of self-fertilization to a great extent. This strange modification is especially seen in what are known as papilionaceous (from resemblance to a butterfly), flowers common in the order Leguminosæ (bean family). Wistaria, Robinia (locust), Apios (ground-nut), Phaseolus (beam), all have such peculiar corollas, that when an insect alights upon them to proceed in search of nectar, it receives a blow on the underside of its body from the pistil, which comes up in advance of the stamens and receives any pollen the insect may have about it collected from other flowers, and at the same time this pistil throws on to the insect pollen of that flower which has been prevented from reaching the stigma, by a collection of hair-like structures arranged on the style of the pistil. Thus we see a wonderful arrangement to aid in transferring pollen of one flower to that of another. In Kalmia (American laurel) and Berberis (barberry) we find the anthers of the stamens bent back into pockets on the petals, but the moment an insect alights on the flower, if the stamens are matured, they spring and fire the pollen upon the insect. This it is likely to carry away to other plants. The Iris (flag), and very many of the Orchids also show wonderful structures in their flowers, which seem to indicate that these modifications are for the purpose of favoring cross-fertilization.

6. *Practical results from a study of Fertilization.*—(1) It explains the innumerable varieties of plants in nature. (2) Becomes of practical value in developing new varieties by art, and enables man to obtain innumerable kinds of fruit, grain and flowers.

Fertilization of varieties gives rise to *crosses*, the seeds of which are fertile, while that of species gives hybrids of which the fertility of the seeds cannot be relied upon.

In hybridization the term generally applied to the process of crossing plants experience indicates :—

(*a*) That the characters of the new plant follow the nature of the plant in which the pistil was used.

(*b*) That the characters of the fruit follow those of the plant from which the pollen was taken.

In other words, if you wish a change in fruit use pollen from a better fruit-bearing plant, but if you want a better plant, use the pistil on a vigorous healthy tree, etc.

Some have suceeded in developing strange forms by hybridization, *e.g.*, a cross between pear and apple, giving rise to a tree which bore fruit, to which the name "What is it" may be well applied. Mr. Dempsey, well known to fruit-growers, succeeded in doing this.

Hybrid plants are not likely to revert, but if you take the seeds of such and sow them, they will likely give you innumerable varieties, and in some cases revert to the original.

Such are some of the teachings of science regarding this exceedingly attractive page in plant life, from which not only a wealth of interesting information has been gleaned, but also an immense profit derived from the practical adaptation of them in the pursuit of horticulture. We see this very markedly in our beautiful flowers, our varied fruits and valuable grains, and no doubt as the years roll on this inviting field will be worked by investigators, who will add more brilliant results to those already attained.

Prof. SAUNDERS.—A great many farmers seem to be in darkness as to fertilization. One day a farmer, knowing I kept bees, said: "We will never be able to produce a crop of buckwheat so long as bees are allowed to be kept in the country; they invariably, by visiting the flowers, destroy them, and the result is we get no grain" (Laughter) These principles ought to be understood by every lady particularly. Our flowers and vegetables can be wonderfully improved by assisting nature. If different varieties of cabbage seed, for example, are planted together they spoil the whole affair, because the pollen is carried from one to the other, and the result is a bad mixture. I would like to hear the result of Mr. Dempsey's crossing between the apple and the pear.

Mr. DEMPSEY.—The seeds were failures, and the whole thing was a miserable failure. The whole interior of the fruit would be black and rotten. There would be nothing but a shell. The apple was the pistillate plant in that case.

Prof. SAUNDERS—One of the laws of fertilization is that in almost every instance the plant used as the male—that is, from which the pollen is collected—has the power of impressing its characteristics on the female in regard to the form and character and color of the fruit or seed or flower; whereas the characteristics of the plant itself—its figure and method of growth, and habits of propagating, are usually in the hybrid—they usually follow those that are possessed by the female form. I made a cross some years ago which illustrates this law. Taking a Clinton grape as the female, and the Buckland Sweet Water—a large white grape growing under glass—as the male, the result resembled the Clinton in form, character and appearance, foliage and growth, but the fruit was a large, loose bunch of white grapes very much resembling the Buckland in form, and to some extent in character, but possessing more or less of the acidity of the Clinton. I might cite from another class of experiments on the raspberry, where the Adelaide Black Cap was taken as the female and the Philadelphia as the male. In one instance the plant propagates from tips, in the other from the suckers. The hybrids all propagated from the tips, although they did not propagate so readily as the female plant did, or so invariably. Occasionally a sucker would be sent up, which was a very rare thing, showing that the law with regard to the characteristics which the female plant has is about as strongly impressed in nature as the contrary law that the male affects the fruit. I cite these instances as one showing the operation of the law on one side, and the other on the other side. Hybridization cannot be accomplished without a great deal of care. People have succeeded occasionally by tying a branch of one sort in among the flowers of another variety and intermingling, and then showing those seeds as hybridized seeds. There may be a few instances of hybridization occurring in that way, but they never can be calculated on with certainty, because you are never sure whether hybridization has taken place or not. In crossing such flowers as the grape, where the stigma is very tender and easily injured by the fine forceps that you use to tear off the corolla and the calyx, you will find that the flower will be injured in nineteen cases out of twenty. In one of the old reports of the association I published my failures in hybridization, and any one will see that out of thousands of trials there were very few successes. By persevering you can get results that will be satisfactory to you and a benefit to the community; and this process is beneficial not only in the immediate results you get from a good cross, but by sowing the seed obtained from these crosses. A starting point is obtained in a case of that kind that has been compared to the wheel of a cart—the hybrid being the starting point. Your varieties extend in different directions, one upwards and one downwards, and one sideways and one below; and you have varieties that run back to the

original wild stock, and other varieties that by some mysterious process have added to them virtues and qualities which neither of the original parents contained; and you have a starting point from which there is no calculating what the results will be, because the continuity of nature being once rudely broken in on by this process of crosses. the tendency to variation is increased, so that by continuing the varieties we have we might produce as good results as by hybrids. In wheat, barley and oats it does not seem as if the agency of insects comes in at all. The grains appear in every case to be self-fertilized, and hence I do not think there is any likelihood of new varieties of wheat or barley or oats being obtained by cross-fertilization in nature, unless it be by accident, where, for instance, a grasshopper or some predacious insect may have eaten away a part of the enclosure surrounding the essential organs of the plant, and thus exposed them in a way that the wind or insects could carry the pollen from one to the other. In that class of plants we can only look for useful results by artificial impregnation. I have succeeded in securing 25 or 30 grains of hybridized cereals to start with this year, the growth of which will be watched with a good deal of interest to see what tendency they develop, and how far they combine the qualities of the two useful species which it has been aimed to combine. Mr. Hilborn, my assistant at the Experimental Farm, has succeeded in making quite a number of crosses with raspberries with different varieties, and also in some other departments of the same line; and I think a very important feature of the farm will be the origination of new varieties by both hybridization and cross-fertilization as well as by selection.

Prof. PANTON.—Do you find that those hybrid raspberries of yours are reverting back to the black in flavor?

Prof. SAUNDERS.—Not the plants themselves, or the plants struck from the roots or tips of those that have been produced; but sowing the seed of those, and raising another generation, they sprout in every direction, some white, some black, and some red, so that I have good hopes that by sowing the seed of the best of these we may multiply varieties of a useful character with much greater rapidity than we could hope to get them in any other way.

BIRDS USEFUL AND INJURIOUS IN HORTICULTURE.

Mr. T. McILRAITH (Hamilton) read the following paper:

Although I have read with interest the reports which have from time to time been issued by this Association, and have heard with satisfaction of the success which has attended the efforts of its members in the production of new fruit, I have not hitherto been present at any of the meetings. Permit me, then, to say, that I consider it an honor to meet with those who are doing such an important work in the Province, and I had much pleasure in complying with the request of your secretary to be present on this occassion.

I do not come as a fruit grower, although I have fruit trees, and many native flowering shrubs near my home, nor yet as a fruit dealer, although for several years I have consigned an annual shipment of apples to friends in the old country. Last fall I sent a barrel of this fruit, grown near Hamilton, to a friend in Devonshire, which seemed at the time to be like sending coals to Newcastle, but in due course the receipt was acknowledged with the remark that "they grew large quantities of apples and made good cider in Devonshire, but produced no such fruit for the table as the Golden Russet, King of Tomkins County, Seek-no-farther, and other sorts which the barrel contained."

I have come, sir, to say a few words about our birds, the native birds of our woods and orchards, and their economic relations with the farmer, fruit grower and gardener.

With one exception I am glad to be able to speak of them all as friends, and that one exception I need scarcely say is the English sparrow. This, as we all know, is not a native of the country, but an imported species which finding here climatic and other conditions suited to its wants, has made up its mind to stay, and has increased at a rate for which we find no parallel in the history of any other bird.

In Canada there has been no concerted action towards getting statistics of its increase and habits, but in the United States, where it first settled and where its depredations first attracted notice, the government has at great expense obtained reports of its operations in every State where it has settled. All concur in the opinion that it now effects prejudicially the interests of the farmer, fruit grower and gardener to a greater extent than any other bird, while its rapid spread and increase renders it impossible to predict where the evil is to end.

Among the *direct* charges brought against the sparrow by the fruit growers is that of visiting the orchard in the early spring and doing serious injury by eating out the germs of the fruit buds; the peach, pear, plum, apricot, cherry, apple, currant, grape being all sufferers.

Later in the season, its visits to the vegetable garden are equally disastrous, for it attacks lettuce, peas, beets, radishes, cabbages and cauliflowers as soon as they appear above the surface, and even the seed has been taken up and devoured before it has had time to germinate. So great, indeed, has been the injury thus sustained, that in many localities the market gardeners have found it necessary to cover their garden beds with netting to prevent the total destruction of the crops. As the season advances the ripe fruit is attacked, and besides what is eaten, large quantities of apples, pears, peaches, plums, tomatoes, grapes and strawberries are destroyed by having holes pecked in the sides, causing the fruit to drop on the ground or decay on the branches.

In some localities where the grape industry once flourished, it is no longer possible to continue it with profit on account of the sparrow pest, though some growers, as a last resource, have tried to save their crops by enclosing the ripening clusters in paper bags.

While hundreds of reports have been sent in to the Department of Agriculture from different points in the union confirming the truth of the foregoing statement, others equally numerous are available to shew that the farmer does not escape the general scourge. The purport of these may be summed up in the words of Mr. Hoadly, who has been intrusted with the collection of evidence:—

"Annoying and injurious as the sparrow is to the fruit grower and vegetable gardener, the loss it inflicts on the producer of cereals is still greater.

Though for its permanent residence it prefers populous cities and places of abundant traffic and commotion, still, in anticipation of the harvest season, it gathers in enormous flocks, and leaving the cities and towns moves off into the surrounding country to feed upon the ripening grain. Its consumption and waste of corn, wheat, oats, rye, barley and buckwheat in many parts of the country is enormous. It feeds on the kernel when it is in the soft, milky state, as well as when it has matured and hardened, and in fields of ripe grain it scatters upon the ground even more than it consumes. Instances have been reported where in place of a full or fair crop, only the straw remained to be gathered."

Besides the foregoing *direct* injuries chargeable to the sparrow, it *indirectly* causes considerable loss by driving away our native birds.

Before the advent of the sparrow the insect pests in the garden and orchard were fairly kept in check, being sought for as food by such birds as the robin, catbird, blue bird, song sparrow, house-wren, yellow bird, oriole, vireo, phœbe, purple martin and white-bellied swallow. All of these have now been either entirely driven away from their former haunts, or remain in greatly reduced numbers under perpetual annoyance. The sparrows have many bitter family quarrels among themselves, but should a bird of a different species appear upon the scene, it is astonishing to see how quickly they lay aside their own disputes and unite in driving off the stranger.

The robin, from its large size and courageous nature, holds his own against the sparrows, better perhaps than any of the other birds named, but even its eggs and young are sometimes attacked and destroyed by this merciless marauder.

The purple martin, with care still has a footing on the cornice beneath the projecting roofs of a few of our city buildings, but should a pair seek to make their home in a garden box, as formerly, they have a continued fight for the occupation, and have even been known to be overpowered by numbers and killed in defence of their home.

Our native birds being thus driven off, the insects are allowed to riot unchecked among the buds in the garden and orchard, and do far more injury now than they could have done while their numbers were reduced by the birds.

On the first appearance of the sparrow among us, it was treated with great kindness and consideration.

The city council of Hamilton, with characteristic benevolence, erected a commodious house for it in the centre of the city, and for a time it was fed daily. Now the feeling toward them has changed everywhere, and the most important consideration is, how to diminish their numbers, or if possible to get rid of them altogether. Dr. Fisher, of the Department of Agriculture at Washington, recommends poisoning in a variety of ways—by strychnine, arsenic, corrosive sublimate, nux vomica, etc. This plan has been tried at the experimental farm at Ottawa, but has not been quite successful, for the sparrows are cunning, observant birds, endowed with more wisdom than some bipeds of a higher class. Should one of their number be observed to stagger, or be otherwise affected by what they are eating, the feast is stopped at once and not again resumed. On this account, a slow poison is recommended which will not take effect till some time after the birds have left the feeding ground.

The sparrows have not yet appeared in Canada in such numbers as they have done farther south, but even here they are on the increase, and with the foregoing facts in view, it becomes a question whether this Association should not take some steps to abate the sparrow nuisance before it gets entirely beyond control.

The history of the sparrow has become so important from its unprecedented increase and spread over such a vast territory, together with the extent of its ravages wherever it has settled, that large sums of money have been expended in gaining information which enables us to speak of its habits with some degree of certainty. But when we turn to consider the economic relations of our old garden friends with whose appearance we are most familiar, we have to inquire into the nature of *their* food, and on this subject our knowledge is so far from complete that any conclusions arrived at must be considered as only approximate.

Much has been said in a general way, by all writers on ornithology, about certain species of birds living on insects, and certain other species living on seeds; but we have many that change their diet according to the season of the year, and it cannot properly be included in either of these groups. Another important consideration is, to determine whether the insects destroyed by the birds are injurious or beneficial in farm or garden. Even on this point there is still some difference of opinion in regard to the true position of certain species.

Among the seed eaters, similar difficulties occur, as many birds are known to feed freely on whatever suitable seeds are available, without considering whether they are noxious to the farmer or not. In this way a bird may, during one part of the season, be doing the farmer good service, and at another he may be doing injury in a corresponding degree. In this connection I would mention the case of the bob-o-link, which, while with us, lives almost entirely on insects, and is considered highly beneficial, but when in vast flocks it reaches the rice fields in the south, it annually entails a loss of thousands, if not of millions, of dollars on the planters, by the destruction of the crops. With the foregoing facts in view, it will be seen how nearly impossible it is, in the present state of our knowledge, to form anything like a positive idea of the economic value of our birds; but we know enough of the habits of many of the species to believe that the balance for good is in their favor, and so let us protect and encourage them as far as in our power.

Among our garden birds, no one is better known than the robin, and a cheerful, joyous fellow he is, turning his bright red breast to the east in the early spring morning, and hailing the rising sun with his *hearty* if not very *musical* ditty. That he is fond of fruit cannot be disputed, and he is a good judge, taking only the finest of the cherries, but he is also known to destroy large numbers of cutworms, caterpillars, grubs and beetles, whose ravages might have far exceeded his own.

Dr. King of River Falls, who has, at the request of the State of Wisconsin, prepared the most exhaustive report I know of on the food of birds, says regarding the robin:—"In its method of obtaining food, and in the situation from which its food is gleaned, the robin performs a very important work, and one for which few other birds are so well adapted. So important is this work, that the small quantity of fruit it consumes is but a stingy compensation for the services which it renders, and I know of no bird whose greater abundance is likely to prove of more service to the country. Its eminently terrestrial habits, its fondness for larvæ of various kinds, its ability to obtain those which are hidden beneath the turf, give it a usefulness in destroying cutworms in the larval state which no other bird possesses in the same degree, and for this feature of its economy alone, its greater abundance should be encouraged."

Another familiar garden bird, now less numerous than formerly, is the cat-bird, which, like the robin, is a member of the thrush family; and it, too, delights in the society of man. It is not so much a city bird as the robin, neither is it found in the heavily timbered woods. Its choice of a residence is in the garden of our suburban villas, or near a log house on the edge of a clearing. In such places its lithe, handsome form may be seen gliding among the shrubbery, and its rich melodious notes, when heard morning and evening, are often mistaken for those of the brown thrush. Its food consists largely of insects, and in the season it also takes the berries of our wild and cultivated bushes, but a careful examination has shewn that the balance of work done has been in favor of the gardener, so by all means give the cat-bird the benefit, and encourage his presence in the garden, where his lively manners are always interesting.

The Baltimore oriole is the most gaily attired of all our garden songsters, and none build a more artistic nest. About the middle of the first week in May, the clear flute-like notes of the male are heard for the first time in the garden in the early morning, the journey from the south having been performed by short stages during the night. A few days afterwards the females arrive, and soon the pair are seen busily engaged weaving their curious purse-like nest, which is usually suspended from the drooping branch of an elm, or other suitable tree. It is a pleasing sight to see the glowing colors of this bird shewn against a background of Norway spruce, and no one of our feathered tribes more quickly attracts the notice of strangers, but it is charged with visiting the orchard to the injury of the fruit.

The food of the oriole, however, consists largely of insects, and it is known to take many of the injurious forms which other birds do not care for. As an instance of this, it has been seen to put its head through the web of the tent caterpillar, and remove the inmates. It is also known to feed freely on the insect known as leaf rollers, as many as twenty-five having been taken from the stomach of one oriole. It thus takes a high stand among beneficial birds, and should be protected accordingly.

The American goldfinch is another of our most showy birds. It resides with us throughout the year but loses its gay colors during the winter and is therefore less noticed during that season. It is very abundant and is generally distributed in all open places, feeding almost exclusively on the seeds of noxious weeds, such as the dandelion, burdock, fox-tail grass, etc. For the consumption of the seeds of the Canada thistle alone it is entitled to our protection and I think it is seldom molested.

The case of the crow is one which requires consideration, and I have no official report on it to refer to. Many writers give it credit for doing great good in the destruction of caterpillars, grubs, beetles, etc., which it picks up while following the plow. No doubt it eats these as it will eat anything else that is eatable, but it also does great havoc by pulling up and devouring the sprouting corn.

In the opinion of many observers it destroys more young chickens, ducklings, goslings, etc., than all the hawks and owls put together. It is known to rob the nests of small birds, taking the eggs and even tearing out and devouring the callon young.

I would strongly urge those who have opportunity to do so, to observe and take notes on the habit of the crow and to let him have his true position as the evidence may direct.

The woodpeckers as a class deserve our protection on account of the service they render in the destruction of the wood-boring grubs and other noxious insects which infest our fruit and forest trees. They all take a little fruit now and then by way of a relish but the true feeding ground of the woodpecker is among the timber. The yellow bellied species, a bird of handsome plumage, is the one which makes those horizontal rows of holes which we see around the trunks of the trees. In some sections where trees are scarce it is said that those holes are so numerous and so close together that the tree becomes girdled and dies in consequence, but no instance of this kind has come under my notice. I believe that the holes are drilled to allow the birds to feed on the saccharine fluid which exudes from them. So far as I have noticed the tree is not thereby in any way injured.

Perhaps there is no class of birds regarding whose habit so much misapprehension exists as the hawks and owls. Every man or boy who could handle a gun used to think he had accomplished a feat when he succeeded in killing one of those birds, but the subject has been taken up in earnest by the Department of Agriculture at Washington and we are likely soon to know all that can be known regarding their food. Dr. A. K. Fisher, assistant ornithologist of the department who has instructions to make an exhaustive report on the subject, has kindly sent me some sheets which have been published in advance. Already several hundred of the birds have been sacrificed to give an opportunity of examining the contents of their stomachs and the results shew largely in favor of the birds, some of which rarely if ever touch poultry, while they render incalculable service to the farmer by the destruction of innumerable rats, mice and other small mammals.

Of the large owls the one we most frequently see or hear about is the great horned owl Bubo Virginianus. It is the strongest and most fierce and daring of all the family, and at times is very destructive to poultry. If one of those birds gets into the habit of visiting the farm buildings and taking the chickens, means should be taken to stop proceedings at once or it will return night after night and take the spoil as long as it lasts. The species is not very numerous and many individuals never come near the poultry but spend their lives in the solitude of the woods where they feast on ruffed grouse, rabbits, and other small mammals.

The long and short eared owls which we see skimming noiselessly over the meadows in the dusk of the evening feed almost entirely on mice and are therefore true friends of the farmer. Out of forty-five stomachs of this species which were examined four contained small birds, thirty-four mice, three other mammals, seven insects, and six were empty.

Much the same may be said in regard to the barred owl, though strange to say in the stomachs of two individuals of this species were found remains of their near relative the screech owl, and in another those of the saw-whet, but of thirty-seven stomachs examined sixteen contained mice while the others contained frogs, insects and crawfish.

The little screech owl which is often very common in the barns during the winter has a record which shews it to be well entitled to protection as one of the best friends of the farmer. Of ninety-four stomachs of this species examined one contained poultry, twenty small birds, forty-one mice, thirty-five insects, and several it is to be regretted were empty.

The saw-whet owl is smaller than the preceding in size, is without the ear tufts and by no means as common as the preceding. Of this species the stomachs of only six were examined and all contained mice.

The marsh hawk, slender in form with long pointed wings, dark brown above lighter below, is often seen sailing over marshes and wet meadows. Of forty-six stomachs of this species examined five contained poultry, or game birds, five small birds, twenty-four mice, nine other mammals, eight insects, three reptiles and one was empty. The large consumption of mice by this species bespeaks for it the protection of the farmer, but it is often needlessly killed by the gunner while he is watching for ducks.

The two following species which resemble each other in color but differ in size are the most destructive to poultry and small birds of all the hawks. They are both quite common, mostly in spring and fall, and excite the admiration of those who are fond of witnessing active exhibitions of bird life by the dexterity

they show in capturing their prey. The sharp shinned hawk is the smaller of the two. The tail is long, the legs slender, and the claws extremely sharp. He is a terror to small birds, whose head he frequently takes off with a jerk at short notice, but is too light to do much mischief among the poultry, though he does sometimes make the attempt. Of forty-eight stomachs examined two contained poultry, thirty-five small birds, four mice, two insects, and ten were empty.

The other one of the pair referred to is Cooper's hawk. It resembles the preceding one in appearance but is a larger, stronger bird and more injurious in proportion. This is the one which does most mischief among the poultry and truly deserves the name of hen hawk, though that title is often applied to other comparatively harmless species.

Some hawks have the habit of sailing high overhead in wide circles carefully scanning the landscape below with eyes which can readily be changed from a telescope to a microscope, but the species we are describing skims noiselessly along in the shade of a fence or row of bushes and pounces with inconceivable velocity on anything suitable which comes in its way. Of forty-six stomachs examined fifteen contained poultry or game birds, seventeen other birds, one mice, one frog, one lizard, two insects and eleven were empty.

The red-tailed hawk, from its large size and grand soaring flight, is well known throughout the country. It is the one usually spoken of as the hen hawk and has always been charged with carrying off poultry. On this account a more exhaustive examination has been made of this species than of any other, no fewer than 311 stomachs having been dissected. The result has shown that of all that large number only twenty-nine had partaken of poultry, while 203 had mice, the others having used insects and reptiles, while a few were empty. I look on this as the most valuable result in the whole examination, removing as it does the stigma from a bird which has always been persecuted as a robber of the roost, and placing it in its true position as a friend to the farmer to whom it renders great service in the destruction of so many mice.

The red shouldered hawk resembles the preceding in general appearance and its habits are similar. It is quite common in southern Ontario where it is known as one of the hen hawks. That it does scoop up a chicken now and then cannot be doubted, yet the examination of 102 stomachs showed that only one contained poultry, while sixty-one had taken mice, twenty other mammals, forty insects, fifteen reptiles, and a few had used a mixed diet of earth worms, crawfish, etc.

There are many other species of bird which well deserve notice, but I have already occupied much of your valuable time and will now draw to a close. On reviewing the subject generally I would recommend that means be taken at once to check the increase of the English sparrow, but all other small birds I think are entitled to protection, the balance of their influence being for good and therefore the more we have of them the better. Of the two hawks most destructive to poultry and small birds (viz., Coopers and the sharp shinned), I can only say that they are natives, and may in some way not known to us, prevent the undue increase of certain species of small birds, thus maintaining the balance of power in the economy of nature, though I must admit that I think their presence could well be spared, unless they could be trained to confine their attention to the English sparrows.

The great horned owl should be kept in check as indicated, and the crow may well be left in the hands of the farmer who is most affected by his operations.

I have only further to say that I have at home mounted specimens of all the birds I have been describing which I will be pleased to shew to any of the members who may find time to pay me a visit at Cairnbrae.

Mr. E. D. SMITH suggested that the Government be urged to take steps to destroy the sparrow. The robin is terribly destructive to the crops, so that we lose more than we gain. We subdue them by taking their nests, destroying their young, and later on shooting them.

The SECRETARY moved, seconded by Mr, E. D. SMITH, that Prof. Saunders, Mr. McIlraith and Mr. Dunton be a committee to prepare a resolution addressed to the Minister of Agriculture asking legislation regarding useful and injurious birds.

Mr. GOLDIE (Guelph) said it was true the sparrow was an immigrant, but it was neither a pauper nor a lunatic. Around his residence he had 500 or 1,000, and he had never yet seen the first injury they had done to either fruits or vegetables or buds, and he knew they destroyed more insects than any other bird. He believed he was the first person to introduce the sparrows to this country. (Laughter.) His friends in the United States told him not to tell this, lest he should get into trouble and suffer lynching. (Laughter.) He could imagine that further south they might do a great deal of injury, but he could not see the injury they would do in any part of Canada, or else they must differ very much from their habits around Guelph. The tent caterpillar is a thing of the past in gardens and orchards around Guelph. He had often seen the sparrows picking the eggs off the branches, and on lanes and roadsides he had seen them frequently destroying insects, and they would catch some moths and butterflies even on the wing. He had never seen them take the buds of trees, either in England or here. He had no doubt the purple finch was the bird that often did the damage the sparrow was blamed for. He had no doubt if there were any oats in the vicinity of the town the sparrows frequented they would take a few heads of the grain around the edge of the field; but in the wheat or grain fields they are not destined to do much damage. He thought the winter destroyed so many of them that we need not fear their great increase.

Mr. WM. ORR thought the sparrow was most destructive and dirty, befouling harness, carriages, etc.

Mr. GOLDIE—That is the only thing I would have against them. I admit that they are very dirty.

Prof. SAUNDERS—We have found sparrows do a great deal of damage to our experimental plots of grain, both in the field and after it has been put in the barn, before it is threshed. Poisoning had been successful to a considerable extent by this method. Cover grains of wheat with a mixture of mucilage and water, and while wet cover these grains with arnica, mix the grains with chaff so as to overcome the acute perception of the birds.

Mr. MCILRAITH—In the Old Country my recollection is that the sparrows betake themselves to the oat fields. Such is their custom in the United States

Dr. BURGESS—The best way to get rid of the sparrows is to destroy the nests. You will have to do this two or three times a year. I know sparrows will destroy fruit buds and fruit, but the main charge I bring against them is that they destroy our native birds and our buildings.

The resolution was carried unanimously, and the association adjourned for lunch till 2.30 p.m.

GROWTH AND MARKETING OF GRAPES.

Mr. E. D. Smith (Winona)—There is plenty of room to extend the market (1) by getting earlier grapes of good quality. We ought to have a grape as early as the Champion and as good as the Worden in every respect. If we had that we could double our plantations. (2) At the end of the season by preserving grapes. (3) By putting on the market nothing but grapes of the very best quality. (4) By teaching the consuming population the good uses of grapes, both as food and medicine. Very little is known about that at present. The Champion is a strong grower, prolific in yield, good hardy vine, good leaf, and comes earlier than anything we have. There is a fortune for some man who will bring the right early grape before the public and handle it well. The first good grape we have is the Worden, which is at least ten days later than the Champion. The best ten days in the season for selling grapes is far more than lost, because it is occupied by a grape which destroys the sale of other grapes, being so poor. The season is partly occupied by Moore's Early, but it does not yield in sufficient quantity to compete with the Champion. We must have a grape good enough in all its points to drive the Champion out. Moyer's Seedling is not known well enough yet to pronounce positively as to all its good points. It is sweet, good flavor, and early. I think about as early as the Champion. But that is a red grape, and even if successful and as good, it may not drive the Champion out. Our thanks are due to the men who have experimented so largely in hybridization. Commercial growers have not the time, and we should be thankful we have men who have time to produce a variety of grapes. With better systems of preserving, grapes could be sold till May, and the time when strawberries come in. The best keeper I find is the Salem; but it has other qualities that do not recommend it to the commercial grower, though it is of an exceedingly good quality, fairly good yield, and handsome to look at. The great objection is the weakness of the leaf; that is the great objection, unless it can be overcome by the French mixtures. The principal one is the Bordeaux mixture. I applied it in a liquid form with a whisk. I have seen some Salem grapes packed in cork dust that are to-day as sound as when they were picked. The Vergennes do not keep as well as the Salem, nor do either of the Rogers, 3 and 4. A gentleman in Ottawa told me that he believed a thousand kegs containing fifty pounds each of the Malaga grapes were sold there every season. If that proportion is sold in other cities it would require a good many acres to raise that amount. I believe we will occupy this field one day with grapes of our own. I presume there are at least one hundred acres in the market already established. Until the Champion can be driven out by grapes of better quality it will be grown. No doubt there has been money in it; it produces so abundantly. The consumer comes along and gets a taste of this grape when it is put on the market. It is green all the time; it is bad to eat, until the Concord is put on the market, which is put on green because it is thought it will take the place of the Champion. And so we have a succession of poor green grapes in the beginning of the season, which is unsatisfactory. We must remember that the most of grapes are sold in five cent packages. A clerk or mechanic comes along and buys those grapes and finds them sour, and says: "I guess I will wait till grapes get better." He does not know the difference between Concord and Champion. He waits a week. That consumer is out of the market for a week or ten days; and perhaps he comes to try it again and gets some green Concords, and he is disgusted again; and that consumer is thrown off the market for the best three weeks of the season I believe if we had no Champion grapes and every grape that was put on the market was good quality, three years after this we could sell three times as many

grapes as we do, and get as good a price for them. People strip their vines and put everything in the basket, and the retail dealer is disgusted, and the customer is disgusted. Selling grapes is like selling whisky or wine; they make it in such a shape that people are enticed to take some more. So I say we must put our grapes on the market in the very best possible shape, and only grow those of the very best quality. If we do that we can grow an enormous quantity of them, for we have an enormous market to supply. It is well known that to day very few grapes are known, except for fermented wine and for eating out of hand. Those who have tried them know that all varieties of grapes are as good as any fruit when sealed, and many think them better; and yet there is not one consumer in five hundred who knows how to do them up. Thousands of people would like to have some unfermented wine, but don't know how to make it; and thousands of people do not know the medicinal value of grapes. The young fellows are weighing themselves often in the fall, and they often find that in the fall they gain from ten to fifteen pounds. (Hear, hear, and laughter) That goes to show they must be of great value as medicine. Besides, we have the old grape cures in the old world, where people are dieted on grapes alone. They are started on one pound, and after they get accustomed to it they get so that they can use twelve pounds a day. (Hear, hear.) If we could show people the medicinal value of grapes we could dispose of a great many more. The fruit growers of Winona a few years ago struck off 100,000 copies of recipes for different ways of using grapes, and those were distributed to our customers in the cities; and I have been repeatedly asked for more of these for succeeding years, so it appears they were used. The way most of them did was to put one in each basket. I think the better way is, if you can get the person you are dealing with to take the matter up, and make it clear to his mind that it will be to his advantage as well as yours for him to distribute them in advance. At the beginning of the season I think it would be more use.

A Delegate—What size package do you recommend?

Mr. Smith—It is better for us to adopt a uniform package, holding ten pounds, basket included. We would get better terms for our grapes than if larger baskets are used. Commission men in Toronto and Montreal object to handling more baskets, but they acknowledge that they would fetch half a cent a pound more than they will in 20-pound baskets. Besides, a great many grapes in the bottom of the basket are always bruised and wasted to the retailer. They are sending a great many Catawbas from the States in 4-pound baskets. In New York and Philadelphia they hold from 8 to 10 lb.

Mr. Goldie—Do you take them off the bunch? A. Most of our varieties tear so much that it would injure them that way.

Prof. Saunders—In cooking them do you pop the seeds out? A. Yes.

Delegate—Will they succeed as well on sandy soil?

Mr. Smith—Slow, feeble growers will do better on rich sand than on clay, while strong, thrifty growers will do better on deep, strong land. On sandy soil wood ashes is the best fertiliser. Bone dust is good.

Q. Should you plant out a one-year old or a two-year old? A. I would prefer a real strong thrifty one-year old to a two-year old. A one-year old Moore's Early beat Worden's considerably in growth on the same soil.

Q. How to put a veto on shipping grapes before they are ripe?

The Secretary—The city health inspector should look after green grapes and confiscate them.

Q. Have you ever tried "ringing" grapes to get them ripe early for the market? A. No.

The SECRETARY—This has been practised quite frequently for the fairs, in order to get large grapes to take prizes. It is practised about the city of Hamilton, I think, for that purpose. In Massachusetts, about the city of Concord, it has been practised largely for market purposes. An owner of a large vineyard there has been experimenting. He "ringed" half the vineyard by twisting little pieces of wire about the branches that were to be cut off that fall; and it is stated that the Concord grapes were ripened early enough to bring them in competition with the Worden in the market.

Mr. A. M. SMITH—Formerly our provincial prize list had a clause in, excluding "ringed" grapes from competition with those that were not ringed. I think this ought to be introduced into all rules of our agricultural and horticultural associations. It is entirely unfair for ringed grapes to compete with those in their natural condition. People who go to fairs to select varieties, see those ringed grapes, and not getting a chance to taste them, order those varieties, and when they come to compare them, say: "That is not the grapes I saw for the Salem or Agawam." As an educator of the public this grape is wrong to be shown in that way. But there is a separate class, like fat cattle; if they are to be shown wherever I am a judge I exclude them, and give a prize for quality instead of size.

A. M. PETTIT—Last year at the Hamilton fair, we consulted the directors and they told us to judge by flavor entirely, and the protests came in t ick and fast. We had a hearing before the president and committee of that department, and they sustained our judgment. All judges at fairs should do the same. If the grape growers of the country should ring their grapes, it would reduce the consumption of the fruit to a very great extent, to put these weak, flavorless grapes upon the market. If we could grow the beautiful little Delaware as large as the Roger 15, it would not be the Delaware: and that is the case with many other varieties.

The PRESIDENT—The matter of ringed fruit rests with the judges at exhibitions altogether. It is very easy to tell ringed fruit by the lack of flavor, its watery, insipid taste. Judges should judge by flavor and throw them out.

Mr. DEMPSEY—I always judge from quality in grapes. I have competed against those that were ringed, but I never ring grapes, though I have stimulated the vine by using scissors and thumb and finger for pinching them; and invariably I have been satisfied with the result. We should encourage people to resist by any honest means the stimulating of fancy growths of fruits for exhibitions; or if we cannot do that, have separate prizes for ringed grapes. This is not the only evil, however; I have known cases of people sending to Quebec and to the United States for samples of fruit to exhibit at fairs as their own.

Mr. STIPE (Hamilton)—Should we not raise grapes for commercial use instead of quality? This Association would be doing a kindness to the grape growers by encouraging some principle of bringing the grape sooner into perfection, and I believe this ringing process will do it, and by that means we get a bigger price, and that is all we care for—the money. (Laughter.)

Mr. E. D. SMITH—I have seen vines that were ringed pretty regularly, and the result was that the vineyards were ruined.

Mr. STIPE—I can't agree with that. I believe a man can ring a grape, grow a cane every year, and produce the same amount of fruit, and have it in the market so early that he will beat others.

Mr. S. BURNER (Hamilton)—I ring all my grapes, and it pays me to do it, and that is why I do it. Last season I produced a little over three tons from five acres. I crop the ground with vegetables as if the grapes were not there. The vines would probably cover an acre if they were planted alone. They are Rogers. It has done no injury to the vines, but you must grow new wood every season to provide your crop for the next. If you ring the wood that produced this season and make no provision for the next, you would be minus a crop. As long as it pays me I think I will ring them.

A DELEGATE—What about the flavor?

Mr. BURNER—I don't possess that nice sense of palate that some of my friends do. In some seasons they will be watery, but in a cold late season I get the most benefit of the ringing. You get color into them, and a good looking thing in a basket, and like every thing else, the best looking thing will bring the best price. I had 300 bearing vines, and 180 more to come into bearing this year. I have them in rows, twelve feet apart each way.

The PRESIDENT—How do you find the ringing affects the shipping and keeping qualities?

Mr. BURNER—I don't know anything about that because I get rid of them as quick as I can. I find that the early bird gets the worm. There is a lot of work about this ringing process, and that does not suit the fruit growers. (Laughter). I strip the bark not less than an inch in width. Anything much less than that is not of much effect. Some I have taken off before the grape was in bloom to make the grape set better, but they are generally about the size of pears before I got at them—in July generally. The ringing makes them four times as large as anybody else's.

The SECRETARY—While we may condemn ringing for exhibition purposes the question comes, is it not likely to be a profitable thing for us to do for marketing them by increasing the size and getting into the market earlier. Mr. Barry, the President of the N. Y. Horticultural Society, boldly denounced the ringing of grapes on the score of loss of quality, and in the face of these differences of opinion it will require further experiment before we can be very positive.

The Secretary read the following extract from one of the bulletins of the Agricultural Experiment Stations in Massachusetts:—

"Cutting rings of bark from the canes of the grape vine to hasten the time of ripening has been practised more or less for many years to prepare large specimens for exhibition, but only for the few years past has it been practised to hasten the crop for market.

"In a series of experiments made in the college vineyard in 1877 and 1878, and recorded in the Report of the Board of Agriculture of Mass. 1878 and 1879, it was found that removing a ring of bark early in July, quarter of an inch wide, resulted in hastening the time of ripening from one to two weeks.

"It was also concluded from very careful tests made at the time that the increased size and early maturity *was not at the expense of the quality*, and that as far as could be determined at that time, and which further observations have confirmed, that the vines are not materially injured by the girdling.

"Girdling has been practised in the college vineyard more or less every year since with favorable results; the canes that are to be cut away at the fall pruning only have been girdled to avoid any possibility of injury to vine or root from stopping the downward flow of sap by the girdle.

"Some seasons the results of this practice have been more marked than in others, but generally the increased price obtained for the early fruit has much more than paid expenses of the work, and in seasons of early frost, to which many sections of New England are liable, it has made the difference between total failure and fair profit.

"To save expense in the work for the past two years the girdling has been done by twisting a wire very firmly about the canes the last of June above the point where the cane is to be cut away at the fall pruning.

"About No. 20 wire has been found best, and results obtained have been more satisfactory when the wires were put on the last of June or early in July and twisted very firmly about the cane.

"While we have no proof that the vines are in any way injured (notwithstanding that we have made very careful observations for many years), we would not advise girdling the entire vine, but would treat only those canes to be cut away at the fall pruning, and would leave about one-half of the vine to grow to a natural condition."

Mr. HILBORN—I think it is that stimulating to the large size that gives them the poor quality—no matter how you do it.

Mr. STIPE—Rogers' forty-three comes in nearly as early as the Champion when it is ringed.

The PRESIDENT—There is a great deal of ringing going on. We can understand that a purchaser would select the finest-looking grapes. For general market purposes ringed grapes would not keep long enough to meet the market. It does not stand to reason that they will bear shipment so well as those that are not ringed.

Mr. BURNER—I ship to Montreal and they are all right enough. I have some in my cellar now pretty nearly as well preserved as those on the table here—all ringed.

Mr. A. M. SMITH—If ringed grapes are of poorer quality, then the large grapes will come to be suspected on account of poorer quality, and then the smaller grapes would get the better price.

Mr. WESLEY SMITH (Winona)—I would like to hear Mr. Smith speak of the best varieties.

Mr. E. D. SMITH—Among the reds I would prefer the Lindley; it is earliest to ripen, yields well, grows well, has a good leaf and hangs on to the end of the season, and it will keep reasonably well—not so well as the Salem. Among the blacks the Worden is king, but it will not keep, it cracks and must be marketed in a short season. For the balance of the season the Concord for commercial purposes would fill the bill better than any I know. For a large fine grape Rogers 43 and 44 succeeds best with me. For white, Niagara is acknowledged to be the queen, but, unlike the Concord, it will not succeed in all soils and all situations It must not be planted in an exposed position where it is liable to be killed with the rot; that is its weak point, but it has no other. The roots must be sheltered.

Prof. SAUNDERS—What do you think of the Early Victor?

Mr. SMITH—Very good grape. Not so early as the Champion and therefore not early enough to crowd it out. It does not come up to the standard in bearing.

Mr. CARPENTER---For blacks I would say Roger 41, Concord, Worden, Roger's 43, 44, and also I think Roger 39, which we find very good after testing. For red I would put Roger 9, 15 and Delaware. I don't approve of the Salem very much---our vines seem to be going back the last two or three years. The grapes are very tender in the skin, and unless we watch closely we lose one-third to half a crop on some vines. For white I suggest Niagara and Pocklington, which is hardy. I would rather use fertilizers than barnyard manure, from results I have seen. I picked last year forty-five or fifty pounds of Roger's 9 off several vines in a poor spot that had not manure for fifteen years. I use the superphosphate from Brodie & Harvie, Smith's Falls, from 300 to 400 pounds to the acre for grapes; for field culture about 200 pounds to the acre every year.

Mr. F. W. FEARMAN (Hamilton)---I am probably the oldest grape grower in the room. I wrote a paper forty years ago, before this Association was started. The subject was: "Grape Growing on five acres." I said in the paper that in a few years there would be a large number in the Niagara district growing grapes and supplying the northern part of this country. I find my prediction verified this afternoon. We had at that time only three grapes---the Isabella, Clinton and Catawba. Some Americans were anxious that we should grow the old Fox grape, and a few of us did; and I find very little difference between the smell of

them and of a skunk. (Laughter). You could smell them from forty to fifty feet away from the waggon. (Laughter). I think sometimes that the Niagara grape was originated somewhere near the Fox grape---not to the same extent, but it has the same odor exactly. I have a small vineyard and have exceedingly great success in growing the Rogers grape on long wires. I have vines fifty feet long and loaded from one end to the other. There is no difficulty in cultivating the ground between the vines that are grown in that way, probably twenty feet apart. Those vines will bear if run wherever you like---up the chimney of a house. My Salems are gradually giving way. After a number of years they seem to fail. I am very much pleased to see the interest in fruit culture.

Mr. PETTIT suggested that Mr. Fearman's paper be published in our annual report.

EXPERIENCE IN A FRUIT GARDEN FOR HOME USE.

Mr. T. H. RACE (Mitchell) read the following paper :---

The garden is a chosen spot of earth. The word garden, in a scriptural sense, is synonymous with that of paradise, and is suggestive of peace, plenty, beauty and enjoyment. The very first record we have of man, associated him with the garden. Man in his primeval state, innocent and holy, was placed in a garden. It was chosen for him as a habitation, a spot in harmony with the perfection of his intellectual and moral nature, and of its fruits he was recommended to eat. When man fell he was driven from the portals of his paradise, with its fruits and flowers, prepared for him ; but though he degenerated through disobedience it remained still in the ordination of the Creator that through toil and the sweat of his brow, man should make the garden a chosen and a fruitful spot for himself, yielding fruit to gratify his appetite, and flowers, with their sweet perfume, to delight his eye and gratify his sense. It is suggestive to note the divine estimate of the garden, for we find it recorded in holy writ, as a mark of God's favor to man, that he shall be given honey out of the garden, and vineyards shall be converted out of the wilderness for an inheritance. Solomon went down into the garden of the nuts to see the plants of the valley, and to see whether the vines flourished, and he said, "I made me gardens and orchards, and I planted trees in them of all kinds of fruits," and Solomon was wiser in his day and generation than most men. Jeremiah recommended the captive people to plant gardens and eat the fruit of them ; and the very last view we are given of man, in the closing chapters of Revelation, is associated with the garden, as the home of our perfected and sanctified humanity. "To him that overcometh will I grant to eat of the tree of life which is in the midst of the paradise, or garden of God." Agriculture is the most innocent, most primeval and delightful of all forms of industry, and the garden is the very acme, the perfection of agriculture, and is associated with the first and the last views of human happiness and peace.

The subject, then, you will perceive, is a noble and exalted one. But while man in his purity was given the garden as a spot of beauty and attractiveness, and the fruits thereof to eat without toil or effort on his part ; in his degenerate state the garden must be made by him, and will yield its fruits only as a reward for his labor. God made the garden for Adam, but Solomon, as he tells us, had to make the garden for himself. Under these circumstances the great question with man is, does it pay to garden ? How often do we hear it remarked by men of every class, "It does not pay me to bother with a garden ; I can buy all the

fruit and such like things that I need cheaper than I could grow them for myself." And how often I am asked the question myself, does it pay you to keep a garden and spend the time in it that you do? The only reply to remarks and questions of this kind, is that much depends on the individual, and the purpose he has in living. Life is made up of its incidents with intermingling responsibilities and pleasures, and it is not all of life to live for filthy lucre, or that which will buy bread and raiment; literally speaking, it would not pay a man to garden who lives for such a purpose with such an aim only in view. What would be labor and loss of time to one man is pleasure and recreation to another. It was said but a year or two ago, by a member of this society, that in order to have a beautiful rose in your garden, it was necessary to have a beautiful rose in your heart. So it may be said of the garden, in order to have a handsome and beautiful garden on your premises, it is necessary to have a garden in your heart. Love makes labor light, and love will remove every obstacle that comes in its way for the accomplishment of its dreams.

Such has been my experience in the garden. No disappointment has ever for an hour subdued my love for the work, or my ambition to produce a fruit or a flower to come up to my ideal. Hence to labor in the garden is to me a recreation and a source of joy and pleasure. If I were to consider the time I have spent in the garden, and the money that I have expended in its cultivation, and calculate the return in mere dollars and cents, I might say as many do, that it does not pay to garden; but when I consider the life-renewing recreations, and the pleasure that it affords me in its cultivation, the satisfaction it brings me to gather the fruit that it yields, and to eat of that fruit at my own table with my family and friends, I realize that if it be the pleasing incidents, the gratification of natural appetite, and the pleasant associations of life that make life worth living, gardening pays.

I turned my attention more especially to fruit gardening about eight years ago, and since that time my experience has not been without its disappointments. I made many mistakes, and among the greatest I may mention that of running after high priced and highly lauded novelties. I never refused a friend or a neighbor a root or a cutting of anything I had, no matter what it cost me, so that my novelties, even though they proved to possess merit, rarely yielded me anything till after all my friends had been supplied, and the novelty had become a common thing. I can recommend it as a safe rule, for all amateur gardeners to adopt—avoid high-priced novelties.

My present garden consists of about a half acre of ground, a portion of this is in lawn and rose beds, and the whole is enclosed on the east, north and west by a high close board fence. All about this fence I have planted one dozen Gregg, one half dozen each Soughegan, Tyler and Hilborn black caps; one dozen Shaffer's Colossal, and a strip of Cuthbert and Turner raspberries. I have the black and the Shaffers planted six feet apart and held to the fence with cord stretched from post to post, and between the bushes I spread, every second year, a large panful of unleached ashes, spading the ground lightly before putting them on. The Gregg I bend down every winter, and keep them to the ground by placing sticks of firewood on the tips. I never had a picking from them until I did this, as they would kill to the snow every winter. The Cuthbert I have had to treat in the same way, and, on account of their tenderness and their trouble, I am now replacing them with the Marlboro and Golden Queen. I never allow more than four shoots of the Gregg to grow, and these I nip off when about three feet high, and encourage a growth of laterals. To allow more than four shoots to grow will only take substance away from the maturing fruit.

I have two rows of gooseberries running east and west through the centre of my garden, containing nearly one hundred bushes, and two rows also of currants, containing a like number of bushes, the latter comprising the Fay's Prolific, Cherry, Moore's Ruby and White Grape. Both currants and gooseberries are planted five feet apart in the rows, with plenty of space between the latter for a grassy walk. I trim out and tie up in the fall and keep the bushes as erect as possible without using frames, and fertilize with ashes every second year. While others have complained about the mildew affecting their gooseberries I have never seen a sign of such a thing among mine; this I attribute largely, if not in whole, to the free use of ashes, together with the free circulation of air and exposure to plenty of sunlight. To protect from the ravages of the currant worm I use white hellebore dusted on in the evening or morning by means of a common glass tumbler and a piece of book muslin. If the bottom is broken off the tumbler all the better, and with this simple and convenient arrangement two hundred bushes can be gone over easily in less than an hour. About one eighth of an acre I keep in strawberries, and the rows of bushes running through the centre of my garden serve as a snow drift to give the former winter protection.

In strawberry culture I adhere chiefly to the hill system, making the rows two and a half feet apart and the plants eighteen inches in the row. Before planting I enrich the ground with stable manure, and after the second year I apply a heavy coat of ashes between the rows. These ashes serve a fourfold purpose; they keep the ground clean, they help to retain the moisture, they supply the soil with the necessary ingredients to produce an abundance of rich berries, and they drive out that abominable pest, the white grub. I plant in both spring and fall, but for a home garden I prefer the latter, after taking off a crop of early potatoes. When planting in the fall I find it always safest to litter the patch, before the snow comes, with fresh manure from the horse stable. Two years ago I had a matted patch of three years standing (Sharpless and Cherry mixed), and to experiment with ashes as a fertilizer I marked the patch, in the fall, into two feet strips, and spaded up each alternate strip. Along the centre of the two feet strips of vines I scattered a row of ashes until they spread at the bottom over a space of six inches in width. Of course these ashes killed every plant they covered, but the effect on the vines on each side was most satisfactory. The drouth seemed to have little effect on them, while those in the hill patches were completely dried up. I place great value on ashes as a fertilizer for small fruits, but for general garden culture there is nothing to compare with stable manure. Next to watching his fruits maturing, and picking them in their luscious ripeness, there is nothing that so delights the gardener's heart as to turn up a rank mellow soil teeming with earth worms, and nothing will produce this condition of soil equal to stable manure. With plenty of stable manure worked into the soil, plenty of ashes used as a top dressing, and with the soil kept free from weeds, other things being equal, the labors of the planter and gardener will be rewarded with fruit in rich abundance.

Mr. JARVIS.—When and where can potted strawberries be obtained, and when is the proper time to set them out; and can an amateur like myself plant them out himself?

Mr. MORDEN.—The system hinted at is the hill system. The potted plants can be got by sinking the pot under the runner as it passes out. The pot can

shortly be removed with the potted plant. Any nurseryman would be able to furnish the plants if there was a demand. The runner will start perhaps in June. Sink your pots in July. Make the earth very rich in the pot.

Mr. JARVIS.—What is the best thing to eradicate the insects that attack the roses?

Mr. RACE.—Every Saturday night I applied soap suds, forced underneath with a force pump as the aphis gets under the leaves; and I had no trouble. I never had better bloom or finer growth. I used to try tobacco water.

SMALL FRUITS.

WHAT VARIETIES OF STRAWBERRIES, CURRANTS, RASPBERRIES AND BLACKBERRIES SHOULD BE PLANTED FOR HOME USE.

Mr. W. W. HILBORN here read a valuable paper on this subject, which, unfortunately has been mislaid.

A DELEGATE.—Have you fruited any of Mr. Saunders' blackberries?

Mr. HILBORN.—Yes, a number. Some of them were an improvement on Lees' Prolific. I don't know that any were an improvement on the Champion. The weather last season was too dry for judging.

Mr. CASTON.—How does the Hilborn raspberry compare with the Gregg?

Mr. HILBORN.—It is scarcely as large in size, but hardier and of better quality.

VARIETIES OF PLUMS FOR HOME USE AND MARKET.

Mr. GEO. CLINE (Winona) read the following paper:

A FEW FACTS ON PLANTING AND GROWING OF PLUMS FOR TABLE OR MARKET AT GRIMSBY, FROM EXPERIENCE.

In giving my views on the growing of plums, I will only give these that are valuable for market, but still are good enough for home use for any person. A good list for market purposes as also for shipping are: Lombard, German Prune, Washington, Yellow Egg, Imperial Gage, Reine Claude, Coe's Golden Drop, Quackenbos, Niagara, Smith's Orleans, Duane's Purple, Pond's Seedling, Glass' Seedling, Bradshaw, Lawson's Golden Gage, General Hand, Victoria, French Prune. These for an orchard of 500 or 1,000 trees, I would divide about equally. For an orchard of 100 trees I would plant as follows:—Washington, Niagara, Lombard, Glass' Seedling, Yellow Egg, Reine Claude, Coe's Golden Drop, being very productive varieties for the number of trees, and the quality is good enough for either table, cooking or market; all of these I have found perfectly hardy and good bearers, good shippers and selling at highest prices. There are several plums claimed to be curculio proof, but I have none entirely free. There are

some that seem more free than others from curculio, such as Smith's Orleans, Columbia, Lombard. I find one of the great secrets of profitable plum growing is to plant the best kinds, give them good cultivation and plenty of fertilizing material to keep good growth in the trees; good cultivation and fertilizers being an enemy to the destructive diseases as black knot and rot. Even the curculio dislikes cultivation, grass and weeds being a hotbed for the insect, while neglect of cultivation is death to profitable culture. Constant bearing of our best quality of budded plums is very weakening and shortens the life of the tree. I also find that the stock that plums are budded on have great influence in the growth of the trees as also on the size of the fruit and ripening of the fruit in a very dry season. The Myrobolan or the French stock grows on trees about double the size of the Canadian wild plum stock, and also there are no suckers from the Myrobolan stock, while the Canadian wild plum throws up suckers from every root near the top of ground, wherever touched by plow or harrow, making it impossible to keep an orchard in any kind of condition; also the suckers take away the strength from the tree and fruit, and in a very dry season the leaves wither and drop, leaving the fruit unripened and bitter, consequently unsaleable and worthless, Therefore, for this section, plant trees budded in the French stock.

The greatest trouble in growing plums is the black knot, which I believe is spreading very rapidly in the northern and western part of Ontario. The only remedy that I know of is to be on the lookout for it the latter part of July and first of August, cutting out all found, as that is the time the knots are formed; all escaping notice then, to be cut off at once after the leaves drop in autumn. I also recommend good cultivation and plenty of fertilizers, which have an abundance of phosphoric acid and potash in the analysis, such as Brodie & Harvie's, of Smith's Falls, fruit tree fertilizer, which is complete for fruit trees of all kinds as well as grape vines, and of which I use several tons yearly. The knot in my orchard is very much less than three or four years ago, and I think it is entirely due to the use of the fertilizer, good cultivation and cutting knots off as fast as I find them.

The rot is also very destructive in some seasons, more especially in very warm, foggy weather. Such weather being peculiarly adapted to the spreading of that disease, and the fruit should be watched very closely at that time, and be picked off at once if attacked by rot, as the rot spreads very rapidly. One plum in a cluster, attacked by rot on one morning, may spread to the whole cluster before the next morning. The rot is caused I think by fungus growth striking the plum where stung by the curculio.

In marketing plums, a great mistake is made by picking all the plums from one tree at one picking and before they are ripened enough to be picked. Plums should not be picked green, and one variety will generally keep steady packing for a week or ten days, by just picking those that are ripened enough for shipping or market; and sell at very much better prices than picked in the green state.

My remedy for exterminating the curculio is to use a solution of Paris green and water, 3 oz. of Paris green to 40 galls. water and keep well mixed, spraying the mixture on the trees with a force pump mounted on a barrel in a wagon, spraying three or four times during the season; the first time just before the blossom is all gone, and again at intervals of a week or ten days, as the weather may be showery or otherwise; heavy rains washing a certain percentage off.

In conclusion I would like to impress upon the minds of all present that my list of plums given may not do to plant in all parts of Ontario, that they may not be all entirely hardy or as productive on all soils as in mine. I think all those among you who are in any way experienced in growing fruits will agree with me that fruits do not grow the same, neither produce the same in different soils and in different localities. Even at the short distance of one mile, or less, the change is quite marked in the quality of fruit, the growth of tree or vine, as also the productiveness. The list of plums that are really good plums is quite large. I am growing some thirty barrels, but as plums for profit I would not advise planting them. I find experience is the best teacher for planters, and the lesson is not to plant largely until you know just what is most suitable for your own particular soil.

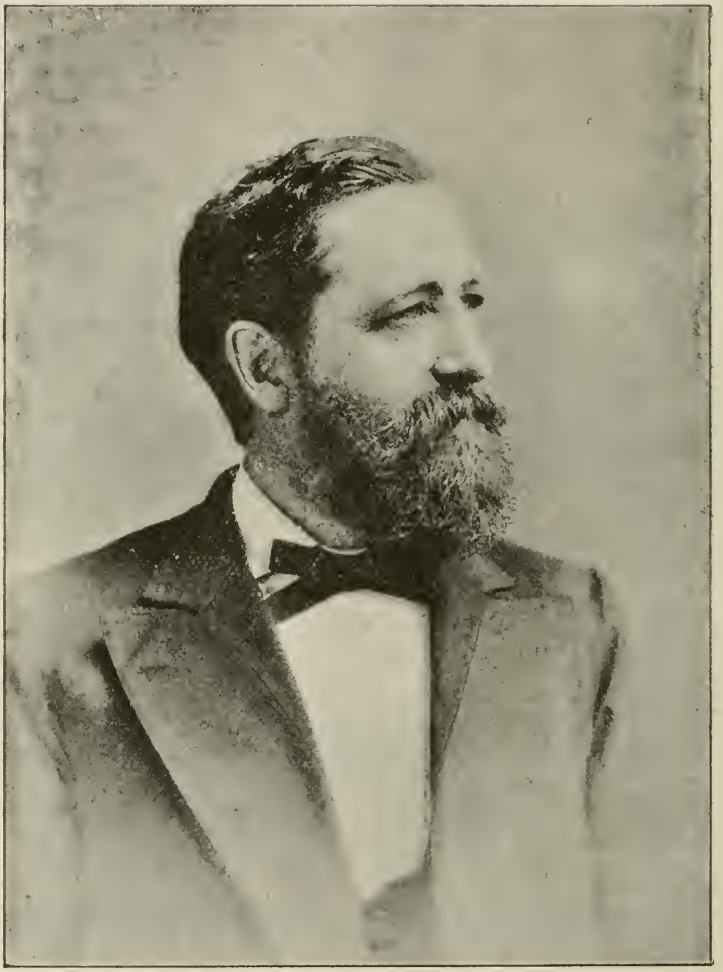
RESOLUTIONS.

Moved by J. A. Morton, seconded by John Croil, That the Fruit Growers' Association of Ontario desire to express their appreciation of the kind attentions and courtesies extended to them by the Press of the city—Carried.

Moved by P. C. Dempsey, seconded by M. Pettit, That the Fruit Growers' Association of Ontario feel themselves under obligation to the County Council of the County of Wentworth, for the kind use of the Court House and rooms afforded them; and that the thanks of this Association be tendered the Council for their courtesy, and that a copy of the resolution be conveyed them through the County Clerk —Carried.

Moved by J. A. Morton, seconded by Secy. Woolverton, That the matter of the preparation of lists of apples for cultivation in this Province, be referred to a committee consisting of the Directorate—Carried.

Moved by M. Pettit, seconded by A. D. Lee, Resolved, that this Association do memoralise the Ontario Legislature, and urge upon them the necessity of enacting such laws as would encourage the protection of existing forests, and further assist farmers and others in planting shade trees as wind-breaks—Carried.



WM. SAUNDERS,

President 1882-1885.

SUMMER MEETING.

The Association held its Summer Meeting at Cardno's Hall. Seaforth, on Wednesday and Thursday, July 3rd and 4th, 1889.

In the forenoon the delegates were driven to the residence of Mr. Robert Gouinlock, where his grapery and farm were inspected. After lunch the delegates met in the hall.

President Allan appointed the following Committees:

On Fruit—T. H. Race, Mitchell; A. H. Pettit, Grimsby,

On Lists of Fruit—P. C. Dempsey, Trenton; Thos. Beall, Lindsay; P. E. Bucke, Ottawa.

Mr. M. Pettit, of Winona, read the following essay on

GRAPES FOR HOME USE, METHODS OF CULTURE, ETC.

The vine besides furnishing such delicious fruit, adds greatly to the attractiveness of home, even the name "vine-covered cottage" or "vine-clad hills" suggests that which once possessed can never be forgotten. The inhabitants of the vine districts of Europe plant vines wherever they go, you can almost pick out their homes here in our country.

The value of the grape and the ease with which it can be propagated, are two points not yet well understood by the farmers of our country.

No fruit is more refreshing and none more healthful. How much is it worth to have all of the grapes one wants for himself, his family and his friends, for even three months of the year, and is within the reach of nearly every man who owns an acre of land in Ontario. Some parts of the country are so favorable to this industry that success comes almost without an effort, but people are slow to learn that it may be carried on successfully almost anywhere. To profitably grow grapes for market only a few varieties are required, and to name those varieties suitable to all locations is a difficult question, as a slight difference in location, soil or culture will produce results so widely different.

The culture of no fruit perhaps gives rise to a greater variety of opinions than that of the vine. For this reason it is safer for those who intend planting to find which varieties succeed best in their own locality.

However, for market I would select the following varieties in the proportion to 1,000 vines: 100 Worden, 200 Concord, 100 Wilder, 200 Lindley, 200 Agawam and 200 Niagara.

Some may say, why are Delaware, Brighton, Salem, Moore's Early, or Pocklington, not included for the following reasons: Lindley will produce more to the acre than the Delaware, ripens at the same time and is more saleable, it will produce as much as the Brighton, and improve by hanging when fully ripe, while the Brighton fails in both color and flavor.

The Lindley and the Agawam fills the place of Salem in the market, are as productive, and not as subject to mildew, or liable to burst with rain. Moore's

Early can only be made to produce one-third of as much as Worden, and is not as good in flavor. Niagara fills the place of Pocklington in the market and is more productive.

There is little profit in testing new varieties, let others do it for you. We frequently hear the remark, that grapes can be profitably grown at one cent per lb. This entirely depends on the cost of production, which is a very important question with the grape growers, as we must admit that the days of strong demand and high prices are past, that the market is frequently overstocked. and prices rule very low. To profitably meet this it is important that we should carefully consider the cost of production.

If we get 3 cents per lb. for a crop and it costs 2½ cents per lb. to grow and market them, there is little more than amusement in the business, but if we reduce the cost of production 1 cent per lb. that would give $30 per ton clear profit.

Grapes like all other fruit, can be produced at less expense on soil that is easily cultivated. This makes the selection of a site for a vineyard important, when we consider the fact that the soil will be cultivated constantly for 30 or 40 years. Hill sides should be avoided or any situation that has much descent, as the yearly waste of the continually cultivated land will carry away the surfaee soil from the high points and deposit it at the bottom where it is least needed. Cultivation that is generally given to secure a good crop of corn or potatoes will place the soil in a suitable condition for planting grape vines. When preparing to plant make a trench where each row is to be placed, by ploughing two furrows throwing one each way, in the bottom of this trench make a deep furrow with a subsoil plough or what will answer as well, take the mouldboard off of an ordinary plough. Then plant two varieties in the same rows, a red and a black, or a white and red, or an early and late variety, six or seven feet apart in the row. By so doing, at the end of five years, when we will know much more about the market for grapes, you can have the privilege of choosing which variety you will keep and cut out the other when it has amply repaid you for the very little extra expense, as no more land, cultivation or trellising is required.

Do not place any manure or other fertilizer in contact or near the roots, thousands of vines are killed each season by doing so. After placing a few inches of fine soil about the roots tread it firmly, then more earth and tread again ; this firming the soil in planting is of vital importance.

After planting give good clean cultivation ; for cleaning and mellowing the soil, no implement answers better than a gang plough with about 2 feet long bar of iron bolted on the plough-head and braced from each side filled with holes so the clevis can be set to plough to or from the vines. By using short whiffletrees nearly all of the ground ean be stirred.

Plough well to the vines not later than August so the earth will become well settled to protect the roots from frost during winter. Allow no brush, rubbish, prunings, or anything of that description to accumulate about or near the vineyard. By burning everything of this kind you will keep your vineyard free from *thrip* and other injurious insects.

The question of pruning is a very unsatisfactory one to discuss on paper, no rules can be laid down that will profitably apply in all cases. So much depends on the strength of the vine, the age, variety, amount of vitality, whether it has carried a heavy crop the previous season or a light one, strength of soil, etc. As a rule too much wood is left. It is common to err in this direction ; the haste to get fruit quickly and plenty of it, are the chief causes of many a failure ; vines are allowed to overbear especially when young. The demands of the fruit exceed the

ability of the vine to supply them. The consequence is the fruit is late in ripening and a poor sample. The bearing canes for the next season's crop are not ripened nor the fruit buds matured, and it requires a year to recuperate.

Whoever attempts to confine the growth to some particular system does so at a loss. Systems may answer for a garden, but in growing grapes for market, prune out the poorest wood and save the best wherever it may be found. The more I look about and see the results of different systems of pruning the more I become convinced there is no science required, but simply to cut away enough of the vine to prevent overloading, leaving enough well matured bearing-wood to carry a fair crop, which on an average vine at full bearing is from 50 to 60 buds on the wood of the previous season's growth. To do this properly requires some experience joined with common sense.

In concluding I would say that I am of the opinion that if the people of our country could be induced to grow and eat more grapes, make and drink plenty of pure *home made* grape wine, it would be a greater step in the way of advancing temperance than the Scott Act or any other legislation can bring about.

In answer to questions, Mr. Cline stated that he did not think the Lawrence plum was so good as some others. The Niagara is a little earlier than the Bradshaw's. The General Hand is a very profitable plum. The trees will run from six to ten baskets each every year. The McLaughlin is a very fine plum, but not sufficiently so for a cropper. The curculio is decreasing with me. Paris green is my cure. Moore's Arctic ought to very far north where they can't grow anything else It is nowhere compared with the Lombard. Referring to a recent article in the *Horticulturist*, he said, a pound of Paris green to a hundred gallons of water was too strong, and would destroy the foliage of the trees.

Mr. A. M. Smith.—The Munro Egg escaped the black knot entirely. It might be valuable for sections where the black knot is found.

Prof. Saunders.—If Paris green is not kept agitated it might destroy the trees, even by using four ounces to a barrel of forty gallons, it gets so strong.

Mr. E. D. Smith.—I can corroborate what Mr. Cline says.

Mr. Rice.—Prof. Cook, of our university, has made very exhaustive experiments in spraying trees, and says London purple is much better than Paris green, without the danger of killing the leaves, unless you get it too strong, He recommends half a pound to a hundred gallons of water. He says the bees are the best friends of the horticulturist, and the spray is not to be used till the trees are so far out of blossom that the bees have left them. Mr. Willard, of Geneva, recommends planting plum trees in the apple orchard, because the curculio likes the plum better than the apple. Fruit growers would thus concentrate the curculio so as to fight him right on his own ground.

Mr. Patterson.—After experiments with Paris green on apple trees, beginning with five ounces to forty gallons of water, I found that three ounces answered better than a larger quantity, by constant stirring. It might possibly be reduced still more. It is a decided benefit to apples. I have experimented by spraying half the orchard and leaving the other half unsprayed, and I have found there is at least fifty per cent. difference in quality and quantity in favor of the Paris green. I have not found the slightest danger, I have had cattle pasturing in the orchard a week after spraying without the slightest ill effect. I used hyposulphite of soda along with Paris green, putting eight ounces of the hyposulphite to forty gallons of water, and that year I had no apple spot at all; but it was not general in our part of the country, and I can't say it was entirely owing to the hyposulphite.

Prof. SAUNDERS.—I would not recommend London purple as a substitute for Paris green, for the latter is of more uniform strength, while I have found a difference of more than half in the arsenic contained London purple. Further, the arsenic is in a more soluble condition than it is in Paris green.

Mr. BEALL.—I think the difficulty often is in using too little water. I always use half a teaspoonful to a pail of water; not more than half an ounce to a pail.

Prof. SAUNDERS.—That would be half a pound to a barrel.

Mr. PORTER.—What is the earliest time that it is safe to put Paris green on the blossom?

The SECRETARY.—Within a week after the fall of the blossom. There is no necessity to spray apple trees with Paris green while they are still in bloom. After the blossom has fallen it is quite early enough, and then we are quite safe from injuring the bees. I believe plums might be sprayed even before the blossom is out, as it is the parent curculio we want to destroy. So that in both instances we can apply the Paris green without danger to the bees.

Prof. SAUNDERS.—I should not agree with the secretary in applying Paris green to the plum before it blossoms. In the first place it has not yet been shown how Paris green acts upon the curculio in the case of the plum; whether it kills the curculio or deters it from operating on the trees, from the fact of containing something that the curculio objects to. It is believed that insects have a sense analogous to smell, and that they were attracted by some odor or exhalation from the plant which leads them to travel in that direction till they find a food plant. In that case it may be that the curculio is not destroyed by the Paris green, but merely deterred from the trees that have this protective coating. Did you ever find the curculio killed from the spray of Paris green on the plum trees?

The SECRETARY.—I have it from very good authority, that it is the curculio itself that we wish to destroy, and that by spraying the leaves of the tree upon which he feeds he is destroyed.

Prof. SAUNDERS.—In my experience the curculio does not feed much at that particular time. I have occasionally found punctures on the leaves, but I never found them to be eaten to any great extent. Their jaws are not mandibles. If they eat anything it is by sucking the leaves; and I think the probability of their eating the leaves is very remote. I think it is sufficient to spray the Paris green just as soon as the young fruit begins to show. They begin to operate very quickly on the fruit, but not before it is large enough to be seen as a newly-formed fruit. I have never seen anything to lead me to suppose that the curculio acted on the blossom before the bloom was formed.

Mr. MCMICHAEL.—Would there be any chemical affinity in mixing sulphate of soda and Paris green, and destroying the fungus and the codling moth at the same time?

Prof. SAUNDERS.—I could not speak of that positively; but my impression is that the hyposulphite would not effect the strength of the Paris green solution in any way or make it more soluble. A little ammonia will make Paris green more soluble, and make it very injurious I should think, to vegetable tissues.

Mr. PATTERSON.—I have used both the hypo-sulphite and the green in the same barrel, and I found the Paris green acted as well as it has ever acted with me; and that year I had no apple spot, I cannot altogether attribute it to the hyposulphite. I have had greater success when I sprayed the earlier apples a few days earlier than late varieties. Select the time just after the apple is formed,

as long as the apple is upright. In a short time it will turn down. You cannot have such good results after that period as before. Where you have the time it is advisable to spray your orchard twice.

The SECRETARY.—I have just remembered my authority for spraying the plum before it blossomed—it was Henry Comstock. It accords with my own experience, because in those seasons where I have applied the Paris green to the plum trees early there has been success, and where it has been delayed until after the young plums were formed, there has been failure.

Prof. SAUNDERS.—It does not seem to be a matter of any importance except as touching upon that bee question.

After some words of congratulation from Mr. Rice, of Michigan, Sheriff McKellar was called in by the President to say a few parting words. He expressed his great pleasure at being present. Referring to the presence of Mr. Rice, he said Canada would like to annex the United States, and take in such men He wished for freer trade between the two countries. We have no reason to fear competition with them in fruit; but besides that, they are our own kith and kin, and the closer our relations the better for us financially and otherwise. Instead of putting up barriers against one another we should cultivate the most friendly relations. Intercourse has done a great deal to remove prejudice. He had spent last winter in Florida, and he brought with him some specimens of the products of that country. [The Sheriff exhibited some curious specimens, chief among which was the material used for building, being a peculiar mixture of gravel and shells, which grows on the sea shore.]

Mr. P. C. DEMPSEY moved, seconded by Mr. Pettit, that the Fruit Growers' Association of Ontario feel themselves under obligation to the County Council of the County of Wentworth for the kind use of the rooms afforded them; and that the kind thanks of this Association be tendered the County Council; and that a copy of this resolution be sent them through the County Clerk. Carried.

After thanks to the press, moved by Mr. Morton, seconded by Mr. Croil, the convention adjourned at six o'clock.

REPORT OF FRUIT EXHIBITED AT HAMILTON MEETING.

Your Committee have to report that they have examined with a good deal of satisfaction the following list of fruits, namely:—Good specimens well preserved of the Baldwin, Seek no Further, Wagner, Canadian Red, Greenings, Bourassa, Northern Spy, Blue Pearmain, Vandevere, Mann, Cooper's Market, Cranberry Pippin, Red Mackintosh, Golden Russet, Bellflower, Red Pound, Pewankee King, Ben Davis, Blenheim Orange, Cayuga Redstreak, Ontario, Walbridge, Maiden's Blush, Alexander, Swaar, Fallawater, Grimes' Golden, Hastings, Tallman Sweet, Fall Pippin, Twenty-ounce, and Swayzie Pomme Gris. We note with much pleasure that a number of the fall varieties have been kept until this date in a good state of preservation showing that the season of many of our fall varieties may be considerably extended by proper storage. Among the newer varieties P. C. Dempsey, of Trenton, shows a number, as follows: Adams' Pearmain, Bonum, Lord Burley, Golden Winter Pearmain, Hardadsturs' Pippin, Start's Golden and Cellini. Of these, Lord Burley is an apple of medium size, color red, with russett dots; quality good. Bonum, a small dessert apple, color dark red, with russet dots; texture fine, quality medium. Hardadsturs' Pippin, size medium, color yellow, splashed with red; quality medium. Start's Golden, small dessert apple, color yellow, of fine quality and handsome appearance. Cellini, an apple of fair appearance but poor quality. In addition to these apples, Mr. Dempsey shows a speciman of the Duchess de Bordeaux. This is a long-keeping variety and will not be in season till March.

A very excellent specimen of Golden Russet was shown by Mr. Taylor, grown in Mariposa. John Leonard shows a handsome specimen of seedling, not unlike King, but quality very poor. There is also a seedling from Humberstone township, county Welland, origin unknown; a large apple somewhat like King, but of finer quality and a better keeper. The tree is said to be a strong grower and very productive. L. Woolverton shows a collection of 15 varieties of apples, very fine specimans and all well kept.

E. C. Fearnside, of Hamilton, shows six varieties of the standard sorts, most of them fine specimens and well preserved. A very fine plate of Perry Russets was also shown by Mr. Holton, of Hamilton. A seedling shown by Joseph Dunn, of Orillia, is judged by your committee to be a seedling of the Fameuse. The apple is about the size of the Baldwin, more light colored, and in flavor distinctly Fameuse, and is worthy of being watched, and if found a good grower and productive, should be propagated. Three varieties of grapes are shown by M. Pettit, of Grimsby, Rogers No. 4, Salem and Vergennes. The first-named picked on October 1st and left in open baskets, retaining its flavor well and is but slightly shrivelled. Salem, picked September 5th, kept in open baskets, is as firm and plump as when picked, and in quality far ahead of the imported Spanish varieties. Vergennes is in an excellent state of preservation, quality first-class.

All of which your committee respectfully submit.

W. E. WELLINGTON,
A. ALEXANDER,
T. H. RACE.

Dr. HANOVER.—Would you remove the vine in the fall from the trellis, and protect it with straw or other material?

Mr. PETTIT.—That entirely depends on the locality. In our section we leave them on the trellis all winter; but in colder sections, where the wood winter kills, it would be necessary to put them down.

The PRESIDENT.—What is your experience with summer pruning? Some people think it is necessary to cut back very heavily for the purpose of ripening the fruit, as they say.

Mr. PETTIT.—I have practised it, and left the vines without, and I think there is very little difference. But where vines make very rapid growth, like Rogers 9, 3, and some of those, it is better, after they have made a growth of about three or four feet, to pinch the ends off. I don't think it advisable to go through and cut off much; and some vineyards that are not touched at all with summer pruning yield just as well as those that are summer pruned. One thing that is very necessary, after vines have made a growth of a foot, or even less—varities that throw out a good many suckers from the old wood, like the Champion, or some very hardy kinds,—to go through and break out a lot of these. Where the bud throws out two shoots, break out the weak one that comes out back of the main bud. Thus you get a better sample of grapes, and nearly as much fruit.

Mr. BUCKE.—Don't you find the new wood blows off a good deal if not tied?

Mr. PETTIT.—They soon catch hold if you hook the leaf on the wires. Where the bearing canes come straight up, then a heavy shower will break them down sometimes, especially the Niagara. For that reason we run Niagara canes horizontally on the wire instead of bringing them up straight.

The PRESIDENT.—Why have you in your vineyard only 100 Worden and 200 Concords, when the Worden is spoken of lately as being the more profitable grape—bringing a higher price than the Concord because it is sweeter, and because it is called for?

Mr. PETTIT.—The Worden is not nearly as good a shipper as the Concord. It bursts very easily; and there is a good deal of complaint, in my experience, on account of its coming through in bad condition; and it is not as long a keeper as the Concord—it gets very soft. Aside from that I think it would be more desirable. I get more per pound for the Worden than the Concord. I don't get as many pounds per vine. The Lindley is almost as early as the Worden.

Mr. BUCKE.—In the Otrawa District we look upon the Brighton as the leading grape—the bunches are so large and beautiful, and it is earlier than many. It would beat the Lindley every crop, for pounds.

Mr. A. H. PETTIT.—The Brighton succeeds very well with me on gravelly soil.

The PRESIDENT.—What varieties do best in this district?

Mr. GOUINLOCK.—I find the Rogers the best. The Lindley and the Roger's 3 have the highest canes and show the most fruit.

Mr. BUCKE.—Which grapes did you make best out of last year?

Mr. GOUINLOCK.—The Rogers.

Mr. PETTIT.—In any case there should not be more than forty or fifty buds on a vine that is full bearing, even supposing it had been bearing ten years.

Mr. BEALL.—It is very difficult to make people understand that the old vine should not have any more buds than a new vine.

Mr. PETTIT.—Less if anything.

Mr. BEALL.—The vine can only produce in proportion to the area of land it is on. You do not increase the space, and you should not increase the bud. Forty or fifty buds to the vine are enough to grow ten or fifteen tons to the acre if you have good luck.

Mr. PETTIT.—Ten to fifteen tons to the acre are something we hear of, but seldom see. When you get five tons to the acre you are getting a pretty good yield. Mr. Hogan, of Oakville, in his evidence before the Agricultural Commission, gave twelve tons to the acre, but it is something extraordinary if a man gets anything near ten tons, I should say.

A. H. PETTIT.—How many tons to the acre do you call a good crop from your vines?

Mr. PETTIT.—I never measured the ground as it is planted, and scarcely know, but I think ten by twelve requires something in the neighborhood of 430 odd vines. Well, if you get an average of twenty pounds to the vine, you are getting all that you can grow on them. All that you are getting, as an average, over that, you are taking out of your next year's crop—unless you have got a very strong growing vineyard, a soil very suitable, and everything in that way.

A. H. PETTIT.—If you plant ten by twelve and plant eight by seven, and reserve forty buds, won't you double your crop?

Mr. PETTIT.—You might for a season or two, while the vineyard is quite young, get more to the acre, but you lose just that amount in a few years when your vines get older. You can't produce so much with them close. The first vineyard I planted I put Concords nine feet apart, and a year or two ago we cut out every other one, I found they were not doing well, and I think I will get just as much from the same land from half the number of vines.

Mr. BUCKE.—How many buds do you leave on this year's wood after you prune in the fall, on each cane?

Mr. PETTIT.—From four to eight.

Mr. BUCKE.—In Ottawa we leave only two buds, and we get a good crop.

Mr. BEALL.—I had no intention of saying a man could grow ten or fifteen tons to the acre; but I said that you had buds enough to grow that much if you had good luck to do it; but I don't think you will have the good luck. I don't think any man ever raised fifteen tons to the acre. The most I ever got was 35 pounds to the vine, some eight or ten vines in a row.

Mr. BUCKE.—There is nothing better than earth to protect vines in winter; and we never use anything else in Ottawa. If any one will bury a potato in the ground in our climate, and put three or four inches of earth over it, in the spring he will find it has not been touched with the frost at all. If he took it up in the winter he would find it frozen solid, but the frost is taken out so gently in the spring that it does not injure the potato. So it is with the vine. If you put straw or anything of that sort on the vines there is also a danger of mice or animals of some kind.

Mr. RACE.—Is not the snow sufficient of itself?

Mr. BUCKE.—No, it wants soil.

The SECRETARY.—I should think Mr. Pettit's mode of pruning, though it works very well in our section, where it is not necessary to lay vines down, would not be so suitable where the vines have to be laid down.

Mr. PETTIT.—No; Mr. Beall's system would be better.

The PRESIDENT.—Will Mr. Beall explain his system?

Mr. BEALL.—I use only one arm. I cannot see there is anything gained in using two arms of a cane. They only reach half way to the next vine, if you have two arms, five feet each; you get just as much wood with one arm ten feet.

The SECRETARY.—The extremities are not so near the root.

Mr. BEALL.—That does not make so much difference, because when the vine is properly established you can grow the same quantity of fruit from end to end. I have satisfied myself that there is not the slightest necessity whatever to have the crop at the outer end of the vine; you can have it evenly distributed from the base of the vine to the top; and by growing one arm you have no trouble whatever in laying them down; they are all laid down in a row, one following the other right along. My man and myself can lay down and cover three hundred vines in a day. I stand on the body of the vine—that keeps the vine down; and I have an ordinary lath four feet long with a crotch in the end, and I have only one arm, but on that arm there are often four or five or six oblique arms, but those have perhaps only six or eight buds on them; these oblique arms are renewed every year or two—sometimes there may not be more than three or four on, but those will all follow along the same line, reaching along the wire. The man will follow on, and throw a little clay on; and I find the least possible quantity of clay succeeds the best. I do not care anything about covering the arm itself; it is only the young buds; and that will keep down sufficient.

The SECRETARY.—You do not cut all those oblique branches back every year.

Mr. BEALL.—Those are renewed at irregular periods; sometimes I let them run two or three years. I do not think I let any of them grow more than three years, then on those of course I grow buds. I try not to have more than fifty buds on each vine; and on the Niagara vine every bud should produce a pound of grapes; that will be fifty pounds to the vine. I don't say I succeed in doing it very often. I think it can be done, but I am not clever enough.

The SECRETARY.—How far apart would you have these oblique branches on the main arm?

Mr. BEALL.—Sixteen or eighteen inches apart.

The SECRETARY.—And the main arm you run ten feet from the root?

Mr. BEALL—The main arm would run nearly to the next cane, and then the last oblique branch would run away over the other cane. The first from the base would of course run in the same direction, but under the other one. I never mutilate this main arm, except when I meet with an accident.

Mr. BUCKE.—You pinned down the oblique branch to take its place?

Mr. BEALL.—No. If one should happen accidentally to be in the right place I will leave it. In pruning we should have two objects; one, to grow bearing cane for next year, and the other, for bearing cane this year. We want always, in pruning, to look out for renewal canes, but not cut out the oblique arms that they protect. I would rather have a new cane any time than an old one.

The SECRETARY.—Have you ever tried the Kniffen system?

Mr. BEALL.—I consider this a combination of the Kniffen system and the Fuller system and every other system, because I adopt from every system. We have the spur system complete, then we have the renewal system complete.

Mr. GOUINLOCK.—How do you manage to cover the new wood; or does it stand.

Mr. BEALL.—No, it will all lie flat on the ground. The cane will twist over on its side. The cane of course is as large as my arm in some places. It requires very little clay; your canes have got used to it; they are always growing in this oblique direction. The arm itself is grown on the lower wire altogether.

Mr. PETTIT.—Very close to the ground?

Mr. BEALL.—Well, I would have the wires closer than I have mine. Mine are fifteen inches from the ground, and I fasten the oblique canes to the wires four or five inches—I find it is better, the nearer I can get them to the ground, so long as the grapes do not touch the dirt.

Mr. DEMPSEY.—The renewal system and the spur system, it seems to me, are badly mixed with Mr. Beall's explanation. With the spur system properly understood I have grown vines fifteen feet long, and produced fruit just as even at the base as at the extremity. There is no difficulty in doing it with the spur system. Every man producing grapes under glass is adopting the spur system: They prune the vine clean, and depend on the dormant eyes that are right at the base of each bearing shoot, for the next year's crop; and those vines are invariably grown at an angle of 45, so that they are easily laid down and raised up; and in the spring of the year, when you have discovered the place that appears to be slowest about starting the vine, you raise that portion and lower the rest of it. If the extreme end of the vine has taken to throwing out shoots vigorously, bring that close to the ground, and raise it where the shoots are not coming out vigorously; and then you cause the whole vine—to use a grape-grower's term—to "break" evenly. In combining the renewal system—from which we invariably get better bunches than by any other system that ever I saw—with the spur system, and leaving little shoots only about from four to six inches long, containing one bunch, clear from the base, and we can continue to renew that little spur, and we can maintain those old buds for years, for an indefinite period if you like. I have had them four inches in diameter and fifteen feet long, and kept on right year after year for twenty years, producing a good crop of fruit every year, and breaking even from one end to the other, where we had not only to bend them around, but to twist them clear around once to get them down. The very system we practice under glass for cultivating grapes will do out of doors, but I like Mr. Pettit's system of pruning on two wires from the

horizontal arms running along both ways, or one way, if you like. We practice that because it saves a very large amount of labor in the summer. Going over a few acres of grapes where you have to raise them to cause them to break even, causes extra labor and expense. We can raise up shoots from the ground and strip clear till we raise them to the wires, and have one to run to the right and one to the left, and two branches to the first wire about two and a half feet high, and two branches to the top wire about five feet high. The advantage of this system is that the fruit and the weight of the branch bends them over so that they are inverted, and saves a great deal of pinching.

JUDGING FRUITS AT FAIRS.

Mr. Thomas Beall, of Lindsay, read the following paper upon this subject:

How Best to Secure Uniformity and Fairness in the Award of Prizes at Fairs.

There are several obstacles to be overcome before this most desirable object may be attained. Most of the Boards of Directors of our Agricultural Societies regard the exhibition of fruit at their exhibitions as a matter of the least importance. Indeed it is generally tolerated only because public opinion demands it, therefore the preparation of the prize list and the appointment of judges, the two most important matters in connection with this department of their exhibition, receive but little care or intelligent thought from them. "Uniformity and fairness" can scarcely be expected at any exhibition where such views are held.

The prize list for the numerous township and county exhibitions throughout the Province are all similar in character, almost the only difference being they are made longer or shorter to suit the amount of funds assigned to this department by each society. One of these lists is now before me from which I will take a few lines. "Best assortment of apples, not more than twelve varieties, five of each," but it is not stated whether they are to be summer, autumn or winter varieties. After giving a number of varieties of autumn apples I find "any other variety of fall apples," but there is no hint given whether they are required for dessert or for culinary purposes. A number of winter varieties are then named, concluding with "any other variety of winter apples." And again there is no indication as to the purpose for which they are required, whether for culinary use or for the home or foreign market. "Uniformity and fairness in the award of prizes" can hardly be expected under such circumstances.

With reference to the appointment of judges in this department the idea generally prevails with boards of directors that anyone can judge which of a half-a-dozen plates of apples of the same variety is the best, and as this is all that is required of judges (as they suppose) they cannot be induced to give the subject further consideration, therefore "any one" is chosen for that purpose. The result of such carelessness in conducting a fruit exhibition becomes fully apparent when the judges have completed their work and the public—the exhibitors and their friends—are admitted to the "show." The public, in the aggregate, are pretty good judges of a fruit show and they are not backward in giving their opinions freely when gross errors have been made. The blame is invariably placed on the judges, where, no doubt, it often belongs, but not always, for the wording of the prize list is often so ambiguous that the cleverest expert might be nearly as far astray.

A few instances which have come under my own observation will show how uncertain an exhibitor must feel as to his chances for obtaining prizes. Prizes were offered for "Swayzie Pomme Gris." Many plates were exhibited purporting to be of that variety, but all, with one exception, were little, half-developed Golden Russets which were awarded the first, second and third prizes between them. There was one plate, however, of Swayzie

Pomme Gris on the table, and they very good ones, but they were not awarded any prize. Prizes were offered for "Grimes' Golden." Two plates of that variety were on the table, one of which, an excellent sample, was awarded third prize, the other plate got nothing. The first and second prizes were awarded to plates *not* of that variety. At another exhibition the first prize for "any other variety of winter apple" was given to a plate of Alexanders and the second to a well kept plate of Duchess of Oldenburgh. There is much difference of opinion respecting the "season" of this variety. The judges in this case, who were three in number, declared it to be a winter variety; perhaps they were right. The list also called for "dessert apples for winter use." There could be no mistaking the wording of the prize list in this case. On the tables there was a very good display of winter apples. Competitors for these prizes: Golden Russets, Kings, Westfield, Seek-no-further, Wagner, Northern Spy, Grime's Golden and others. Several of these may fairly be claimed as dessert apples, but the three prizes were awarded, first to Alexander, second to Pumpkin's Sweet, third to Colvert. Evidently the judges thought that if the largest apples on the tables were not the best "dessert apples for winter use" it was not their fault.

On another occasion a sort of sweepstake prize was offered for the "best plate of winter apples on the tables." Knowing this special prize was offered, I had some curiosity to know to what variety they had awarded this prize and was much surprised to find it given to a plate of Tallman Sweets, specially so as there were many excellent varieties of winter apples on the table, notably some of the finest specimens of Golden Russets I had ever seen at any exhibition. Having an opportunity subsequently, I asked one of the judges why they had selected the "Tallman" as the best winter apple on the tables. His reply was, "because we believed the Tallman Sweet to be the best apple grown in this or in any other country." That answer was quite satisfactory, of course.

At one exhibition where a prize of $10 was offered for the "best collection of apples, correctly named, five of each variety and not less than sixteen varieties," it was awarded to an exhibit consisting of some twenty or twenty-five varieties and all *named*, viz., names were attached to each variety. There were not more than ten tolerable specimens in this lot and only four of these correctly named. More than one-half of the lot were nondescript seedlings without sufficient merit to be allowed a place in any sensible man's orchard. One of the three or four lots competing contained sixteen varieties, and all, with one or two possible exceptions, correctly named. The varieties were good and the samples well grown. The judges evidently awarded the prize to the lot having the largest number of names attached without regard to any other consideration. Can "uniformity and fairness in the award of prizes" be expected under such management?

But there can be no improvement in this respect as long as the present system of appointing *three* judges to act together in each division lasts. This system is bad in every respect. The judging of fruits at exhibitions requires the best horticultural skill that can be obtained. The idea which guides the boards of directors seems to be that by appointing three persons, each having a very little knowledge of the subject, the concentrated wisdom of the three is more than equal to that which may be obtained from one expert. But experience shows this is not the case. The judgment of the best of the three is often cancelled by the ignorance of the other two, and it frequently occurs that the most ignorant one of the three, who generally has the stronger will, gets everything his own way. When some gross error is quietly pointed out to one of the judges the reply is almost invariably, "Oh, I knew it was wrong and would have had it otherwise but you know I was only one of three and the others were against me." If either of the other two are spoken to the reply will be substantially the same. This system is unjust to exhibitors, to visitors and to all others concerned, and must be swept out of existence. Let the directorate appoint only one judge in each class or division and hold that *one* responsible for his work. Fewer mistakes will then be made and these more easily corrected.

The issuing of an intelligible prize list and the appointment of one expert judge only in each class will go far towards securing "fairness" at our exhibitions, but "uniformity" may not be secured until the judges can be supplied with some uniform standard of quality for all purposes, for all our fruits wherever they may be grown, without regard to

soil or situation ; and I would urge in the strongest terms that this association do at once cause to be prepared a catalogue of all such fruits as are generally grown in this province, and that it be so prepared that all the varieties, and of every kind, are compared each with the other for all the purposes for which such fruits may be grown. It will require much labor to prepare such a catalogue, but the labor and time required should be no obstacle to prevent the work being thoroughly done. This Association is largely subsidized by the Ontario Government for the purpose of giving all possible assistance to the public in fruit culture. The public, therefore, have a right and do claim such a catalogue at the hands of this Association, and I have no hesitation in stating, from enquiries frequently made of me at exhibitions, that no other work which the Fruit Growers' Association of Ontario, can perform will be so acceptable to the tens of thousands of fruit exhibitors throughout the Province as the preparation of such a catalogue, for then obtaining prizes at exhibitions will no longer be regarded as a lottery, and exhibitors will soon learn that " uniformity and fairness in the awards of prizes " at our exhibitions has been secured.

Mr. MORTON.—I think the strictures in regard to the judges are a little too stringent. We cannot draw the line absolutely and say what apple is a summer or fall, and what is a fall or winter apple. Some come so near the border-land that it is a matter of opinion how they should be classed. I was a judge at a fair where we gave the first prizes for the best six fall apples, and the best six winter apples, to two collections which both had King of Tompkins County in them. We began with summer and went to early winter; and then we went from early winter till the conclusion of the season. We cannot fix the date in one locality as we can in another. A judge from the south cannot draw the line for a northern county, because he does not know when those fruits would mature in that section. I have known a judge at one fair call a fruit Primate apple, and at another fair he said it was not Primate. We are all liable to mistakes. I don't think those small foibles should be pointed out. The thing that should be done is to get out a complete classified list. It would be useless repetition to divide the list into home and foreign. The same apple might be entered as home, foreign and dessert; and there are some dessert that are good for cooking. The list would be rather bulky to divide it into those classes. Some move should be made so that judging could be done by some common standard.

A. H. PETTIT.—There has to be wide scope allowed in judging. If all exhibitors were educated up to the one-judge system, and the prizes being given by points, it would give satisfaction ; but it would be years before we would dare undertake it so fine as laid out in the paper read.

Mr. MORTON.—I approve of the one-judge system. Being secretary of our fair, I took the fruit department into special charge, and got Mr. Allan, the president here, as judge, and we have had him ever since, though there was some kicking at first. In the other departments we have not educated the people up to the one-judge system yet.

Mr. RACE.—Don't you often find exhibitors who say that Mr. Allan does not know anything about fruit? (Laughter).

Mr. MORTON.—Yes, and we find such in every branch. You find people telling you, you don't know how to run a newspaper.

Mr. A. H. PETTIT.—If the judges could place on cards the value of fruit—their market value, and their value for production, and some points on which they base their judgment—why they discarded one and gave the prize to another—it would be a good thing.

The PRESIDENT.—If we as an association are to do as it is intended under the Act we are to do—educate the public in this matter—we must take a step in

advance. We have been standing too long in one spot. I am very thankful indeed to Mr. Beall for having the courage to write upon this subject. To a very large extent I agree with his paper. The system of judging has been terribly abused, not only in the east, but all over; and all who have had any experience in judging fruits at our exhibitions must agree with what Mr. Beall has said. The difficulty of course is to find the remedy—to lay down the set of rules for our guidance. I believe in the first place, that our exhibitions have done a good deal of harm to fruit culture generally, by offering prizes for large collections—of apples, for instance. It has induced the growth of a large number of varieties, that are quite unprofitable for home use or shipment. Then there certainly is an inducement to parties that are keen for prizes, to pick up a few varieties in the neighbors' orchards, if they have not enough in their own to make up the forty, or twenty, or ten varieties called for. We have often heard of such things being done. Men who are in the habit of judging at our leading fairs have tried to introduce judgment upon points, adopting a scale of one to ten, ten points constituting a perfect sample. The Bartlett pear, for example, would bear as a maximum ten. The Northern Spy apple, there might be a question as to it deserving the full ten for the perfect sample. What we mean by a perfect sample, is as to how it appears, both as to size, coloring, shape, etc. The only question that might detract from its ten points, would be its commercial value, it takes so many years to come into bearing; but in judging on the ten points we take into consideration the healthfulness or growth of the tree, its bearing quality, its use. If we are judging for cooking alone, we judge it in that way; so for dessert; and commercial value comes in where we look upon that particular fruit for home and foreign markets. We must make a combination of these points of excellence in judging at our fairs, if we are to do justice to our duty and lead the public to cultivate those qualities they should. Planters going to an exhibition for information, and seeing the prize ticket on a collection of perhaps twenty varieties, will naturally conclude to plant out an orchard from that standard. If the judgment of the judges has been improper, it is a serious thing for that man. That collection might perhaps be largely summer and fall fruit; and ten chances to one the commercial value is not there, simply because there is not a sufficient number of the standard winter fruit in that collection. The collection to be perfect, must extend over the longest possible season in that particular locality, and must contain fruit for dessert and for cooking in the different seasons. Then it contains those varieties for the various seasons that have the highest commercial value. You will have to look also to each sample, and see that they are perfect and properly named. I believe judging on points is the quickest and easiest way to judge, whether it is one judge or three; and the points awarded on each sample or each plate, should be written upon a large ticket, so that the owner can see what it is considered worth by the judge or judges. If a fruit is incorrectly named, and the judge knows what the name is, he ought to change that; and if that sample is in a collection, that collection is short one variety, if the lines are drawn very close. In our Goderich Horricultural Society, we drew the line closer from year to year, giving exhibitors notice, and doing what we could to get them educated into the proper naming of their fruits, so that in a few years they could bring ten, twenty, yes forty varieties of apples correctly named. When we got them to that state of perfection, and found that there was a mistake, of course we cut out the improperly named sample, and the collection was short that variety. It is impossible to give one scale of points, so far as seasons are concerned, for the whole Province. That will have to be a local matter to a very large extent; for you will find an apple that in one section is a summer apple, in another section is an early—or possibly a

late—fall apple; and on the other hand, you will find varieties vary very much, a variety that here has no practical value in the local market, and is not esteemed for home use, in another section is esteemed highly, both for home use and home market. As to the one-judge system, I have advocated that for some time past; in fact I have made up my mind several times not to act as judge at any of our fairs except alone. I want to be responsible for any mistakes three are that I make, and not blame it on the other fellows. It is almost universal—in the west as well as the east—to blame it on the other two.

Mr. GOUINLOCK.—I believe this one judge system will be the best, because a great many just leave it to one any way. If he is posted in the matter it is left to him, and he can get out of it by laying it on to the others if he has made a mistake.

Mr. STEWART.—I would favor the one judge system if the man is expert in the branch he judges in. I have seen less dissatisfaction with one judge than with three. Several of the local fairs here have appointed but one judge.

P. C. DEMPSEY.—I can fully endorse nearly everything Mr. Beall says. Our committees usually, more particularly in those great fairs we have in some places, like to select judges on account of their social or political position being high. Too often those men obtain the position because they can make the largest blow politically, and know the less about fruit, or anything else pertaining to the advancement of our country. (Laughter.) At one of our fairs, for the last fifteen years, there is always a prize offered for Beurre d'Anjou pears. They have always had the same two men judging, and they are both appointed on account of their high standing in life, and they are certainly, in their profession, very clever men. Invariably there is a Beurre d'Anjou on exhibition; but the Howell pear got it. You could not get two pears as far apart in appearance. Those men awarded first prize for twenty varieties of apples to a collection containing several inferior local varieties unfit for home use or for market; in fact, worth, commercially speaking, nothing; while there were not less than ten superior collections for them to step over. Where we will get a remedy for this I can't understand. I am enclined to blame newspaper men. Why don't the press come down on such affairs? Why is it that in the fruit department we must have men that don't know anything about it—though the same committee would not appoint for the live stock department men who did not know a bull from a cow? Our press are to blame, because they are afraid to come down on those men on account of their standing in life. The first time I ever acted as judge of fruits, a prize was offered for a Pomme d'Or apple. Neither of the other judges, both old men and good judges, knew Pomme d'Or. It was ruled out. When the young man in charge of the department demanded of me why this was done, I told him there was no such thing in existence as Pomme d'Or apple; that was only a synonym for another apple. I referred him for my authority to LeRoy's dictionary of Pomology. There has never been a prize offered on that variety since. The prizes for articles at many of our fairs are offered to please prominent men in the district who grow those things. In one case the Concord grape was left out, and a prize offered for the Isabella because a prominent man grew it. A greater difficulty than judging comes in in preparing the list; it is prepared usually by men of little or no experience in fruit. I would much rather judge alone than with two others, because we usually have one of the two who is there judging for the first time, and we have to educate him out of thinking that he knows everything. The scale of points, as recommended by the President, involves a great deal of work, but the judge could get along in two-thirds of the time with the aid of a clerk. I favor the single-judge system.

Mr. RACE.—The scale of points is good, but the gist of the remarks made amounts to this—educate the people. As a newspaper man I came down pretty hard on judges who did not understand their business; and last fall I was frequently selected to go and fill those places I had condemned. At one place, out of seventeen plates labelled Wealthy and Wallbridge, I cast out eleven that were Colvert, or Canada Red. That resulted from dishonest agents who had gone through that section deceiving the people. This system of judging will have to be carried out till the people know one variety from another, and by adopting some universal scale of points, I think we will find the remedy for the many difficulties we have had in former years.

Mr. DEMPSEY cited a case where a man deliberately "fooled" the judges, and chuckled over it. In such a case he thought the exhibitor should forfeit all his prize money.

M. PETTIT.—Flavor should have greater prominence than size as an element in awarding prizes. At present the prizes often go the biggest articles, regardless of their quality,

Mr. RACE.—At one of the fairs where I judged I set aside a very large sample of the Alexander and gave the preference to the Cayuga Red Streak; and there was a great deal of fault found with me on account of the size and appearance of the Alexander. If we had had a scale of points we would have got out of the difficulty in that case. The Alexander has size and appearance, while the Cayuga Red Streak has quality, solidity and size. The people at the country fairs count too much on size.

A. H. PETTIT.—I would suggest that the prize cards be printed in this way: Commercial Value, 1 to 5; Productiveness, 1 to 5; Hardiness, 1 to 5; Perfection, of Growth, 1 to 10; correct nomenclature. Then every one would know exactly why the prize was awarded.

Mr. DEMPSEY.—That is a very important point indeed. We invariably take into consideration the market value, and this plan would show exactly what the value was. In judging fruit we need some character. Generally you will see the character developed in the skin; but we cannot carry that point very far, particularly in judging plates. In judging at the Provincial Exhibition we must remember we are judging for the Province of Ontario. Fruit from Owen Sound would not have color, while that from the Niagara district would be mature and well-colored. It is not so at the country fairs.

Mr. BUCKE.—What is "commercial value?" I have seen the Champion grape sold at a higher price than any other grape because it comes in early; and I have seen the Alexander apple sold higher than any other because it is large and well-colored. Is "commercial value" the price we get for the fruit?

Mr. DEMPSEY.—Last year the Golden Russet apple was worth just about half the expense of the barrelling, and the Alexander apple were clearing at the station at $2 a barrel. There was commercial value of the Alexander over the Golden Russet certainly. The commercial value of the Alexander is always high. The Twenty-ounce Pippin possesses a very high commercial value; it keeps very well in winter. I have seen it kept away late this last winter, and commanding perhaps double what the Baldwins do. Now, the commercial value of the Baldwin stands high on account of its appearance, but, certainly, it is a very poor cooker; and who on earth wants to eat one? So with the Ben Davis; it is very high, and it is a fair cooker, but there is nobody that wants to eat it. So with pears. The Bartlett is the superior pear, but there are many varieties that I would rather eat that possess no commercial value whatever. The apple that stood highest this

last year commercially with us was the Snow, because they were not spotted, and we got them off our hands before the market was thoroughly glutted with fruit; and the result was a little profit. This does not always occur. Next year we may get as big prices for our winter fruit, but, invariably, any long-keeping apple stands high commercially.

Mr. RACE.—You have given us to understand that the Alexander is a higher value than the Golden Russet?

Mr. DEMPSEY.—Last year was an exceptional year.

Mr. RACE.—If the Alexander will bring a higher price in the market than the Golden Russet, then that is to be the relative commercial value to these others.

Mr. BUCKE.—I think the association should take the apple list and select five to ten varieties each of summer, fall and winter apples, and reject the whole list but those ten—let the others go to the wall. I do not think it is necessary to have more than ten apples for any one season. Then the judge should be governed by the consideration of the locality where he is judging. For instance, in North Hasting, where they cannot grow a Greening or a Baldwin, the Alexander would be entitled to five for commercial value, while the Greening and the Baldwin would not be entitled to anything. How are we going to get at the commercial value of apples to suit every part of the country unless we localize them, and it would entail a great amount of labour that would be perfectly useless when you got it done.

The PRESIDENT.—In judging of commercial value we look upon those varieties that are grown more generally, and that have, the country over, a more general reputation. Hence the number of those varieties is very few.

Mr. RACE.—Let the market itself regulate the commercial value.

The SECRETARY.—It will be a valuable feature of our report for 1890, to have this discussion given broadcast over the country. If a good scale of points is prepared by this committee and approved by this association, it would be a most valuable thing to distribute to the different fair managers and secretaries throughout Ontario; and I would suggest that it be printed separately, with this scale of points, and sent directly to the fair managers in Ontario, so that they may have the option of using it if they choose, and handing it to those who are to be judges. I think it is going to be a great step in advance in the management of our fairs. I would move that the following gentlemen be a committee to strike a scale of points: the President and Mr. Thomas Beall.

Mr. DEMPSEY seconded the motion.

Mr. PETTIT suggested one committee on apples and another on pears, plums, peaches and grapes.

The SECRETARY.—Let the committee be a committee on apples and pears.

The PRESIDENT.—It is just as easy for the one committee to go over all the work, if those fruit lists that are now out were in and compiled, because we could tell pretty largely the fruits that are grown in the different districts. It is necessary to award points to the fruits grown in the different districts, and give them their general value in proportion to the district. Parties that are going to judge are going to judge according to the district they are going to plant in, and, of course, they are going to plant the varieties that have a large number of points. If we want to discredit a variety we give that variety a low standing, and the public are going to avoid that variety. I do not think the work of this committee can be done properly without the return of those statistics.

Mr. BEALL suggested that the committee have power to add to their number.

The SECRETARY.—I think we make a mistake if we make a large committee. If the scale of points is submitted to the Association for discussion before adoption, we will have an opportunity of modifying it as we choose.

The motion was then put and carried, constituting the President and Mr. Beall the committee.

CULTIVATION OF THE CURRANT FOR HOME USE AND FOR MARKET.

Mr. T. H. RACE.—I have given attention to the cultivation of currants for the last five or six years, and am persuaded the value of the currant for home purposes is not fully appreciated, in this section at all events. Three years ago one of our fruit men brought into town six baskets of currants, and had them standing at his door for several days unable to sell them, and I think he had to give some of them away. For the past two years I have had people coming from all parts of the county to see my currants. They talked so much about them that it created quite an interest in that section in connection with the currant, as soon as it became known that we had them for sale. I have about a hundred bushes, and they averaged about five quarts to the bush. My children sold them for ten cents a quart, and were not able to supply one-half of the local demand. Now I am satisfied I could sell any quantity, far more than I could raise in my garden. My method has been to plant the bushes about five feet apart in a row. I find they do better where they have plenty of room and air and sunlight. Plant them far enough apart so that you can get in among them to keep the ground clean. I have trimmed them out every fall, cutting out the older wood; and every second year I have placed beneath them a very heavy coat of hardwood ashes unleached. I place great value on ashes as a fertilizer for all kinds of small fruits. The White Grape and the Cherry are the two standard varieties of currants. I have gone considerably into the culture of Fay's Prolific. There is no currant I have met with yet that will compare with it for the first and second years of bearing; but if you allow the wood to become older than the third year, I think you will find your currant very much decreased in size; but if you keep the Fay's on two years wood I don't know that any currant will give you much more satisfaction. It is a currant that is very much admired, and it is from the production and the growth of that currant that I created such an interest in my section of the country. The first samples I had in my hand and showed them on the street, it was very hard to persuade the people that they were not some kind of grape, and many people refused to believe they were currants, because they had such a length of bunch and such a size of berry. However, on the whole, I could not say that the Fay's Prolific is on the whole a more profitable berry than the Cherry, nor is it as profitable a berry for home purposes as the White Grape, however, I do not think any collection would be complete without it. Another currant that I have cultivated during the past five years is Moore's Ruby. It is one that Stone & Wellington made a run on for some years. Its special value is its sweetness. I don't know that it is quite as heavy a bearer as the Cherry or the Fay's Prolific, but it is much more pleasant to eat off the bush. I have also grown the old Dutch Red; that is a very good currant, and the Marseilles. But I confine myself now to the White Grape, the Fay's Prolific, the Moore's Ruby and the Cherry; and for home purposes I don't know any person who would require a better assortment; and these properly

cultivated and kept in good shape, without allowing them to grow too much to wood, any ordinary size bush will produce from four to five quarts every year; they have done so with me. I am satisfied that the currant is of very much more value as a home fruit than has ever been supposed by the general public; and I am satisfied also that if a little more interest is given to it by members of this Association and recommended more to the public generally than they have done heretofore, that the currant is a fruit that will come into very general favor and very general use.

Mr. MORTON.—Does the Cherry currant bear well?

Mr. RACE.—It is a very good bearer. My soil is a clay loam.

The SECRETARY.—On a clay loam it will bear well; on a light sand it will not.

Mr. BUCKE.—Mr. Race has said nothing about the black currants.

Mr. RACE.—I have just ten bushes of the black currants, Lee's Prolific and the Champion. I have not found that the black currant is profitable to cultivate for sale, and all that I could recommend would be for any household just to have enough bushes to supply their needs. The black currant is a very valuable fruit for family purposes, and I just grow enough for my own use.

Mr. LITTLE.—In St. Mary's they are selling them by the bushel; they are much thought of and sought after.

The PRESIDENT.—The general report of the market is that the market is fully stocked with the black currant.

The SECRETARY.—They are a great deal of trouble to pick, and you do not get a very heavy crop; but I have been growing quite a large quantity of Black Naples, and I think at the price they bring they pay. You can get 12½ cents and more per quart, or $1.50 for a twelve quart basketful, and at that price, on rather a stiff soil, where they produce well, I think they pay a good profit. The heavy fruiting of my Cherry currants I attribute to the fact that I have been applying yearly wood ashes to the rows very freely. For home use I think Mr. Race is quite right in speaking highly of the White Grape. Of course if it were for market we would speak differently. He speaks of Fay's Prolific being a good bearer when it is kept back, so that there is young wood always formed. There is a verygreat advantage in keeping the currant wood heavily cut back. I cut back very heavily. I try to keep the old wood down and keep young wood springing up continually.

Mr. MORTON.—What we call suckers, that grow up, will they bear the next year?

The SECRETARY.—Yes.

Mr. BUCKE.—The red currant bears on two year old wood, the black currant on one year old wood.

Mr. MORTON.—I have found that the borer is worse in the Fay than any other currant.

The SECRETARY.—Keep the bushes well cut back and the borer would have no chance.

Mr. A. H. PETTIT.—You speak of the White Grape for home use only. Why?

The SECRETARY.—Because you cannot get any market for it. I cannot.

Mr. COLLINS.—I have had the Fay's for four years, and have not been able to gather any crop from it. I have been able to gather from the Cherry currant. The soil is heavy clay.

Mr. BUCKE.—I don't think anything can be too highly said of the currant. You can grow it in any section of Ontario, even at James's Bay. When I go past a farmer's place and don't see currants, I don't think there is much soul about that man. Anybody can grow it. Keep it well cultivated, let no grass grow amongst it, and in two years you will have a good crop. It grows quickly. The hardiness of the currant, and the magnificent crop it gives under good cultivation, place it in the front rank of anything we have in the garden.

Mr. LITTLE.—Except the strawberry.

Mr. BUCKE.—I think the white currant with milk and sugar is as good a dish as any one can raise. There is no "off" year with the currant. Last year we lost all our strawberries in Ottawa because of there being no snow.

Mr. RACE.—I got my first Fay's Prolific some six years ago from the late E. P. Roe, and the second year every limb was bearing heavily. You will find some of Fay's Prolific that are weaker in the wood than some other currants, and I found even a difference in the Fay's itself.

THE CURRANT FOR MARKET.

Mr. P. C. DEMPSEY.—We should understand what we want to grow it for before we select the location. If we want to produce a very early variety I prefer loamy land, warm land, sloping to the south, and we will have our currants ripen early, and the result is we have the first market. But for a late variety or producing our currants late, or enabling us to keep them late, we prefer a northern exposure and a nice clay loam if possible, a soil that requires under-draining. If we can preserve moisture four feet below the surface those currants will flourish, they will maintain their foliage till very late in the season, the result is we have our currants in the market after the market has been once supplied and the supplies have become exhausted, the result is about double what the early currants have brought. In point of culture I would endorse what has been said. Plant six feet one way by four the other. Give us plenty of room to cultivate in between them. I prefer the rows farther apart than five feet, and have them in a row. I prefer not too close pruning. We shorten them back and thin them out, but not as much as we did formerly. I found shortening them back had the effect of producing weakness in the crotch, even of Cherry currants. I grow for market almost exclusively, though we have other varieties, the Cherry currant and Versailles. I am unable yet to decide which I would have of the two; but we get more currants from the Versailles than we do from the Cherry, and the only difference I see is the Versailles is a longer bunch, and the berries on the extreme end of the bunch are smaller than those at the base of the bunch, that is about the only difference; but we find that when they are thoroughly ripened people buy them for manufacture into jelly, and we sell three or four times as many currants by letting them thoroughly mature. We manage to maintain the foliage and keep our currants until they get perfectly ripe, dead ripe, on the bushes. The result is purchasers have more jelly, they have better flavored jelly, than they would to have them when they are only about half or two-thirds ripe.

Mr. MCMICHAEL.—We are growing currants upon a gravel ridge upon a southern slope. By putting on pretty heavily of ashes we have been successful with red currants. The black we were trying first upon very rich land, and we only succeeded in getting wood, but by growing on this land we are successful with black currants also.

The SECRETARY.—I think it is a great mistake to grow the currant in the form that used to be recommended, the tree form, with only one main trunk, principally because of the currant borer. If one stem is affected by the borer, your whole bush is gone, or if your bush is broken down in that way it is permanently injured. I think the far better way is to grow it in bush form and to allow quite a number of shoots, as many as you think it should carry, to spring from the ground; but thin these out by cutting out the older ones, those that are perhaps three or four years of age. Cut these out completely, and the young, vigorous shoots every spring cut back at least one-third, sometimes half, in order to encourage a constant growth of new wood. In this way I am sure I can get far more fruit than I used to under the old, more careless way of trying to keep the stems a greater length of time.

Mr. BUCKE.—When you talk about cutting the bush back, you don't mean that you cut the branch out at the root?

The SECRETARY.—I do both. I thin out the stems and I cut back the new growth fully one-third early in the spring, or else in the fall. That tends to form a large number of new shoots which give bearing wood the following year.

Mr. DEMPSEY---The saw fly is very easily managed if we take it in time, but it is surprising if we neglect it a few days how quick they will take the foliage off the currants. When the currant begins to come in blossom---before it is really in blossom---give the bushes a little shower of Paris green diluted. We can use it very weak. It takes very little to destroy those worms when they are first hatched. After a while now and then a leaf will appear perforated, and by repeating the same process we can destroy them with Paris green while the currants are not on the bushes. We want to maintain the foliage in the fall in order that the fruit buds mature properly for the crop of next year. That is one great reason why people do not have a crop the next year. When there is no foliage the currants are poor and lack juice, while the failure next year is certain.

Mr. GOUINLOCK---All that Mr. Dempsey has said refers to the raspberry bushes too. If you allow the worm to strip off the leaves you won't have any crop next year. Last year I used Paris green and this year I see nothing of the worm.

The SECRETARY---I do not like using Paris green on currants, but I always use the hellebore, applying it it in the powder form. It is much less trouble than to mix it with water to carry about, and if the bush is treated in time it is a very simple thing to check the worm. You will notice that the worm begins its operations very low down, about the base of the bush, and if you are a little watchful you will observe a few leaves eaten down near the base of your bushes, and by a little examination you will see that the worms are beginning to work. I have a little sifter that has a handle and carries just what is convenient to carry in one hand, and the seive is fine in it, and by just opening the bush a little when damp, either after rain or after the dew has been heavy, then a little shake will distribute enough powder to poison the leaves sufficiently to thoroughly destroy those worms at the very beginning; and if you do that your bush is saved, and it is very little trouble indeed. You can easily pass along from one bush to the other and sift enough along the lower part of the bush to prevent the worm from making any headway at all. If you let the worms get scattered over the branches it is a much more diffieult task, and I suppose in a large plantation the best possible thing to use would be a spraying pump.

Mr. RACE—I have never yet seen a less expensive or more convenient method of sprinkling bushes than the one I use. I just take a common glass tumbler. If

the bottom is broken off so much the better. Fill that full of hellebore, draw a piece of book-muslin over it, take it by the bottom and go along, and you can sprinkle a hundred bushes with a very small quantity of hellebore in a very short time. I want to ask whether, if I moved the bushes in September after all the currants had been taken off, they would take hold and bear next year?

Mr. DEMPSEY---September is the best month for striking cuttings, and if for striking cuttings why not for moving the whole bush? I cannot see any advantage in applying the hellebore while the bushes are damp or applying it through a syringe. As I understand the way it acts upon the currant worm, they breathe through pores at their sides, and when the hellebore comes in contact with them they fall to the ground and they continue to grow less until they are fully exhausted in size or die that day. I have taken them when they had lost fully half their size from the effects of the hellebore and washed them a little in water and thrown them down, and they come to life and are just as lively as they ever were, and they will go back on the bush and eat the leaves again.

The SECRETARY—But if the leaves are poisoned when they come to eat them that will be a surer remedy.

Mr. DEMPSEY—But it does not take half as much. We mix the ordinary white hellebore with about five times its quantity of flour and we put on very little, and we treat them when the bushes are dry, and it is nicer to handle.

Mr. BUCKE—Very often the currant bush will ripen before the end of the season---that is to say before the frost comes, and the leaf will begin to turn a little yellow. Sometimes when the season is moist and cold that does not take place until after frost, but in a warm season often the currant bush gets ripe and the leaves begin to fall before the frost comes. As soon as you begin to see any leaves on the bush beginning to get yellow you can move your currant bushes, and the sooner you do it then the better, and you will have a good crop the next spring.

Adjourned at five o'clock p.m. till eight o'clock.

EVENING SESSION.

The PRESIDENT introduced Mr. D. D. Wilson, the "Egg King of Canada," who gave an address of welcome.

Mr. WILSON said he had been asked by His Worship the Mayor to welcome the delegates. He regretted that the storm had prevented many of the townspeople from attending. He touched on the various points of importance to fruit-growers---the production of first-class fruit, the selection of fruit for different localities, getting it marketed in good condition, the best mode of keeping it in a perfect state for the greatest length of time, and the securing of the highest price. Every fruit grower who would be successful must read, must think, must reason out for himself. It has been said that the man who makes two blades of grass grow where only one grew before is a public benefactor. Now, if this Association can educate only one man to grow twice the amount of fruit and of twice as good a quality as he has been producing in the past it might be said to be a public benefactor. We can all live and learn. Fruit culture has not reached perfection yet. The good book says: "As iron sharpeneth iron, so does the face of a man that of his friend;" and in this way we can sharpen one another by having discussions on certain topics where one man has given a great amount of thought to one line. Those who had come from a distance would come to the conclusion

from what they had witnessed in the past few days and during to-day that if this locality could not produce anything else it could boast of a superabundance of rain. (Laughter).

The PRESIDENT replied : We are always pleased to visit the various sections of this Province in the interests of fruits and fruit culture, flowers and forestry. We all share with yourselves of the town the disappointment on account of the weather in having a small audience. Had matters been different in that respect we would have had a fine gathering. Being a resident of the county of Huron I feel personally as the residents of the town feel. In the matter of fruit culture our county stands well to the front, especially in apple culture. The statistics show that very clearly. Our Association has various objects in view in travelling over this Province. In holding meetings in various sections of the Province, wherever we are invited for the purpose of special discussion we like to confine those discussions to matters of special interest to those localities. We are coming to that age in this Province when we must study specialties. We cannot expect in every section of the Province to grow all the fruits and make a success as far as the market value is concerned. Many of those fruits we can grow as a specialty for family use, whereas we cannot produce them for market value. We have come to the point now where we must make a more perfect study and dwell more upon specialties. We find those who make most money in fruit culture are those who devote their time to something special in the culture and something that their particular climate and locality are adapted for. We do not claim that we have arrived at the stage of perfection. We try to reap what information we can in the various sections. We are always willing to give out what we have had of experience in our own sections, but at the same time we ask those living in the sections where we meet and in the various lines of culture to speak at the meetings, because this is the way we gain solid information. There is many a man that comes to our meetings, here as well as elsewhere, who thinks he knows nothing special that will be of general interest or of any use. That is a very great mistake. Sometimes the simplest remark dropped from the youngest amateur we may have in any one line of culture may redound to the very large benefit of us all. Our meetings are open to all, and we feel that the time has come when the ladies ought to take a deeper interest in the matter of fruit and fruit culture and especially in floriculture than they have in the past. For instance, at Farmers' Institutes I have made a special point of introducing the matter of ornamental gardening on a small scale, asking farmers to indulge more in that class of work than they have in the past. We believe the ladies on the farms---our farmers' wives---are hard worked ; they work harder than the farmers themselves now-a-days. The farmers have implements to save labor, whereas in the household there is not that advancement that there has been on the farm. The work is a repetition, morning, noon and night. It is monotonous. We ask our farmers to indulge more in ornamental planting---to plant, for instance, ornamental trees, flower beds and everything of that sort; and I believe that the cry that we hear over this Province from end to end---the question asked so often, "Why do young men leave the farm ?"— would not be asked if matters of this sort were indulged in more generally, if home were made more pleasant and literature provided for young men and young women on the farm. I assure you that our Association, notwithstanding the inclement weather, feel satisfied because we find, as we always did, that we had good men with us, and as long as we know that the people themselves are satisfied, and feel that they are deriving some benefit, we are satisfied with our Association. (Applause).

QUESTION DRAWER.

Q.—Is it advisable to use tanbark between the rows of strawberries to keep the weeds down, and also to keep the berries clean? Is tanbark any good as a fertiliser?

Mr. LITTLE (Granton)—I have never used tanbark, but I have used well-rotted hardwood sawdust, and I have fonnd that by putting enough on it will keep down the weeds; and another year I have used coal ashes, and that is just about one of the finest mulches that I can find for the strawberries. No weeds grow where they are, and in the spring when they get a good dressing of wood ashes they are there for two or three years, just with pulling a weed here and there.

The PRESIDENT—I am afraid tanbark would have the same effect as fresh sawdust would of souring the soil, and as a fertiliser I am not aware that it has any particular properties that would make it serviceable.

Mr. LITTLE---I think it would sour the land and destroy the vitality of the roots of the strawberry.

APPLES FOR THE MARKET.

The PRESIDENT.—It seems to me more natural, looking at the apple culture for the past few years, to go a little back of the subject before touching on the subject itself. We continually hear the question asked in every part of the province now-a-days, "Why is it that we have so much inferior fruit in our orchards?" And it is a fact. I believe that our fruit is not what it was some years ago; and the question arises, What is the cause of this? That might be proved in a good many different ways. There may be a good many causes that I do not think of at present; but, generally speaking, I believe that a great many of the first principles of planting an orchard, and selecting, have not been adhered to. Underdrainage, for instance, is a very particular point that should always be attended to before planting an orchard. Then, in many of our old orchards we find the trees planted too close together. It is absolutely necessary that an abundance both of sunlight and air should penetrate every orchard; and the trees should be planted with regard to varieties, because they vary so much—some varieties being spreading varieties, such as the Rhode Island Greening and the King of Tompkins County, which spread tremendously, whereas other varieties might be planted somewhat closer that are more upright in their growth. I have laid it down as a principle to plant them even forty feet apart every way. It seems a long distance to begin with, but when you get an orchard in full bearing that is the time to find the advantage. I really don't think, upon the whole, that forty feet would be too far for general orchards of mixed varieties, as we generally plant them. Of course if we were planting an orchard of upright growers it would be too far Again, our orchards are neglected as far as cultivation and manure are concerned. Many orchards are not touched for years in the way of cultivation; and as far as manure is concerned they are seldom visited with a load. Then the trees are not trimmed or kept clean. It is a common thing to go into our old orchards and find the trees covered with the oyster-shell bark louse, for instance, which is very destructive. No tree can produce healthy fruit where these points are not attended to. It is as necessary to feed a bearing orchard with proper nourishment as it is to feed the soil where you are growing annual crops of any other

description. It is too often that we find in bearing orchards, where they are cultivated, you find a crop of some other description planted there. That is trying to drag from that soil two crops at one time. It is not fair play with the trees at all. I think the time has come where it is actually becoming a serious matter that these points are not attended to. I am afraid the time is not far distant—for this country is getting pretty well aged all through so far as orchards are concerned—when we will be on the same road as they are in Britain—we will be complaining that we cannot grow apples, that the orchards are running out. It is simply our own fault, because we are not keeping up the fertility of the soil and attending to those rules that we do attend to in the culture of any other crop on the farm. I believe, if these points are attended to, there is no spot on the farm that will pay better than the orchard.

As regards the methods of culling, packing and grading apples for market, I believe, and I know I have a good deal of opposition in what I contend, that the whole system of buying fruit, for instance, is wrong. It is a system by which we fail to induce the grower to grow those varieties that are really wanted in our best markets. I believe that in buying fruit we should buy as we sell. We buy our fruit at present in almost all sections of this province at so much per barrel for fall apples, and without regard to kind or quality, and so much per barrel for winter apples. Now that system, according to my estimation, is wrong. We should buy according to kind, according to the absolute market value of each variety. We find, when we come to sell our consignments in Britain and other markets, that we must sell, as a rule, according to quality and according to variety. I have been thinking the matter over so far as the scale is concerned. Well, it would be a difficult thing for me to go at once and place a scale; but to give you an idea, I would place it something like this, I am speaking now only of thoroughly well-grown fruit, perfect fruit of its kind; I would take a scale something like this: for instance, take Ribston Pippin and Blenheim Pippin, those are two varieties of course you cannot grow in all sections, and they are not varieties that are valuable, that pay the producer, in many sections; still where they do grow to perfection you will find that they are excellent and profitable varieties to grow, and those are varieties that are highly esteemed in the British markets. Take these at an average of $1.50 a barrel; if you are paying $1 for Baldwins they will stand in about that average. King of Tompkins County would stand very much the same, perhaps five cents a barrel less than Ribston and Blenheim. Then the Northern Spy—taking that perfect, which the last few years seems to have been hard to find, owing to the fungus spot in the apple—but that, looking at the market in Britain, would be worth about $1.30 in the orchard. If we bought the American Golden Russet at the proper season for selling it, it would be worth the same; but unfortunately, when we buy that, we buy it at a season when we cannot get the proper price for it in the markets where they use it. They do not use that apple in the British markets till after the first of January. Of course they buy it when consignments are shipped there, but they usually store it till after the first of January. Therefore we have two apples that sell also from $1.20 to $1.25. Rhode Island Greening I would like to place a little higher than the Baldwin, because it is a better all-round apple, both for eating and cooking, than the Baldwin; but unfortunately in the British market they have not come to that state of perfection in the taste for our fruits that they look sufficiently well to quality, to intrinsic value; they look too much to color; hence they are not willing to pay as much for the Greening apple as they are for a highly colored apple; therefore Baldwin brings a higher price in the British market than Greening; but I believe the time is coming, and probably not far distant, when the Greening will bring a higher price in the market than

the Baldwin does. So that in placing a scale of points it would require a good deal of consideration. The scale would have to vary according to the season and according to the demand, but I would place it something in that way. It has got to be agitated, of course at the markets where we sell. I believe that is the proper way to buy, because then we are acting fairly and squarely with the producer, because we buy just in the proportion that we sell, and we are inducing that grower to grow those varieties that we actually want for the particular market that we are dealing with, and that is what we want to bring our growers to. Now we are not encouraging our growers to do that way; we are paying the same price all around for everything that is winter. Under the present system that grower is going to grow everything that is hard, for winter apples, because he is getting the same price all around, and the variety that will grow the most fruit is the variety that is most valuable to the grower; and it may be a variety that is practically worthless as far as intrinsic value is concerned.

The SECRETARY.—You did not refer to the Gravenstein.

The PRESIDENT.—I just referred to the winter apples especially. The Gravenstein in its season I place as the best early fall apple. Of course they they vary; you will find it early in some sections, and somewhat medium to late in other sections. The Gravenstein I consider the finest apple we have. The Duchess of Oldenburg I always place for an early fall apple; although in some places I would place it as a summer apple. You will find it in some catalogues placed as a summer apple, and in some other as a fall apple. The Duchess is an early bearer, and a heavy bearer, and it is always an advantage to thin that out early, and you can do that with advantage, because you can begin to use it for stewing when it is about half green. It comes at a time of the year when we feel that we want something in the apple line, and it is very palatable. I consider it the finest general early apple that we have, and an apple that I am confident, if we had proper facilities for shipping to foreign markets, would bring a large amount of money. It is an apple that growers, who make a specialty of growing an early apple for home markets, make the most of. For an all-round general apple I would recommend the Duchess of Oldenburg over anything that I know of.

The SECRETARY.—You did not mention the Roxbury Russet.

The PRESIDENT.—So far as we have gone, they place the Russets all on an even grade. Of course for long keeping generally you will get the Roxbury larger than you will the American Golden; and for late shipping the Roxbury will no doubt make more money; but as a rule, the way we ship, and the particular season we do ship and sell, we make no more money out of the Roxbury than we do out of the American Golden.

A DELEGATE.—Is the Duchess a good shipping apple?

The PRESIDENT.—It is not to ship a long distance. We would require a cold place to ship to the old country. I have shipped it and have succeeded in landing it in Liverpool in very fair order, and received a very fine price for it. It was in a season when fruit was rather scarce any way; but it is an apple that would "take" in any of their markets there, on account of its beauty if nothing else, because they have a great eye for beauty over there. Put anything up in a fine package and show it to them in good condition and fine looking and they do not seem to grudge the price at all; but anything inferior in appearance they don't want it at all. The British market is the worst market I know of for a poor article in fruit, but the best for a first-class article.

Roderick Gray.—I could grow Duchess two to one. They are a fine apple, nice to cook and nice to look at, and you can commence using them early, and what remains on the tree grow larger for standing.

D. D. Wilson.—The present system of buying is a very bad one. It gives no encouragement to the grower of fruit to produce a good article. In this neighborhood, generally, the buyer must have made up his mind he was going to make his profit out of the good fruit, for he could not make it out of the medium fruits. I think that by a proper selection, and by giving encouragement to producers to produce the most saleable apple; good color and good quality and good size; I think better prices could be paid than have been paid for that class of fruit, while not as high prices would be paid for a poorer class of fruit. The question is, How are you going to adopt any other mode? A man comes to the grower and says, I will give you a dollar a barrel, all round, for all your winter apples; and another buyer says, I will give you $1.50 for all these apples, and $1.35 for these, and $1 for these, and 80 cents for something else; the man that says he will give the dollar all round will get the apples, the probabilities are, and so the mode that is in vogue at present will be perpetuated. How are you going to correct it?

The President.—I can think of no way to remedy it except to wait till we ruin all those men who pay a dollar a barrel.

Mr. Wilson.—I have been in the habit of shipping apples till the last two years; and I got so disgusted with the mode of paying perhaps a dollar all round, that I gave it up. If the information of the president has given was spread around the country, would it not open the eyes of the community to the planting of trees that would give them the best results? Usually the poorer qualities of fruit produce more abundantly, and consequently a man that gets a dollar all round, makes more out of his poor fruit than he does for his better qualities. We will have to give more attention to the mode of packing and transportation. It is of the utmost importance that the goods you ship should arrive at its destination in the best condition possible. We have cold storage and refrigerator cars, and cold chamber in the steamer. There is another thing wanted; you want a cold chamber or cold storage when it lands; because fruit is like anything else, it wants to be kept at an even temperature or it deteriorates very quickly. The kind of fruit, the quality, the selections that are made before shipment, and everything of that nature must tend greatly to increase the profits to the producer. I believe our orchards are deteriorating very rapidly, and if more care and nourishment are not given to the soil than has been given, the orchards in this and other localities will be non-productive in a very few years. I do not know of anything that is produced on the farm that will pay better for care and culture and manure than the orchard. It will not produce if left to itself any more than a field of wheat will if left to its natural condition and the wheat sown over it. It must be prepared, cultivated, manured, underdrained; it must be put in good "tilth," and if that is done with an orchard you will get good results. I will give you my experience with an old orchard in this town. It was non-productive. Everything was very small; the trees were planted thickly. It would have paid me if I had cut half of them down. I pruned the trees. During the winter I manured it, and I kept manuring it each winter for a number of years. The third season I had an abundant crop; not only that, but apples about as large as you usually find on a young orchard; showing that all that that orchard wanted was plenty of nourishment at the root; it had the air and everything around it that was necessary, only it wanted something to give strength to make it fruitful, and that was the result. Out of that old orchard I have taken apples that when shown at the fair here have taken the prize. The orchard is too thick by one half now,

and the apples are not as good color as they would be if we had more space; but we can get the size and an approximation to the quality, only you want more air to give them better quality. I did not cultivate it; it was in grass and has remained so.

Mr. McMICHAEL.—I like the system of sowing in clover and then plowing under; the clover that is plowed under manures the land very nicely. It is in every way clean. For the larvæ of the codling moth I use bandages on the trees, scraping the bark off, and also use Paris green and keep them very much in check. For bandages I use old carpet about four inches wide: tack one end and wind the other around and nail it; and every couple of weeks go around and destroy the larvæ; get sometimes from 60 or 70 of the larvæ in twelve days with those bandages; about this time of the year till the first brood are gone, then leave them till the apples are ready; then destroy the next brood in the fall and put the bandages away until the next spring.

The PRESIDENT.—The point Mr. Wilson made regarding shipping is very important. Those are matters we are continually pressing on the railway and steamship cainpanies; and it is the intention to hold a large convention either in Ottawa or Montreal—we hope in Montreal—next winter for one week. The convention is going to be held and we are using our influence to have it held in Montreal, for the reason that Montreal is the head centre of foreign shipping for Canada, and the headquarters of our large railway lines; and we want to get at them; we want to speak to them; we want to consult them on matters of this sort; we want to have a higher state of perfection in handling and shipping our goods, and we want a different accommodation entirely in the steamship lines from what we have had in order to land our goods in perfect order in the British and other foreign markets. Another important point that we have discussed often, and looked into, is the matter of handling fruits in the British markets; and that point impressed itself upon me very particularly when, about two months ago, there was an attempt to form a company in the city of Toronto, for the purpose of handling all lines of Canadian produce in the British markets; and I was astonished at first, but upon consideration I did not wonder at the opposition that was showered down upon us by the brokers in the different lines, the cheese brokers especially, and the fruit brokers of Britain. They used every influence that seemed within their power to kill the company. They did not want the business taken out of their hands for some reason or other, and we can easily guess at those reasons. They say that the formation of such a company was going to hurt their business, because the line upon which the company was going to handle the goods was different from the method adopted by the commission brokers of Britain, quite different. In the first place the company would not be allowed by their charter to be speculators in any sense of the word. They could not purchase the goods they were handling for producers or others, because they would handle for producers or any one who would ship to them. Therefore the brokers seemed to unite for the purpose of killing the company, and so far as the present season is concerned I am afraid that they have succeeded, largely on account of a little weakness on the part of one man, especially, in the city of Toronto, and I was very sorry indeed to think that a man of such prominence would give way, and I am afraid he has given way to the influence of the brokers in that respect. However, I think there is a possibility of the company going ahead yet; but it proved to me that there is a matter there that is well worthy of our consideration and the consideration of the producers of this country. The intention of the company was, in the handling of fruits, for instance, to deal almost entirely with the retail trade of Britain. Now, that is a point that hurts

the broker at once. He does not want us to do that. The broker wants to sell only to the wholesale trade, and the wholesale dealer has the control of the retail trade; the retailer then selling to the consumer. They used every sort of artifice for the purpose of delaying the operation of the company, in fact, killing the company outright; and I hope that either this company or some similar company working on the same basis, will yet come to the front for the purpose of handling the produce of this country. It is highly important that they should; and it is a matter that the producers of this country cannot afford to allow the broker of Britain to control any longer.

BEST THREE VARIETIES OF STAWBERRIES FOR THE HOME AND MARKET GARDEN.

The PRESIDENT—Mr. Little is probably the highest authority we have in Canada on strawberries. He makes a specialty of testing every variety of strawberry he lays his hands on, and I think he succeeds admirably in laying his hands on everything in the strawberry line.

Mr. JOHN LITTLE (Granton)—There is not a variety of strawberry that has come before the public for the last fifteen years but what I have tested, and some of those were not worth the ground they were put on, and the money and the time we lost; nevertheless, I am still at it. They are sent to me from everywhere, I have had plants sent to me this year from ten states for testing, and if I was going to plant to-morrow I would not plant any old varieties. You will ask me why? because if you get a strawberry that will be three times as large as the Crescent, you would surely want to grow that in preference to the Crescent, no matter how valuable it might be otherwise. There is a new variety that has come out—the Haverland—that was a seedling of the Crescent, and it will come to pick just as early as the Crescent will, and it is nowhere to be compared with it, I have picked them on the 17th June, with all the first blossoms gone, and they were a wonder to all who saw them in St. Marys. I never have to go further than that, I sell everything I raise in the strawberry line in St. Marys, and I get an advance beyond those that ship here and yonder and everywhere. Then there is the Warfield—a very valuable berry, that will yield more, and larger, double what the Crescent would in its palmiest days. Then there is the Eureka. I had that from Birk County, Ohio, four years ago; and I had the privilege of letting it go to friend Woolverton and Mr. Lyons, and he wrote me last year, having fruited it two years, that out of one hundred varieties he had nothing to compare with it except the Bubach, and that did not produce as much or as large. There is something singular in connection with the Eureka; I never, since I got them, mulched them, and any that have got them can testify to their root matter. No frost ever took them out of the ground yet, while others, that would probably have half a dozen roots, would be right on the top of the ground, and these have held there just as if anchored all through the summer and winter.

The PRESIDENT—Would you vary between the market and the home garden?

Mr. LITTLE—I would make no difference; for if a berry is valuable for one, it would be for the other. Most of them all, with care, will ship. For instance, the Wilson is not ripe when it is shipped, neither are some of the other ones that color early.

Mr. GOUINLOCK—What about the Jessie?

Mr. LITTLE—The Jessie is a favorite mostly everywhere it is planted. I went to Wisconsin two years ago just to see the Jessie growing, and I saw them lying there in piles, of a third picking, just as large as plums. But you will find men here and there that do not give them the attention that they ought to give; they will stick them into the ground, and if they do not grow it is the fault of the originator, and men are combined to palm things upon the community that are worthless; but I give you my word that I never saw in my life anything to exceed the Jessie for fruit—and I have seen many good things in the strawberry line—unless it would be the Eureka, and that is a wonder to every one that saw it.

The SECRETARY—You have a seedling yourself—the No. 10—that I got some fruit off this year, and it is a very fine berry—a large berry.

Mr. LITTLE—Yes, it is one of the good things too; but John Little doesn't say much about his own fruit. (Laughter.) Different soil and different treatment makes a difference in the fruit. The habit of the Haverland with me is to let its top down. The color of that will take a buyer's eye anywhere; it is a beautiful orange color, and a man or woman in going to buy a strawberry don't ask whether it is good or bad or indifferent, if it is large enough. You will find that, go where you will, about the strawberry; they will buy the fruit and eat it, and so will every child that sees it.

The SECRETARY—You think a good deal of Bubach's 5?

Mr. LITTLE—Yes, it is a good berry, but it won't ship; are a grand berry, and the foliage is just complete. The Manchester is a famous berry, but it will not fruit, and sometimes in fruiting time the foliage will rust, but it will come out in the spring as clear as a dollar.

The SECRETARY—What do you think now of the Itasca? It is not proving as good as it did.

Mr. LITTLE—No, but the Logan is; it is a good bearer, and a fine size. The Itasca is a failure so far as the fruit is concerned. The plant is a fine one.

The SECRETARY—We have better modes of planting strawberries than those mentioned in the paper. The easiest and quickest way I have found to plant a large number of strawberries, is for two persons to go on, one with a spade and the other with a basket of plants; and the one who has the spade simply puts it in the soil, runs the spade in a slanting direction, and raises the handle a little, just sufficient for the other to put the plant under the spade and spread out the roots there and hold them in the proper position while the other one withdraws the spade; the earth falls back at once on the roots of the plant, and he presses his foot upon it, and the thing is done. They can walk along that way very rapidly.

Mr. LITTLE—You will be told there are some varieties of strawberries that are imperfect, while other varieties are perfect. How are they fertilised? They will tell you that strawberries are fertilised by the bees. I believe that myself. but there was neither bees nor wind this year, but two days, to fertilise the strawberry, and there is the Crescent seedling—and it is just about one of the worst to give you a crop—a perfect fruit; and the Manchester is another; and there was but two days that the bees could work and carry the pollen from plant to plant. Now how will you account for that, and all these which you call pistilate varieties give perfect fruit this year? I maintain it is not all with the bees, that sometimes even when the bees are there they have not time to do their work properly; and yet this year there was neither bees nor sunshine when all the

flowers were gone, and yet I had just about as perfect a crop of fruit as ever I raised in my life—that is, what the frost left. Now, how do you scientific gentlemen account for that?

Mr. MORTON—You must recollect that bees are not the only insect nature has prepared for the cross fertilisation of flowers.

Mr. LITTLE—They are the only ones that are said to fertilise the strawberry.

Mr. MORTON (of Wingham)—I am perfectly satisfied of this, that any insect that is found in the locality of a flower that bears pollen, that insect must carry away a certain amount of pollen, because the insect was built that way for that specific purpose. I am of opinion that the bee plays a less important part in the fertilisation of the strawberry plant, than does a small little beetle. I have found as many as half a dozen upon one flower. Now, my bees do not operate on the strawberries to any great extent. They will go there, but they don't linger very long; they busy themselves with other flowers, they would rather go elsewhere; but those small beetles are there, and I have no doubt there are other insects that visit those flowers. It does not make any difference whether it is the bee or any other insect—if it comes near a flower that is provided with pollen, it will transmit it to other flowers. There are insects that will work upon pollen when the weather is so bad that the bee will not work on it. You will find a number of blossoms of the Crescent's seedling that apparently bear what I would call pollen. You will find hermaphrodite flower on the Cresent seedling, but the stamens are less numerous than on what are known as perfectly flowered strawberry plants. The supposition is that the pollen-bearing stamens are not present in sufficient proportion to make the perfect fertilisation crop. I will tell you why I think that is correct. I have grown Crescent seedling under glass—taking plants that I knew were Crescent seedling—and have covered them over with glass so that no wind could get at them, and no insects—at least I thought there were no insects. Well, the crop was certainly imperfect, and I found that a great many of the berries were defective, in consequence of the seeds on one side dropping, and the receptacle of the berry was imperfect, therefore I found there was not sufficient fertilisation.

Mr. LITTLE—I never saw anything or any insect to visit the strawberry bed except the bee. I never saw an insect except it would be the crown borer, bother the strawberry.

Mr. MORTON—Those berries that you mentioned, how are they classed?

Mr. LITTLE—They are all classed pistillate; and on the Haverland I had not an imperfect berry.

Adjourned at 10 p.m., till 10 a.m. to-morrow.

The President took the chair at 10.30 a.m. on Thursday, July 4.

QUESTION DRAWER.

Q.—How can large plants or small fruit trees be kept growing when too large to move into bigger pots or boxes—that is, when you cannot get a pot large enough to hold them?

Mr. STEWART.—When plants get root-bound, or the soil gets all filled so that they cannot have much growth, I wash the soil away from the roots and re-pot them with fresh soil. You can sometimes use liquid manure. Once or

twice a week that would help them considerably. The best way is to wash the soil clean from the roots and put them into fresh soil. If you are going to put them into a larger pot I would leave the soil on the roots.

Q.—Should raspberries be manured with stable manure every year, or would not bones be better, alternating years?

Mr. BUCKE (of Ottawa).—Raspberries require a great deal of manure, and I find it better to mulch them heavily with stable manure in the spring, and after the crop is done to dig it in. I have never tried bone manure, although I fancy the mulching is what they require as much as the manure. I would repeat the stable manure every spring and fall.

Mr. DEMPSEY.—That is what we have done, and we find the most satisfaction We have tested bone manure too, but mulching helps considerably.

DELEGATE.—I thought the stable manure would make them grow too thriftily.

Mr. BUCKE.—In Ottawa we do not pinch the canes the same as they do here. We prune them back in the spring. We let them grow as high as they like; they sometimes grow eight or nine feet.

The SECRETARY.—You lay them down in the winter?

Mr. BUCKE.—Sometimes we do, and sometimes not. We grow them tall so as to lay them down. They grow thinner.

Q.—Would not half inch bones be more profitable than bone dust, on account of adulteration?

Mr. DEMPSEY.—There is another question involved in that; is it really bone dust after it is adulterated? I have bought for bone dust a great deal of plaster in my time; but the finer the bones are ground the better. I have seen the result of fine ground bones—not half inch bones—for five years after applying to garden crops. Apply first half a ton to an acre. You can start off that year and produce a good garden crop, and all you have to do for five years is to fight insects; and I believe it is the cheapest fertilizer to-day in the market. Buy the bones, and buy a bone mill, and grind them yourself.

Mr MORTON.—For appreciable result I don't think half inch bones would be of much utility in the garden. I would not use them. In buying bone dust you should buy from a respectable firm. If you buy because it is cheap, you are apt to get it nasty. If you put bones into the ground they will remain a long time before they will decay. I have bones I pick up every year, that have been in the ground for ten years. The way I do, I buy the bones and ship them to the market and have them ground for me, and I believe they send me back the produce of what I send down. I use bone dust in preference to stable manure for my raspberries.

Mr. DEMPSEY.—Where can you get bones ground?

Mr. MORTON.—In London or Toronto. You can get it done at Lamb's blacking factory in Toronto.

Mr. BUCKE.—If you can get your bones reduced by steam it is a great deal better than getting them ground. In Ottawa we have a pork manufactory, and after they have taken out all the bones they put them under a high pressure of steam and reduce them so that the largest of them you can crumble between your finger and thumb. You apply that on the soil, and you have the genuine article; but you must be careful how you put it on, because it is pretty strong.

Q.—What is the best remedy for cabbage worm?

The SECRETARY.—Pyrethrum powder, I think, either applied as a powder, or diluted in water. Apply it with a puff.

Mr. MORTON.—I think the best is Paris green. I am not afraid, because the amount we use is not large. I don't see any danger from the use of Paris green, because the injury done by the cabbage worm is done while the cabbage is small, and all those leaves drop off and are cut off, anyway. They are no part of the heart. Before the cabbage is headed out you mark a leaf, and you won't find that in the head at all. I don't think there is any danger from absorption of poison. But I have found very good results from ordinary road dust thrown upon them pretty plentifully. The trouble with pyrethrum is that you cannot always get it pure and fresh, and you have rather variable results from its use.

Mr. LUCKE.—There is no danger from Paris green if it is done with the hand of a man that understands what he is about; but if you recommend Paris green to the general public you are going to get into trouble, because they will apply it too heavily.

The SECRETARY.—And what they will use for cabbage they will use for cauliflower.

Mr. RACE.—Mr. Mitchell's method is to use his finger and thumb. (Laughter). I adopted that means the last two years, and I have been successful in growing cauliflowers. I found I could get through the patch and pick off the worms in about as little time as by using any kind of powder.

Q. What is the best remedy for the striped bug of the cucumbers?

Mr. MORRIS.—I use for cabbage worm five pounds of sulphur to fifty pounds of land plaster and twenty pounds of wood ashes, screened all together. I go over three times in the season. For the squash and cucumber bugs I use the same material. You don't have to put it on the plant, but only on the ground, and I guarantee that every bug will skip that place. Sometimes I sprinkle it on the plant, but as soon as I put it on the ground I see every bug crawl away.

Mr. DEMPSEY.—For squash and cucumber bugs I use nothing but pure sulphur. We use sulphur for mildew on grapes under glass, but it is not the sulphur applied to the mildew direct; but when the rays of the sun strike the sulphur there is a certain amount of sulphuric acid rises, and this is evidently what destroys the bug. As soon as the sun shines the bugs will start very quickly—thy can't seemingly endure it.

Q.—What is the best remedy for lice on rose trees?

The SECRETARY.—I should think the kerosene emulsion would be the best thing here.

Mr. BEALL.—What is meant by lice?

The SECRETARY.—The aphis.

Mr. BEALL.—I have never seen the aphis on the roses.

Mr. MORTON.—Strong tobacco water is the thing I have been most successful with, and I like to mix it with soapsuds, and boil together, make an infusion of tobacco sweepings which I get from the cigar factory, and make a good strong decoction, and syringe the plants with it. I have tried pyrethrum and do not like it so well. Whale oil soap I have tried, but it is an awfully stinking thing, and the odor remains on the buds long after. In the earlier part of the season I sometimes mix the whale oil soap with the decoction.

Mr. PETTIT.—Is there any danger of making the tobacco soap too strong?

Mr. MORTON.—I don't think so. What I gave last was actually black. I use about a quart of tobacco—pure leaf, no stems—to a pailful of water.

Mr. DEMPSEY.—I have used a pound of black tobacco to an old-fashioned pail of water.

Mr. RACE.—I use half a dozen cigars to a pail of water.

The SECRETARY.—I use half a pound of soap and a gallon of water to two gallons of coal oil, diluted with I think thirty parts of water If you pour in the coal oil while the suds of the soap and water are in a boiling state, it will immediately mulsify. It is better to stir it while you are pouring the coal oil.

M. DEMPSEY.—A very cheap remedy, where people have only a few rose bushes, is to cover the bush with the old hoop skirt, put paper over it, and burn tobacco under the bush.

Mr. RACE.—I can give you a cheaper method than that. When I am asked to take a drink I say, "No, thank you, I will take a cigar." I take those cigars home, and by spring I have quite a lot of them. I take half a dozen cigars to a pail of water.

Mr. ELLIOTT.—How do you apply these solutions?—because I notice these insects are invariably on the under side of the leaf.

Mr. MORTON.—Not the green aphis. The thrip is under the leaf.

Mr. ELLIOTT.—A good many of these insects are on the under side of the leaf, where the vegetable matter is soft and juicy, and it is very difficult to get at them.

The SECRETARY.—The lice cluster on the upper side of the stem, but the rose hopper on the under side of the leaf. For the rose hopper the best thing is to puff the pyrethrum powder up from beneath on the under side of the bushes when the bushes are a little damp. I have found that to rid the bushes of the hoppers in a very little time.

Q.—Please state the preferable situation for the raspberry—whether in the shade or exposed to the sun. Which are the best varieties?

The SECRETARY.—I think decidedly have an open exposure for the raspberry; I have found the Schaffer, for instance, growing exceedingly well under the shade of peach trees; but I don't think that would be the rule. As for varieties, I think the Marlboro for early, and the Cuthbert for the main crop. I value the Turner very highly also. For black, perhaps the Souhegan and the Gregg.

Mr. BEALL.—Do you think the Marlboro is a fine-flavored raspberry?

The SECRETARY.—No, but it sells well, and it bears very well with me.

Mr. MORTON.—Shade is not preferable for the raspberry; I would want an open exposure. They sometimes do well on the north side of a fence, if the fence is not too high; but I would rather have open ground. For home consumption I would prefer Turner and Cuthbert; Marlboro I would not have for home consumption, although you can get a good big crop of them. Two reds are enough for any man; one is enough for home consumption, because they are dreadful things to run. Schaffer's Colossal is my favorite; I am rooting out all my reds and putting in Schaffers. I have about a hundred of them in my garden, but in blacks I recommend the Tyler rather than the Souhegan. Gregg for late; and the Ohio is a very good one if you want to try a few berries, because they hold out better than the others; I think those three, to come after the Schaffer, and I would advise you to plant at least one-half of the whole number Schaffer, and your choice out of those two reds would cover the ground. Golden Queen I think is going to be valuable. Caroline I would not have. I have no trouble with the Cuthbert through the winter. The Cuthbert does not bear so heavy a crop as the Turner, and it is not so nice for the table. The

Schaffer is the finest for canning; don't can with any sugar, and put the sugar in when you put them on the table, and you will have the flavor of the fruit. The same with strawberries. Brinkle's Orange is one of the finest berries that there is, but it is not handy enough with us. We would have to lay it up and cover it up.

Rev. Mr. MACAULEY.—I find the Golden Queens very strong growers. They bore some the same year they were put down, but they were a little later coming on than the Cuthbert, but I think they are quite as prolific as the Cuthbert. The Cuthbert is not anything like as strong a bush; and I am a little afraid that while the Cuthbert bore very well last year, though it was their first year down, they are not going to hold out this year with the Golden Queen.

The PRESIDENT.—What is your soil and exposure?

Mr. MACAULEY.—It is the shady side of the garden, and it is a kind of clay loam in which there have been a few loads of sand mixed in order to lighten the soil; richly manured with stable manure.

The SECRETARY.—I have one or two dozen Golden Queen that were bearing last year, and my opinion agrees with that of Mr. Macauley. It seemed to be even more thrifty than the Cuthbert. The Cuthbert berries have not been doing as well lately. I have two or three acres of them, and they have not the healthy look they should have the last year or two, and I am rather afraid they are going to fail to a certain extent; but I have not noticed that with the Golden Queen, so that I am inclined to think it is a thrifty bush.

Mr. DIXON.—I would like to get a few of the best varieties of grapes for home use—say three—for this locality.

Mr. PETTIT.—I would say Moore's Early, Worden, Lindley, Delaware, and Brighton. For a white grape I think Lady would answer better for home use than anything else.

Mr. RACE.—I have tried the Moore's Early, and I have thrown them all out. It is impossible to grow enough wood unless you get the ground very rich; and even after that it is not a good bearer in this section. The grape I have the most satisfaction with is the Worden, the Lindley No. 9, the Agawam No. 15. I never tried the Rogers 44, but it is growing in the town. So far as the growth is concerned I would prefer the Niagara to any other white grape.

Mr. PETTIT.—Do I understand the Agawam will ripen with you?

Mr. RACE.—Yes, it ripens every year with me. The Agawam ripened last year a little north of my place. I intend to confine myself to these three varieties—the Lindley, Worden and Niagara. I don't know a grape that will grow better here than the Champion, but it is no good after you grow it.

Mr. MORTON.—I would recommend the Wilder No. 4 instead of either the Niagara or the Agawam. I would say Worden, Lindley and Wilder.

Mr. RACE.—The Salem will do better in this section than the Wilder.

Mr. MORTON.—It mildews.

The PRESIDENT.—It is evidently pretty hard for a person to pick out the three best from the different speakers. If I were judging from my own experience, and what I know of this section, I would say for this section Worden, Lindley and Niagara.

Q. What is the best way to cultivate cedar hedge?

The SECRETARY.—They will grow without much cultivation after the first year, in my experience. A little work with the hoe and spade the first year.

The PRESIDENT.—The cedar hedge is one of the most satisfactory hedges you can plant, upon condition that you can get good small stocky plants when you put them down. The Norway Spruce is a very handsome and satisfactory hedge. I trim the cedar every second year, giving them freedom then to get a good growth. The cedar will bear trimming better than the Norway Spruce after the first year.

DELEGATE.—Will it require much water?

The PRESIDENT.—No; in my section I never water at all unless it is particularly dry season when you plant.

Mr. STEWART.—The cedar makes equally as good a hedge as the Norway Spruce. The Norway Spruce stands well for maybe ten years, but after a number of years I find it begins to decay a little; but you can prune the cedar for any length of time. I never saw a cedar hedge that was decayed. I don't think they require much cultivation.

The SECRETARY.—I think it would be a mistake to use the Norway Spruce around the door-yard for a hedge. It is too strong a grower. The cedar is a much slower grower, and therefore is much better adapted for a small hedge, and can be kept pruned into better shape; but if it is for a hedge that you can allow to grow up large, as a screen, certainly the Norway Spruce would be best. Nothing could be better for a screen for buildings, barnyards and other places you wish to hide, than the Norway Spruce.

GOOSEBERRIES—THEIR CULTURE AND PREPARATION.

Mr. P. E. BUCKE (Ottawa) read the following paper:

Having been requested to write a paper on some one of the small fruits, I have selected the gooseberry.

There is no doubt, though this fruit is one of the most valuable it is also one of the most neglected on the list. It is difficult to find the reason for this unless it may be that it is more subject to the attacks of the saw fly than the currant, and consequently the leaves and plants are destroyed before the pest is detected, when grown by amateurs.

In no country has this fruit received so much attention as in the British Isles, where it has been fostered by special exhibitions, by premiums and prizes until the small worthless hedge-row plant—infinitely more insignificant than either of our two native kinds—has been cultivated into an exceedingly fine dessert fruit of the richest flavor and texture.

The attempt to introduce the English varieties into this country, and the failure in doing so, owing to the mildew, which is produced by the unsuitableness of this climate which destroys the fruit and foliage is too familiar to all cultivators of this plant to need any notice from me. It is now conceded we shall have no really first-class berries until we begin *de novo* and work up our native fruits as have been done in the Old Country. From the two varieties we may confidently expect the same gratifying result that has been there (in Britain) obtained.

The Houghton, Smith's and Downing are all advances on the native stock, and it is not improbable that any one of these may be in the direct line of future success, though a cross between the smooth swamp berry and the prickly high land variety would give the initial start to a new and hardy strain, which could subsequently be improved, upon the Van Mons system, with high cultivation or by an admixture with the finer sorts by hybridization. The first object to be gained in a plant perfectly capable of resisting mildew.

Why the gooseberry is so little written or spoken about it is hard to say; its value is undeniable. Either for stewing in the green or half ripe state, and for canning or preserving it has no rival in my estimation. It has an acid of its own which the system

seems to crave for during the long winter and spring months, before the fresh fruits of early summer can be gathered. Its season is longer than any of the fruits used only in their ripe state, besides which it is handled without loss or damage from carriage and will remain bright and fresh for many days after it is gathered. The price obtained is remunerative, being from twenty to forty cents per gallon. The bush itself is perfectly hardy, resisting the cold of winter and the drouth of summer with as much indifference as a telegraph pole. It may therefore be cultivated in northern regions where the raspberry and strawberry would utterly fail.

Owing to the little attention given to its cultivation the market is never overstocked. Even with the varieties we now have, and a superior berry would open out a much wider range. The bushes come quickly into bearing, the crop is annual and abundant, they have no "off" years, it is only required to keep the soil well cultivated so that no grass or weeds are allowed to choke the plants. It must be remembered that if a full crop is expected plenty of manure must be added to the soil annually, or as occasion requires. It will not do to expect everything and give nothing in return.

The great natural enemy of the gooseberry is the saw fly, or as it is usually called the currant worm. This insect usually attacks the gooseberry a day or two before it appears on the currant bushes. No attempt should be made to cultivate this fruit until a supply of hellebore or Paris green has first been secured to meet the attacks of this dreadful destructive pest. It would be well if the first application be made to the bushes just as the blossoms begin to open in early spring, before any sign of the insect appears. There is no insecticide that can compare with Paris green. This remedy is so dangerous in the hands of unskilled manipulators that I hesitate to name it in a mixed audience, least it may be misapplied. The proper way to apply it is to put a small teaspoonful of green into a pail of water—a tin pail should be used as the green sticks to a wooden pail—keep the mixture well agitated and apply with a common hand whisk or a bundle of twigs tied together.

Water adds greatly to the weight and bulk, but I would strongly object to mix the poison with any dry material, as is done when applying it to potatoes. Care should be taken to keep the green in properly covered boxes, placed out of the reach of children, and to see that the vessel from which it is used is thoroughly cleansed each time after it has been employed.

The gooseberry is not so readily propagated by cuttings as the currant. It is therefore found necessary to mound up the bush with rich earth, or peg down the branches, when they will readily take root if brought in contact with the soil. This should be done as soon as the crop is gathered, and the earlier this is done—say the end of June—the better, as at the time mentioned if the berries are picked green for tarts and stews they can readily be disposed of. When the crop is removed the ground is gone over lightly with a digging fork and loosened, some old, well rotted manure is added if necessary to the soil. The branches are then placed in contact with the fresh mould. By the end of October, if the season is moist, the branches are cut off and taken up with care, the ground having again been first loosened with the fork, so that the bark may not be striped from the young roots. The plants are then divided with a sharp pair of pruning shears, any twigs that have roots on them will strike freely. These are set in rows for one or two years when the plants are ready for sale.

New varieties of gooseberries are produced from seed. The finest of good shape are selected when ripe, these are rubbed between the hands with dry sand, to separate the seeds, which should be sown in a bottomless box set in good rich earth. The young plants will appear the following spring. They must be kept free from weeds. When they show a few leaves they are pricked out four inches apart in rows, those with the largest leaves and of the most thrifty appearance being selected. Perhaps three or four plants in every hundred may show signs of improvement, the rest are rejected. Those retained are then planted out to fruit. When the berries appear the best are again selected for further experiment. It will thus be seen that raising new varieties from seed is rather a tedious job, to which two drawbacks are added. First, with all one's labor no real advance in bush, bearing, berry, size or quality of fruit may be obtained; and secondly, if something really valuable is produced there is no means of protecting the

discovery, so that the party originating it may reap all the advantages that should accrue to him for the time and labor expended. Before any plant becomes an unqualified success it has to be tested on various soils and in different climates, and therefore has to be placed in many localities, whilst undergoing the process of trial, the plant may get into unauthorised hands and so be lost in a great measure to the discoverer. Should he, however, succeed in sending it out unpirated, so soon as he begins to sell, the methods and appliances nowadays for propagating plants are such that experts will buy the first few plants at a high price and in a year or two will undersell the originator with his own production.

This is not a paper on "Protection," but I think this Association should lend its aid in endeavoring to devise some means for securing to an originator of new and useful varieties of plants a full and unqualified property in them to himself for a certain number of years.

Hitherto the Smith and Downing were the leading gooseberries on the market practically free from mildew; to-day I show specimens of the "Autocrat," a new berry a long step in advance of either of the former both in size and productiveness. It has never been known to mildew, though in my ground I have utterly failed with the White-Smith and several other foreign varieties.

The bush is healthy and thrifty, the foliage is of darker green than those mentioned, whilst the plant is of a stiffer, stockier growth. Our secretary, to whom I sent plants a couple of years ago (and also Mr. Robinson, of Owen Sound) can probably testify to its merits. Mr. W. W. Hilborn, of the Experimental Farm, who has seen it growing with me is quite interested in this new candidate for public favor. It is altogether likely the Autocrat will be placed on the market next spring, as a limited number of plants have been propagated.

The SECRETARY showed a specimen that he had grown at Grimsby from a plant sent by Mr. Bucke. In thriftiness of growth, and in every respect, it is everything that is claimed for it. He was sorry Mr. Bucke was going to change the name of the King Conn to the Autocrat.

Mr. BUCKE.—Mr. Hilborn asked me to change the name. It was suggested that it would take better under another name.

Mr. BEALL.—I am very much afraid Mr. Bucke is introducing an old variety by a new name. I am perfectly satisfied I have seen them ten or fifteen years ago. I thought I saw it at Peterboro' when our meeting was held there.

Mr. BUCKE.—I do not claim it as a new berry, but I think it is a berry that should be grown in this country. We cannot find the origin.

Mr. BEALL.—Why not bring it out under its proper name?

Mr. BUCKE.—It has no name. I call it the Conn from the man I got it from, but it has no name.

Mr. BEALL.—If it gets into a good speculator's hands there will be thousands, and tens of thousands sent all over the country for a high price, when it might be obtained perhaps for one-tenth part of the money.

Mr. BUCKE.—That is what we want.

Mr. BEALL.—Then, in a year or two we shall have the Government coming down upon us, saying, "We have done a great deal to protect farmers from frauds, but here the Fruit Growers are defrauding them themselves."

The SECRETARY.—Does Mr. Beall think it is an English variety?

Mr. BEALL.—I do.

The SECRETARY.—But the English berries all mildew in this country—or, at least, most of them.

Mr. BEALL.—Some of them; and that may mildew too.

Mr. LITTLE.—The Industry is not free from mildew.

Mr. BUCKE.—I have no desire to defraud anybody, but I want to see that berry propagated.

Mr. BEALL.—I can find many persons who will say that the Whitesmith will not mildew. I grew the Whitesmith for fifteen years in succession constantly, and had enormous crops, and not a sign of mildew; but, by-and-by the mildew came and destroyed everything. One year I planted two or three bushes of Whitesmith, and they are all mildewed. I gave a dozen to my daughter-in-law, and they are planted out in her garden; there was no protection given; she is a very poor gardener; they have been neglected continually; but they have borne excellent crops every year, and not the slightest sign of mildew. They are the bushes out of the same nursery rows.

Mr. BUCKE.—We have sent this around—to the Secretary, to St. Catharines, to the Experimental Farm—and we want to see if it will mildew.

The PRESIDENT.—I have tested a good many varieties of English gooseberry, and I have found that they mildew, and I have been very loth to recommend any one to go into the culture of those varieties to any extent; but we find sectional differences with gooseberries as we do with other fruit. I have seen several English varieties around Stratford succeeding admirably, with no sign of mildew whatever. There is one point Mr. Bucke brings up in his paper, as to the Association protecting the originator of a fruit for a certain number of years. So far as I am concerned—and I think I voice the feelings and the principles of the Fruit Growers' Association—I say our principle is not that. We like to see a certain amount of protection; we like to see an individual that has energy to go into the cultivation, and propagation, and introduction of something new—an improvement on some fruits we have—we like to see them succeed and make money; but our object is more to introduce and recommend varieties of the highest excellence for the different sections of our country; and we want to see growers obtain those varieties at the lowest possible price. Where we have varieties that are of a high state of excellence, and generally useful in the country, we want to see them propagated largely by our nurserymen and spread over our country; and we want to see our growers get those varieties that are best suited to their particular section or location, at the lowest possible price. I, for one, do not feel like offering any particular line of protection in that respect, but leaving the matter to take its usual course. I feel a desire—as I believe the rest of us do—to see anything that is good come to the front as rapidly as possible.

Mr. DEMPSEY.—With respect to introducing a gooseberry that we are satisfied is an old variety under a new name, I can see at present no objections to it. We have only to look down the list of names of some of the best pears we have in cultivation, and we see a great many synonymous names attached to them; and that goes to prove that those varieties of fruit have been sent to the different parts of the world, and there the labels were lost, and new names have been given to them; and those names are following them, but we have the same fruit still. The Bartlett pear, for example, is not the Bartlett at all; and as honest Britons I have always argued that we should not call it the Bartlett; because it originated in England, and was imported from England by a man of the name of Bartlett living in Boston With respect to protection, I differ materially from our President, In protecting the person that produces new fruit you protect the farmer and everybody. We heard yesterday of apples sold by nursery agents for Walbridge and Wealthy, that were not those varieties. That was because there was no protection allowed the originator of those varieties. Now, if the originator of a new fruit had an exclusive right to propagate and send out, he could hand it over to a nurseryman to propagate it; he could propagate it just as fast as fifty or a hundred nurserymen would, and no danger of those frauds at all; and the farmer would be protected as well as the producer of the new fruit. I can assure you that producing new fruits and new flowers is the most discouraging business, from a financial standpoint, that anyone can undertake. I have spent a lifetime in this way so far, and have not much more life, I think sometimes, to spend; but the balance will be spent the same way. I have succeeded in originating some very fine fruits indeed. I have got some on hand; but really, for all that has ever slipped out of my hands I have not had a dollar yet. (Hear, hear). Now, I have been working for whom? For the protection of those miserable—I may say thievish—

nurserymen. They are not all that. (Laughter). I am proud to say there are a few honest ones but I tell you that as a rule, those men that are so anxious to speculate on another man's labor, will do it without character, because they lack it. I contend that for ten years after a man begins to send out a new article it should be his right; no other person should be allowed to send it out except himself. Now, we heard a lot about Fay's currant. I can show you the old Red Dutch currant on my premises, bought for $1.50 a plant, and the man pretends to be one of the most respectable nurserymen in the State of New Jersey that sent it to me. So it goes There is not a class of people in the world that is defrauded so much as fruit growers; and there is not a class of people that get defrauded by another party more than the farmers get defrauded sometimes by nurserymen. I agitate protection because I want it. If I had had a little protection, I could hand you, I believe, the best pear you ever saw in two years; but I am holding it; and what is the use of holding it? I hope to see the day when we will have a little protection for it. I believe that the best apple we have, taking all things into consideration, for dessert apple, I have produced; but I ain't going to get anything out of it at all; it is out of my hands, and it has been sent out this year: and I am sure that some people that buy it at a high price won't get the article at all, just for the want of this protection. So here are two sides to this question; and we want to look at the side that is likely to protect the farmer, or build up the character of the nurserymen by removing that temptation from them.

Mr. Bucke.—Why should not a man have profit in his plant as well as in his book? Mr. Dempsey has spent nearly his whole lifetime getting up new fruits. What has he got for it?

The President.—I do not see any difficulty in this matter at all. I stick firmly to what I have said already. I know Mr. Dempsey has originated a large number of varieties of fruits. He has got a pear now equal, if not superior, to anything we have in cultivation, as far as I have seen of it; and I believe that Mr. Dempsey is going to make money out of that. I hope he will make a fortune out of it; he deserves to; he has got a grand pear. It is a cross between a Bartlett and the Duchess d'Angoulême, and it bears the qualities of both, with the points of excellence in both; and I believe the originator of a fruit of that sort has the protection within his own hands, by propagating and selling direct from his own grounds; and our Association then steps in; we know that man; we know that he is propagating that, and we can recommend that; but as far as throwing any further protection than that around the originator, I do not see how the Association can step in there at all. We want to propagate that fruit. When Mr. Dempsey asked me what he should name it, I told him to call it the Dempsey pear.

Mr. Beall.—Would it not be a nice thing for you, Mr. President, to approach the Government of Ontario, and get them to get Mr. Dempsey to propagate enough to give one to each member of our Association in 1891, and to pay Mr. Dempsey for the same, $2 a-piece.

Mr. Little.—I don't see how Mr. Dempsey would reap anything out of that, because there are men that would not think anything of giving $5 a tree for Mr. Dempsey's pear in a few years.

Mr. Dempsey.—I would jump at that offer that Mr. Beall is talking of.

The President.—Ladies and geutlemen,—I do not see that there is anything else before us. The regular programme as printed is complete. Every question has been discussed; and although the audience has been very small on this occasion, still, so far as I can see, they have been an appreciative audience, and we have had some good words from those located around Seaforth; and I hope they have all benefited by our presence here. We certainly have benefited by the information we have received. We are extremely obliged to the residents of Seaforth for providing us with this Hall and general accommodation, and we hope on some future occasion we will reach this section again.

Mr. Elliott hoped that those who had attended would go home and put into practice what they had learned.

The Association adjourned at noon, to meet in winter at Windsor.

REPORT OF COMMITTEE ON FRUITS SHOWN AT SUMMER MEETING AT SEAFORTH.

Your Committee have examined the following fruits, roses, etc., shown by members of the Association and others, and beg to report thereon.

The Secretary showed a very fine specimen branch of the Great Biggarreau cherry, fruit fully ripe, also a branch, not quite so heavily laden, of the Napoleon Biggarreau fruit, only partially ripe. He also showed a specimen branch of the Yellow Spanish cherry, the bearing qualities of which do not appear sufficient to commend it for general cultivation, though it is in flavor quite equal to the other varieties shown.

The Secretary also showed specimen branches of the Fays and Cherry currants, nearly ripe, and attractive samples of the Logan, Jessie and Filches Prolific strawberry: also very fair specimens of the standard varieties of gooseberries.

Mr. Bucke, of Ottawa, shows a few specimen varieties of gooseberries, among them being the "Conn" or "Autocrat," evidently a berry of great promise judging from its size and bearing qualities, and freedom from mildew.

Mr. Gowanlock, of Seaforth, shows some very good samples of Fays, Cherry and White Grape currants in a green state, and several varieties of gooseberries, among them the Industry; free from mildew and of good size.

Mr. Morton, of Wingham, shows some very excellent specimens of the Crown Bob gooseberry in a green state, and Mr. D. D. Wilson of Seaforth shows two bunches of last year's grapes, Roger No. 15 and No. 44, preserved in sawdust at a low temperature. The fruit showed no signs of decay nor shrivelling of the skin.

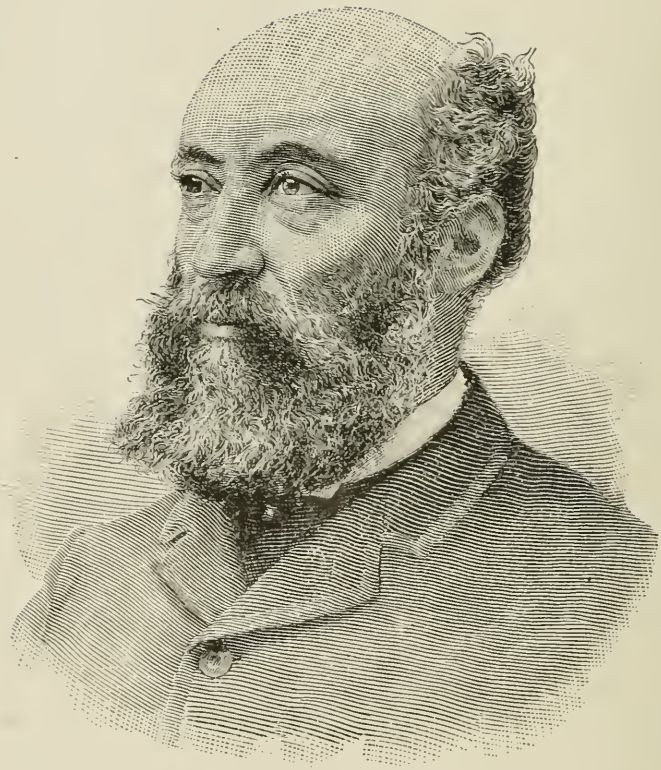
In roses Mr. Thomas Beall, of Lindsay, makes an attractive display, showing among his collection specimens of the Duke of Edinburgh, Madame Plantier, Le Rhein, Jules Margottin, (fine rose with splendid dark foliage), M. P. Wilder, Eugene Verdier, Caroline de Sansal, Coquette des Alpes, Lena Turner, Cabbage, Common Moss, and a few other varieties of more or less merit for outdoor culture. Taken as a whole Mr. Beall's collection deserves more than a passing notice, and your committee highly commend his efforts and success in the cultivation of this the "Queen of Flowers."

The Secretary also showed a very choice collection comprising the Paul Neyron, La France, Sir Garnet Wolesley, M. P Wilder, Madame Plantier, Gabriel Tournier, Anna de Diesbach, and Alfred Colomb, all desirable roses, and a number of other varieties of lesser merit.

A few specimens of unnamed roses were also shown by Mr. Gowanlock of Seaforth.

T. H. RACE,
A. H. PETTIT, } Committee.

Seaforth, Ontario.



ALEXANDER McD. ALLAN,

President 1885-1889.

APPENDIX.

ADDITIONAL PAPERS.

FRUIT GROWING IN THE NIAGARA DISTRICT.

The following paper was read at the Lincoln farmers' institute gathering held at Smithville on January 9th and 10th, 1889, by Mr. A. M. Smith of St. Catharines:

The most of us recollect the time when fruit growing for profit, or as a staple crop, was confined to a few localities and individuals, the general farmer taking no interest in it. But now, in many sections of our country, it is becoming one of the leading industries, and instead of importing a large amount of fruit to supply our home market, they are well supplied with fruit of our own growing. Besides this, we annually export half a million dollars' worth of fruits to other countries, and the production and demand, too, is constantly increasing. The quality of our fruit, particularly apples, is second to none in the world, and the increased facilities for transportation, together with the improved methods of preserving fruits for shipments long distances, such as canning and evaporating, is opening up markets hitherto unaccessible to us. The settling up of our vast territories where fruit can not be grown successfully, and which will demand our supplies, all indicate that this industry is but in its infancy ; that it is one which demands our attention, and that the discussion of subjects connected with fruit growing at meetings of this kind should interest every farmer, whether he be a fruit grower or not. About thirty years ago, when I first began the fruit and nursery business at Grimsby, fruit growing for profit was scarcely thought of. Such a thing as shipping fruit, even to our own towns and cities, except in the shape of sun and kitchen-tanned dried apples, was entirely unknown. When I planted 5,000 or 6,000 young trees in my first nursery the old farmers shook their heads and said, "The boy must be crazy, what in the world will he do with them all? We don't want them here—we have already more fruit than we can use." But a few of their more hopeful sons thought there might be something in fruit growing, and they planted out young orchards and some small fruits, and grafted up some of the old trees, and what has been the result? We got the express company to establish an office there and commenced shipping small fruits and peaches to our own towns and cities, which had hitherto been supplied with these luxuries from the States; we induced buyers to come from the States to buy our apples, which they soon found were superior to their own; we began sending some to the Old Country, and in a few years Grimsby township alone was sending away $30,000 to $40,000 worth of fruit annually, and Grimsby became famous as a fruit-growing section, and the business has now spread nearly all over the Niagara district. But I was to say something about "Failures in fruit-growing among farmers; their cause and remedy." You know that men in some respects are a good deal like a flock of sheep; if one of the flock jumps over the fence into the clover, the rest will follow pell-mell without regard to consequences. If one man happens to make a lucky hit, or falls into a good thing to make money, his neighbors are pretty sure to follow, whether they know anything about the business or not, and consequently it is overdone, or those who don't know anything about the business "get left." This has been especially true of fruit-growing, and has been the cause of a good many failures. Not that the business has been overdone, except perhaps in a few lines and instances, but because so many have gone into it that know little or nothing about the business. I stated before, and you know the fact, that Grimsby and the Niagara district have become famous

for fruit-growing. Men in other parts of the country and in some of our cities have heard that farmers have got rich off of a few acres of land in a few years, and they have fondly imagined that if they could jump into Grimsby or somewhere near it, they could soon fill their pockets and retire. Men have left good grain and stock farms, and others good businesses in the city, and invested in Grimsby or Niagara land, not dreaming but what all land there was fruit land, and thinking that all they had to do was to invest a few dollars in trees, dig holes in the ground and plant them, sit under the trees for a few years, and the fruit would drop into their laps and the money roll into their pockets. But many of them have had the illusion dispelled; they have found out that all of Grimsby or Niagara is not fruit land—except it might be fruitful in growing frogs, or in material for making bricks—and even where suitable land has been secured they have found out that trees will not grow by simply sticking them in the post hole and leaving them to take care of themselves. They did not understand the business, and the same is true of a good many farmers who live in fruit-growing sections and fail in growing fruit. They don't understand that the following rules or conditions must be observed in order to be successful, and this is the main cause of their failure: First, they must have soil and climate adapted to fruit-growing. Second, they must have varieties of fruit adapted to that particular soil and location. And then the trees planted should be carefully planted, cultivated, pruned, protected and fed. To illustrate: I have seen farmers who have decided to go into the fruit-growing, select the poorest field they had on the farm for the purpose, because it was more convenient to the house, or because they wanted others for pasture, for growing roots, or for some other purpose. And these same men generally consult some travelling tree agent in regard to what varieties they shall plant, or select from the stock of pictures which he carries, instead of consulting some reliable horticultural work, or some man who is posted and knows what will succeed in that particular locality. These men invariably get the varieties that the agent wants to get rid of, or that he can make the most money out of, whether they are adapted to the locality or not, and they are not over particular in planting out their trees. Instead of digging holes large enough to straighten out all the roots and fibres, and then carefully filling in and preparing the earth around them, or, if it is dry, throwing in a pail of water to settle the soil about them, they dig a small hole, crowd in the roots, throw on a little dirt, and if they die blame the nurseryman or the weather for it. Their after-culture is sometimes a crop of grain sown around them, and sometimes they are left in sod, instead of being hoed and cultivated as they should be. As for the pruning and trimming they get—well, that is generally left to the animals on the farm, and it is done by horse or cattle power until there is little left of the struggling tree. Is it any wonder they fail? But you say, perhaps, that careful cultivators sometimes fail—even those who have complied with all the requirements I have mentioned. Granted, and so do careful cultivators of grain and other products sometimes fail from causes beyond their control, but as a general thing where you find failures, there has been one or more of the rules mentioned violated. I have seen, and had in my experience, good selections of soil and varieties made in grape vines and small fruits, and had them carefully planted, cultivated and trained, and they did splendid the first season, but they were all destroyed the first and second winters after planting for want of proper protection or covering to the roots; and I believe that this is the cause of more failures in the growing of small fruits and grapes, and even peaches, quinces and some varieties of plums, pears and apples, than we are aware of. Take some of the winters we have had in this section during the past five or six years! When

there has been very little snow, and what there was blown away from the fields by the wind, and not much moisture in the ground to counteract the effects of the frost, and the thermometer 10 to 16 degrees below zero, and the ground frozen three to four feet deep, is it any wonder that the tender roots are injured or killed? I have seen the roots of blackberries and grapes, quinces, and young walnut trees even, killed by the frost, while their tops were apparently uninjured. I have even taken cuttings from these same grape vines and propagated them, thus showing conclusively that the tops were sound; and I have seen vines and trees throw out leaves in the spring, and then die and wither away, and on examining the roots found them dead and rotten. The remedy for this is to cover the ground around the trees and plants in winter. A slight covering of coarse manure straw, cornstalks, evergreen brush, or anything to hold the snow to keep it from blowing off, will be a protection, and where these are scarce, a crop of rye sown early in the fall among trees and vines affords an excellent covering, and it may be turned under in the spring, and will make a good fertalizer also. But the most permanent protection is a good evergreen hedge that will stop the force of the wind and keep the snow from blowing off. I have a hedge of Norway spruce on the west side of my place, and about five years ago I planted a vineyard along the east of it. The vines grew well the first summer, but the following winter was a dry, severe one, with very little snow, and the result was that three or four rows of vines beyond the protection of this hedge were every one killed by the frost, while those near it and under its protection all came out sound and have grown nicely, and never fail to produce an abundant crop. A neighbor adjoining planted a vineyard on similar soil the year following, and has given them just as good cultivation and care, all but the protection, and to-day he has not a healthy vine except a few in a low place in the field where the snow has drifted in and protected the roots. I have seen similar results even from the protection of a row of currant bushes. A few years ago I visited a young vineyard belonging to Peter Wright, in Stamford, a portion of which was almost entirely destroyed by freezing the previous winter, but the remainder had been planted with alternate rows of currants, which had broken the wind, retained the snow, and saved the young vines. I could cite similar cases amongst peach, quince and dwarf pear trees. In one instance tomatoes had been grown in a peach orchard and the vines raked off and thrown around one row of trees, and the adjoining trees had been plowed around and the ground left bare. We had one of our dry, bleak winters, with very little snow, and nearly every tree where the ground was bare was killed, and those that were protected with the tomato vines came out all right. I saw a remarkable instance this last season in an apple orchard belonging to Mr. D. Vanduzer, of Grimsby, which I can attribute to nothing but the protection of the roots. There had been a strip left for a road through his orchard alongside of a row of Baldwin apple trees, on which the grass had grown for several years, extending up to the trees; the opposite side had been cultivated, and the ground had been left comparatively bare the previous winter. On the side where the grass was, a healthy growth and a good crop of apples all along the row, while on the opposite side there was scarcely any fruit and the leaves had a sickly appearance. We all know that our fathers had no difficulty in growing any fruits they planted. I have dwelt upon this subject of protection at some length because I believe it to be of importance, and the want of it to be the cause of a large proportion of the failures in fruit-growing. I would like to say a word or two about feeding trees and plants. None of you would expect to be successful breeders or stock-growers without a judicious system of feeding your stock; nor would you expect to be successful in growing grain or any other crop without sufficiently fertilizing the soil, or giving the plants suitable

plant food. Yet farmers in the treatment of their orchards seem to forget the need of this when they crop their orchards year after year and don't give them half manure enough to feed the crops they are taking off, forgetting that the trees require the full strength of the land, and should have a double supply of nourishment instead of being robbed of what little they have. Is it any wonder that we hear of orchards failing to bear? The remedy for these kinds of failure is easily seen. Don't rob your trees of the food that belongs to them, and instead of carrying it away in hay, grain and other crops, give them an extra supply in the shape of barnyard manure, unbleached wood ashes, bone dust and other fertilizers.

CO-OPERATION BETWEEN THE FRUIT GROWERS' ASSOCIATION OF ONTARIO AND THE FARMERS' INSTITUTES.

The following paper was read by the secretary of the Fruit Grower's Association of Ontario, at the Central Farmers' Institute, Toronto, February, 1889:—

For some time past I have been advocating closer sympathy and co-operation between the different branches of work which come under the care of the Department of Agriculture, and now that we have a Minister of Agriculture who takes a deep interest in furthering every movement which fosters the prosperity of our Canadian farmers, what may we not hope for in the near future? Nothing I am sure, short of the elevation of the farmer to a position of affluence and respectability, equal to and perhaps surpassing that of those who are engaged in the so called learned professions.

One of the grandest movements of the day for accomplishing this end is the establishment of farmers' institutes for the education of farmers in scientific agriculture. The Agricultural College is doing a grand work for the young men of Ontario, but to diffuse education still more widely we must carry it to the very doors of the farmers, and meet them where they will feel free to question what is said if it is not in accord with their own experience. And this is exactly the work of the farmers' institutes.

The Fruit Growers' Association of Ontario has been trying to accomplish the same end, but, of course, limiting its attention to the cultivation of the garden and orchard, and the care of wood lots. For thirty years we have been meeting two or three times a year in the various parts of Ontario collecting and disseminating useful information on these subjects, and I claim that in that time we have stored up in our annual reports, and in the pages of our useful journal *The Canadian Horticulturist*, a vast amount of most useful information, just such as every farmer should be in possession of. Yet although we have grown in numbers from a membership of about a dozen to over two thousand in number, still our two or three meetings each year, are wholly inadequate for the rapid diffusion of that knowledge among those who are not members of our Association, and who consequently do not receive our report.

I am aware that many persons will argue that the farmer should devote himself entirely to one line of agriculture, and to that only. I grant that such a plan might tend to bring about the highest state of perfection in the agricultural profession, yet mixed farming will often be found the most expedient; giving

returns from one department when others fail. I claim that in very many cases farmers are so situated that it would pay them, from a purely commercial point of view, to take up some one line or other of fruit culture. Personally I would prefer that all farmers would wholly avoid this line of industry, and leave it wholly to those who, like myself, have devoted their whole farms to fruit culture, and make a specialty of it only. No doubt that, on the whole, such a division of labor is most advantageous; farm crops and fruit crops often come in conflict and one or the other must suffer neglect, Nevertheless, a farmer may be situated near a good market for fruit products, or he may have ground so well adapted for garden crops, that an acre devoted to small fruits, vineyard or orchard, may net him more ready cash than twice or thrice that amount of land in an ordinary field crop. In such a case, all that he lacks, in order to make the most of his ground, is to have reliable information concerning the best varieties to purchase, the proper culture of the plants or trees, and the best method of handling and marketing his fruits.

Even for home uses only, I claim that every farmer should have a fruit garden of liberal extent, so planted as to give a bountiful supply of fresh fruit of various kinds, for the use of his family in every month of the year. This is no impossibility, for it is quite possible to have luscious pears on the table for dessert during nine months of every year, and small fruits in succession for at least four months of the summer, and by a proper selection of varieties to have the health-inspiring grape, fresh and plump, during eight months of the year.

Now, such particulars as these, are those to which our Association has given the closest attention and which we are endeavouring by every means at our disposal, to make public, in accordance with the object for which it was originally formed, as is set forth in article 3 of our constitution, which reads as follows:— "Its objects shall be the advancement of the science and art of fruit culture by holding meetings for the exhibition of fruit and for the discussion of all questions relative to fruit culture, by collecting arranging and disseminating useful information, and by such other means as may from time to time seem advisable."

It has been proposed that we dispose of at least one meeting of our Association proper, and that our directors, of whom there is one for each Agricultural division of Ontario, should each be prepared to attend as many meetings of farmers' institutes each year as possible, and give a paper or an address on such subject in practical fruit culture, as shall appear best suited to the locality in which the meeting is held.

These subjects treated by our best practical fruit specialists, and accompanied by the usual cross-questioning, at some fifty or sixty meetings of institutes every year, will I am sure, tend toward advancing the fruit industry of our country, an industry the importance of which may be imagined when we note that according to the last report of the Bureau of Industries, the value of the fruit exports of Canada in the year 1887, alone, amounted to the sum of nearly $1,000,000.

I may add that this plan has been experimented upon in a small way during the past year, and our directors, as far as they have gone out, have been most heartily welcomed by the farmers, who have taken a very lively interest in the subjects of their addresses.

It was moved by Mr. Clarke, seconded by Mr. Campbell, that the thanks of this meeting be tendered to the Fruit Growers' Association of Ontario for their offer of assistance in the work of the Farmers' Institute as set out in the paper of Mr. L. Woolverton, just read, and this meeting desires to express their thorough appreciation of the benefit that will accrue to the Farmers' Institutes by such assistance. The motion was carried.

SPRAYING WITH THE ARSENITES.

The following paper was read at Toronto, August 26, 1889, before the Society for the Promotion of Agricultural Science, by Professor A. J. Cook, of the Agricultural College, Michigan:—

Nine years ago, at the first meeting of this society, I presented a paper upon the use of Paris green as a specific against the codling moth.

In that paper I gave the results of careful and elaborate experiments, which settled two facts which were very important in economic entomology: First that Paris green was efficient as a preventive of the ravages of the codling larva; and secondly, that such use was entirely safe in respect to poisoning the fruit. To-day, less than a decade from the date of the discovery of this remedy, this method to combat the worst insect pest of the apple grower is generally adopted by the more intelligent orchadists of our country. Its value is now universally conceded. Easy and cheap methods to apply the insecticide are now known and generally adopted.

For several years myself and others have been experimenting, in hopes to find that this same insecticide was equally efficient to destroy the plum curculio. For six or seven years I have sprayed plum trees once and even twice with no apparent good. Test trees, close beside the trees sprayed, and that were not treated, were as free from attack as were the trees that were sprayed, and the trees treated were no more exempt from attack than the others. Thus I was convinced that this insecticide was of no value in this curculio warfare. Several of my horticultural friends, in whose ability to experiment and observe correctly I had great confidence, had tried this remedy with *very satisfactory* results. In 1888 I studied this matter very closely, and concluded that as the plum is a smooth fruit, with no calyx cup like that of the apple, in which the poison may lodge, and as the curculio lays its eggs anywhere on the smooth rind, the poison would be very easily washed off, or even blown off by the wind. I thus concluded that my want of success was very likely due to a want of thoroughness. In 1888 I sprayed certain trees three times, at intervals of eight days, and omitted to treat other trees close along side. The benefit from spraying was very marked.

I also found that carbolized plaster—one pint of crude carbolic acid to fifty pounds of plaster—was quite as efficient to repel the curculio as was the arsenites. This was also applied three times. The season was very dry, and there were few or no rains to wash off the insecticides. This year I repeated the experiments both with the London purple and with the carbolized plaster, but with no success.

All the trees were severely attacked, and all the plums lost. This year we had almost daily rains, which were frequently quite severe.

I believe I am warranted in the following conclusions: The arsenites and carbolized plaster will protect against the plum curculio if they can be kept on the tree or fruit. But in case of very frequent rains the jarring method will not only be cheaper, but much more effective. Again, as our wild fruits are more cleared away we must have plums in our orchards to protect the apples from the curculio. When apples are seriously stung they become so gnarled and deformed as to be worthless. It will pay, then, to set plum trees near by or among the apple trees. Then we will escape mischief among our apples from the curculio, and will only need to spray our apples once, to destroy the codlin moth, and can treat the plum trees three or four times with Paris green or carbolated lime in case we have only occasional showers, or can jar the trees when the rains are very frequent. For the apples we can use London purple, one pound to 200 gallons of water. For the plums we must use Paris green, one pound to two or thee hundred gallons of water. If the corbolated plaster is preferred, we use one pint of crude carbolic acid to fifty pounds of land plaster. This is thrown freely over the trees so as to strike every plum on the tree, which is being treated.

Another very important practical point has been suggested by the past season's experience with these insecticides: I refer to the danger of applying them before the blossoms fall. Bees are quite as susceptible to these poisons as are the codlin larvæ and curculio. In their good work of collecting nectar and fertilizing the blossoms, they are very certain to take the poison as well, if the trees have been sprayed. Of course there is no excuse for spraying at so early a date, as neither the curculio or codlin larvæ commence their attack till the blossoms fall. Thus for the object in mind, as well as for the safety of the bees, delay should be insisted upon. I think we as scientists and all educated men should pronounce vehemently and with one voice against spraying our fruit trees with the arsenites till the blossoms have all fallen. We should even go farther: We should secure the enactment of laws which would visit any such offence with fine and imprisonment. Such laws would prove a ready and active educator.

In the past season, many bee keepers have lost severely from the neglect of their fruit growing neighbors to observe this caution. I will only mention two cases: Mr. John G. Smith, Barry, Illinois, writes: "One of my neighbours owning an orchard of about one hundred acres of apple trees, sprayed the trees with Paris green and water just as they were in full bloom. The result is that ten or twelve bee keepers are ruined." The imago no less than the larvæ and pupæ were destroyed. Mr. J. A. Pearce, Grand Rapids, Mich., was also a heavy loser from the same cause. His bees likewise died in all stages of development.

It is well to remember and to urge that this loss is not confined to the bee keeper, for the fruit grower as well as the apiarist needs the bees and their work to insure his best success. It only requires, then, that our people know the truth, to insure against loss in this direction.

INJURY TO THE FOLIAGE.

Another practical question of no small moment in this use of the arsenites refers to injury to the foliage of the trees treated. In an elaborate series of experiments the past season, we desired to learn the effect on different trees of the different arsenites, and whether the date of treatment and atmospheric

condition had any influence. The following is a tabulated statement of the experiments:

Date.	Variety Treated.	Poison used.	Date of second application.	Time after treatment.	Weather.	Effect.
May 20..	6 plum trees...	Lon'n p'ple 1 lb to 200 gal.	June 5..	Ten days	Rain 21,23	No injury.
May 20..	2 cherry trees..	" " "	" ..	"	"	" "
May 21..	4 apple "	" " "	May 23..	"	"	" "
May 23..	5 cherry "	" 1 lb to 150 gal.	" ..	"	"	" "
June 7...	3 willow "	" 1 lb to 100 gal.	June 12..	"	.....	" "
June 7...	3 elm "	" " "	" ..	"	.....	Some.
June 7...	3 h. maple "	" " "	" ..	"	.....	"
June 7...	5 apple "	" " "	" ..	"	.....	"
June 7...	5 cherry "	" " "	" ..	"	.....	None.
June 7...	5 plum "	" " "	" ..	"	.....	Some.
June 12..	3 elm "	" " "	June 17..	"	.....	Much.
June 12..	3 plum "	" " "	" ..	"	.....	"
June 12..	3 apple "	" " "	" ..	"	.....	"
June 12..	3 cherry "	" " "	" ..	"	.....	None.
June 24..	3 apple "	" " "	.....	"	Rain 25th.	Very bad.
June 24..	3 peach "	" " "	.....	"	"	" "
June 24..	3 plum "	" " "	.....	"	"	" "
July 5...	5 peach "	" 1 lb to 200 gal.	.....	Five days.	.....	Great injury.
July 8...	2 peach "	" " "	.....	"	.....	" "
July 8...	1 cherry "	" " "	.....	"	.....	Slight.
July 8...	1 pear "	" " "	.....	"	.....	Some.
July 10..	1 pear "	" " "	.....	"	.....	"
July 10.	3 peach "	" " "	.....	"	.....	Very bad.
July 10..	1 plum "	" " "	.....	"	.....	Quite bad.
July 11..	2 peach "	Paris gr'n, 1 lb to 100 gal.	.....	"	.....	Slight.
July 11..	2 peach "	" " 200 gal.	.....	"	.....	None.
July 11..	2 peach "	" " 250 gal.	.....	"	.....	"
July 11..	2 peach "	" " 300 gal.	.....	"	.....	"
July 11..	2 peach "	London purple water.....	.....	"	.....	Great injury.
July 15..	3 peach "	W'te ars'ic 1 lb to 300 gal.	.....	"	.....	" "
July 15..	3 peach "	Lon'n p'ple 1 lb to 200 gal.	.....	"	.....	" "
July 15..	3 peach "	Solution analine	.....	"	.....	None.

I think we are warranted in the following conclusions: first London purple is more injurious to the foliage than is Paris green; and white arsenic—arsenious acid—is more harmful than is either London purple or Paris green. This is doubtless owing to the soluble arsenic which is quite abundant in London purple, and almost absent in Paris green. In experiment No. 29 (see table) it will be noticed that the colored water after London purple fully settles is very destructive to foliage, while analine (see experiment No. 32) is not at all harmful. This agrees with the experiments of Prof. C. P. Gillette, made in 1888, where white arsenic was found very destructive to foliage.

Secondly, peach foliage is especially susceptible to injury, and cherry foliage the least so of any of the kinds treated.

Thirdly, it would seem that London purple and white arsenic, used just before a rain, are more harmful than when used during a drought. We not only saw greater injury when a rain followed spraying within two or three days, but secured the same results by spraying, soon after treatment, with pure water. This also accords with the view that the injury comes from the presence of soluble arsenic.

Fourthly, it would seem that spraying soon after the foliage puts out, is less harmful than when it is delayed a few days, or better a few weeks. For ten years I have sprayed both apple and plum trees in May, and for several years with London purple; and often used a mixture as strong as one pound to one hundred or even fifty gallons of water. Yet in most cases no damage was done. This year I sprayed several trees in May, using one pound to 100 gallons of water with no damage. In June and July spraying the same trees with a mixture only one-half as strong did no slight injury This fact, if fact it be, accounts for the few reports of injury in the past, even with a stronger mixture, and the freqeunt reports of damage within a year or two, even with a dilute mixture. Then the spraying was confined to May; now it reaches to June, or even to July.

Fifthly, London purple may be used on apple, plum, cherry, pear, and most ornamental trees, but on these should never be stronger than one pound to two hundred gallons of water, If the application is to be repeated, as it must be for the curculio, to prove effective, or if it is to be used in June or July, Paris green should be used, in the same proportion as above, or else we should use only one pound of London purple to three hundred gallons of water. I now think that this necessity is more due to time of application than to the fact of increased quantity of the poison.

Sixthly, if the arsenites are to be used on the peach, to defend against the curculio, Paris green only should be used, and that not stronger than one pound to three hundred gallons of water. With the peach the poison is not only absorbed, coloring the tissue purple or brown, but even the petiole or stem of the leaf is weakened, and the leaf falls. Thus in several cases where we used London purple one pound to two hundred gallons of water, or white arsenic, the peach leaves all fell off. White arsenic colors the tissue the same as does the London purple, showing once more that it is the soluble arsenic, not analine, that does the mischief.

Seventhly, the injury done to the foliage is never immediately apparent. It usually shows somewhat the second day, but the full injury is frequently not manifest till the fifth day, and often not till the tenth.

POISONING THE PASTURE UNDER THE TREES.

Another important practical question which I have tried to settle this season—1889—concerns the danger of pasturing under trees which have been sprayed with the arsenites.

A gentleman wishing to spray his orchard, in which he was pasturing seventy-five hogs, consulted me as to the wisdom of doing so without first removing the swine. I told him I believed there was no danger. I said use a mixture, one pound of London purple to two hundred gallons of water, watch your hogs closely and if any seem affected remove all at once, and I will be responsible to the amount of twenty-five dollars. The gentleman did so and reports no damage.

In the following experiments I used the mixture of twice the strength which should be used, that the experiment might be the more convincing. I used one pound to one hundred gallons of water. In every case the spraying was very thoroughly done. Care was taken that every twig and leaf should be drenched.

In tree No. 1 a thick paper was placed under one-half of a rather small apple tree. The space covered was six by twelve feet, or seventy-two square feet. The paper was left till all dripping ceased. As the day was quite windy the dripping was rather excessive. In this case every particle of the poison that fell from the tree was caught on the paper. Dr. R. C. Kedzie analyzed the poison and found four-tenths (.4) of a grain. Tree No. 2 was a large tree with very thick foliage. Underneath this tree was a thick carpet of clover, blue grass and timothy just in bloom. The space covered by the tree was fully sixteen feet square, or equal to two hundred and fifty-six square feet. As soon as all dripping had ceased, the grass under the tree was all cut, very gently and very close to the ground. This was taken to the chemical laboratory and analyzed by Dr. R. C. Kedzie. There was found 2.2 grains of arsenic. Now as our authorities say that one grain is poisonous for a dog, two for a man, ten for a cow, and twenty for a horse, there would seem to be small danger from pasturing our orchards during and immediately after spraying, especially as no animal would eat the sprayed grass exclusively. To test this fully, I sprayed a large tree over some bright tender grass and clover. I then cut the clover carefully, close to the ground and fed it all to my horse. It was all eaten up in an hour or two, and the horse showed no signs of any injury. This mixture, remember, was of double the proper strength, was applied very thoroughly, and all the grass fed to and eaten by the horse. This experiment was repeated with the same result. I next secured three sheep. These were kept till hungry, then put into a pen about a tree under which was rich juicy June grass and clover. The sheep soon ate the grass, yet showed no signs of any injury. This experiment was repeated twice with the same result. It seems to me that these experiments are crucial and settle the matter fully. The analyses show that there is no danger, the experiments confirm the conclusion.

Thus we have it demonstrated that the arsenites are effective against the codling moth, that in their use there is no danger of poisoning the fruit, and when used properly no danger to the foliage, nor to stock that may be pastured in the orchard.

FORESTRY.

The following paper was written by Dr. J. W. Beall, Prof. of Botany and Forestry, Michigan Agricultural College.

Why not Plant a Grove?

These few pages on forestry have not been written to secure the applause of those who see little use for a bulletin unless it contain some new truth brought out by conducting careful experiments. On the contrary, they have been prepared with the view to help awaken an interest in the subject by calling attention to a few simple facts in the plainest way possible, and then to give some elementary hints on the selecting, planting and management of young forest trees in groves and screens.

Of the three greatest interests of our country, manufacturing of all kinds ranks first, agriculture second and forestry third.

"The evidence is ample and conclusive that we are making fearful inroads on our forest stores. We are cutting off a much larger crop than can possibly be replaced by natural growth within the period when at the present rate, we shall have cleared the original forest off the ground. We are wasting our forests by the axe, by fire, by pasturage, by neglect. So far as timber is concerned, we are eating into our capital with little care for the future."—Dr. E. J. James in Forestry Bulletin No. 2 of U. S. Agrl. Dept.

We legislate to protect birds and wild game, and appropriate money to encourage a large number of worthy objects, but for "our forests, from which we are drawing a larger amount in natural wealth than from any other source of supply, or from all other sources together, we have so far done practically nothing to protect or cultivate.—Dr. E. J. James.

If something profitably cannot be done in connection with this great subject of forestry, then it is very unlike any other question of great importance.

We feel confident that there are many important points in connection with forestry which should constantly receive a good deal of thought from many of our best citizens.

The writer is now supposed to be passing one of the thousands of good farm houses situated in any of the older settled counties of the State, when the following conversation ensues:

B. "I see the snow drifts have not yet all disappeared."

C. "No, and we haven't had much snow this winter either, and there has been less strong wind than for some years past. Generally, of late years, when there is a heavy fall of snow it is soon so unevenly distributed that we have little idea of how much has fallen. It piles up along the north and south roads, and blows from some parts of the east and west roads. The wheat field has many bare spots, while in other places the drifts are deep."

B. "What do you suppose has brought about this change?"

C. "Since I cut off that piece of timber down there and brought to view the farms over west for a couple of miles, the wind has frequently swept over my fields with a great deal of force, sometimes making things fairly jingle, and when cold the air seems to penetrate the smallest cracks in my pens, sheds and barns. The pigs squeal, the cows give less milk, the horses shiver and even the hen-coop is too freely ventilated. I believe the animals at such times eat more grain and fodder than they do when there is less cold air in motion. The house, too, gets colder in the night than it used to when there were few strong winds. I am sure I have to lay in a larger supply of firewood than I used to."

B. "You seem to take in the whole situation at a glance."

C. "I have seen many changes in my life. When I came to this neighborhood much of the land was still covered with a dense virgin forest. As one block of woods after another disappeared, I noticed the winds became more frequent and penetrating, but what could I do? and what could my neighbors do? We needed the land to raise more wheat and to feed more stock, and we got something for the timber which helped to pay off mortgages."

B. "There is a partial remedy for checking the fierce winds which drift the snows in winter, shake the apples from the trees in summer and lodge the grain before it is ripe."

C. "Yes, I know it. We can let the young trees grow up along the fences of our fields, and we can plant trees west of our farm buildings; but then it would be a great deal of trouble and cost a good deal to plant trees, and we should have to wait so long for any favorable results."

B. "The cost is much less than most persons imagine, and when once started they keep growing year by year, and before you are aware of it, the little trees have grown upwards and spread outwards. Suppose you were to plow a strip a rod wide and ten or fifteen rods long, either in a straight line, in a curve or in an irregular shape. That would not cost much. Then harrow it well as though you were fitting the piece for corn."

C. "Then I should have to go to the woods and find some good trees, dig them, cart them to the house, dig deep holes, set the trees, stake them, mulch them, wait a while, see half of them die and the others would look pale and stunted."

B. "I think you could do better than that. Of course you must arrange the fence so as to keep cattle, sheep and horses away from young trees. Let us see about a plan for a wind-break or for a small grove. You can put in as many kinds of trees as you like, the more the better, if you want to try experiments and think you would like to study them and learn their habits, but if you want trees that will grow fast, that are likely to remain healthy and furnish protection, you need only one, two or three species which are best adapted for the purpose. We can't afford to go to the woods and dig trees. We can buy them cheaper."

C. "Buy them! Why, a nurseryman will charge me twenty-five to fifty cents apiece for his evergreens. I can't afford that."

B. "Procure small trees; they will cost much less; they can be more easily planted; will be more likely to live and after a few years they will very likely catch up and overtake trees which were larger at the time of planting. The foundation of your screen will consist of evergreens. If others are added which are not evergreens, they should not be put in blocks each sort by itself, but mixed more or less in checker-board style with the evergreens. And the evergreens may as well be mixed if no others are planted. You will want to set them in rows, straight, curved or crooked in one way four feet apart, and three or four feet apart in the row, so they can be as easily cultivated one way as corn and potatoes. There is little risk in setting too thickly, and the trees will sooner shade the ground.

"R. Douglas & Son, Waukegan, Illinois, will send by mail:

"White pines, 3 years old, @ $1.00 per 100, or $8 per 1,000.

"Norway spruces, 3 years old, @ 75 per 100, or $6 per 1,000.

"At about the same price, you can procure any or all of the following: European larch, white ash, American elm, black cherry, black locust and many others, remembering that for good screens half or more of the trees should be evergreens rather equally distributed over the ground. W. W. Johnson, Snowflake, Antrim Co., Michigan, will doubtless send young trees at the above prices. A single row or two rows will make a good screen, but you will be better pleased with a wider strip of trees."

C. "I will send a postal card right away and get the price lists from those two men. It won't cost much to start a screen in that way. Tell me more about setting the trees, as you seem to know concerning such things."

B. "The trees arrive about the time you are sowing oats. Open the packages, and place the roots in damp soil in the shade, not forgetting that the roots of trees are unfitted by nature to stand the air. In the wind or the sun or in dry air, or in the open air, roots will live just about as long as a black bass will live out of water; not much longer. Prepare some thin mud in a pail filling it a third full. In this mud place the roots of the trees one sort at a time. Of course you have staked or marked out your ground. Dig a small hole with a spade and let the boy drop a tree in the hole; straighten it up; replace the soil, not omitting to step your full weight with one foot each side and near each tree before leaving it. This is important, as it packs the soil close to the roots, helping it to retain moisture, and preventing the air from entering. One after the other, all the kinds are planted."

C. "Then what?"

B. "If you are now careless and lose all your interest in the subject, and keep busy at something else, you will very likely leave the young things to look out for themselves. The grass and weeds will choke them, and your little enterprise will cause deep regret, every time you think of it and prove the laughing stock of all your neighbors."

C. "I am not that kind of a farmer, to drop a thing before I give it a fair trial."

B. "Then you will cultivate this land as you do your best cornfield, with level culture, only continue to cultivate all summer."

C. "What shall I do next?"

B. "Keep on cultivating during succeeding years, as long as a horse can get through the rows, perhaps four or five years or more, then the trees will not need it any longer. From time to time you will very likely pick up some other kinds of very small trees, or shrubs from the neighboring woods, and set them in among the others in the grove. If the cultivation is attended to, and the land is not too wet, you will be surprised at the rapid growth of the trees."

C. "Why can't I mulch the ground all over with straw from the old stack and save all further trouble?"

B. "It is not a good plan, and if you try it you will be disappointed. Cultivation is much better, and with the trees near the house, it is but a light chore to cultivate each time. If black walnuts, chestnuts, butternuts, hickories and oaks are desired in any places, plant the nuts where the trees are to remain."

C. "Thank you. I feel sure now that I understand the plan. It is so much cheaper and easier than I had supposed, that I am going to plant a grove, even a small one started this year will be much better than a larger one long delayed and perhaps never planted."

B. "In older States like Massachusetts farms already bring a better price if they contain some suitable groves or lots of young thrifty timber. As the grove improves with age, you will be reading every good thing you can get on forestry. You will take a deeper interest in the work of the State Forestry commission. You will want to see their last report and all that may be issued in the future. You will have a good right to consider yourself as one of Michigan's most enterprising farmers. You will be planting for study as well as for producing a grove to shield animals or growing crops from the severe winds. You will be an experimenter, a pioneer in a good cause, and the longer you live the more will you see the importance of a knowledge of forestry."

"What is the custom in this neighborhood in regard to pasturing woodlots?"

C. "Every one turns in his cattle, sheep, horses and hogs or one or more kinds of these animals. It affords some feed, and cleans out lots of rubbish and makes the woods look like a park."

B. "Yes, and it lets in the light, and with the light grasses will slowly creep in, affording more pasture, to be sure, but this will check the growth of larger trees and small trees are not allowed to follow on to take their places. The man who has much interest in the future of his reserve timber lot will not use it for a pasture."

Reader, if not already done, will you not plant a grove this year, or do something to induce some of your friends to plant one? The writer will be glad to give any further instructions in his power on this subject, and would consider it a favor to receive a postal card from any who contemplate a grove.

March 20, 1889.

STATUTORY PROVISIONS.

It is provided by the Agriculture and Arts Act, 49 Victoria, chap. 11 (1886), that the Fruit Growers' Association should be a body corporate, comprising not less than fifty members, each paying an annual subscription fee of not less than $1; that it shall hold an annual meeting at such time and place as may be determined upon; that the retiring officers shall at such meeting present a full report of their proceedings; and of the proceedings of the Association, and a detailed statement of its receipts and expenditure for the previous year, duly audited by the Auditors; that the Association shall at such meeting elect a President, a Vice-President, and one Director from each of the Agricultural Divisions of the Province (mentioned in Schedule A following), and the officers and Directors so elected shall appoint from among themselves, or otherwise, a Secretary and a Treasurer, or a Secretary-Treasurer; and that the Association shall also elect two Auditors.

Vacancies occurring through death, resignation, or otherwise in the directorate of the Fruit Growers Association, shall be filled by the Board of Directors.

The officers shall have full power to act for and on behalf of the Association, and all grants of money and other funds of the Association shall be received and expended under their direction, subject nevertheless to the by-laws and regulations of the Association.

A copy of the Annual Report of its proceedings, a statement of receipts and expenditure, a list of the officers elected, and also such general information on matters of special interest as the Association have been able to obtain, shall be sent to the Commissioner of Agriculture within forty days after the holding of such annual meeting.

SCHEDULE A.—AGRICULTURAL DIVISIONS.

1. Stormont, Dundas, Glengarry, Prescott and Cornwall.
2. Lanark North, Lanark South, Renfrew North, Renfrew South, Carleton, Russell and the City of Ottawa.
3. Frontenac, City of Kingston, Leeds and Grenville North, Leeds South, Grenville South and Brockville.
4. Hastings East, Hastings North, Hastings West, Addington, Lennox and Prince Edward.
5. Durham East, Durham West, Northumberland East, Northumberland West, Peterborough East, Peterborough West, Victoria North (including Haliburton), and Victoria South.
6. York East, York North, York West, Ontario North, Ontario South, Peel, Cardwell and City of Toronto.
7. Wellington Centre, Wellington South, Wellington West, Waterloo North, Waterloo South, Wentworth North, Wentworth South, Dufferin, Halton and City of Hamilton.
8. Lincoln, Niagara, Welland, Haldimand and Monck.
9. Elgin East, Elgin West, Brant North, Brant South, Oxford North, Oxford South, Norfolk North and Norfolk South.
10. Huron East, Huron South, Huron West, Bruce Centre, Bruce North, Bruce South, Grey East, Grey North and Grey South.
11. Perth North, Perth South, Middlesex East, Middlesex North, Middlesex West and City of London.
12. Essex North, Essex South, Kent East, Kent West, Lambton East and Lambton West.
13. Algoma East, Algoma West, Simcoe East, Simcoe South, Simcoe West, Muskoka and Parry Sound.

CONSTITUTION OF THE ASSOCIATION.

Art. I.—This Association shall be called "The Fruit Growers' Association of Ontario."

Art. II.—Its objects shall be the advancement of the science and art of fruit culture by holding meetings for the Exhibition of fruit and for the discussion of all questions relative to fruit culture, by collecting, arranging and disseminating useful information, and by such other means as may from time to time seem advisable.

Art. III.—The annual meeting of the Association shall be held at such time and place as shall be designated by the Association.

Art. IV.—The officers of the Association shall be composed of a President, Vice-President, a Secretary, or Secretary-Treasurer, and thirteen Directors.

Art. V.—Any person may become a member by an annual payment of one dollar, and a payment of ten dollars shall constitute a member for life.

Art. VI.—This Constitution may be amended by a vote of a majority of the members present at and regular meeting, notice of the proposed amendments having been given at the previous meeting.

Art. VII.—The said Officers and Directors shall prepare and present to the annual meeting of the Association a report of their proceedings during the year, in which shall be stated the names of all the members of the Association, the places of meeting during the year, and such information as the Association shall have been able to obtain on the subject of fruit culture in the Province during the year. There shall also be presented at the said annual meeting a detailed statement of the receipts and disbursements of the Association during the year, which report and statement shall be entered in the journal and signed by the President as being a correct copy; and a true copy thereof, certified by the Secretary for the time being, shall be sent to the Commissioner of Agriculture within forty days after the holding of such annual meeting.

Art. VIII.—The Association shall have power to make, alter and amend By-laws for prescribing the mode of admission of new members, the election of officers, and otherwise regulating the administration of its affairs and property.

BY-LAWS.

1. The President, Vice-President and Secretary-Treasurer shall be *ex-officio* members of all committees.

2. The directors may offer premiums to any person originating or introducing any new fruit adapted to the climate of the Province which shall possess such distinctive excellence as shall, in their opinion, render the same of special value; also for essays upon such subjects connected with fruit-growing as they may designate, under such rules and regulations as they may prescribe.

3. The Secretary shall prepare an annual report containing the minutes of the proceedings of meetings during the year; a detailed statement of receipts and expenditure; the reports upon fruits received from different localities; and all essays to which prizes have been awarded, and such other information in regard to fruit culture as may have been received during the year, and submit the same to the Directors or any Committee of Directors appointed for this purpose, and, with their sanction, after presenting the same at the annual meeting, cause the same to be printed by and through the Publication Committee, and send a copy thereof to each member of the Association and to the Commissioner of Agriculture.

4. Seven Directors shall constitute a quorum, and if at any meeting of Directors there shall not be a quorum, the members present may adjourn the meeting from time to time until a quorum shall be obtained

5. The annual subscription shall be due in advance at the annual meeting.

6. The President (or in case of his disability, the Vice-President) may convene special meetings at such times and places as he may deem advisable, and he shall convene such special meetings as shall be requested in writing by five members.

7. The President may deliver an address on some subject relating to the objects of the Association.

8. The Treasurer shall receive all moneys belonging to the Association, keep a correct account thereof and submit the same to the Directors at any legal meeting of such Directors, five days' notice having been previously given for that purpose.

9. The Directors shall audit and pass all accounts, which, when approved of by the President's signature, shall be submitted to and paid by the Treasurer.

10. It shall be the duty of the Secretary to keep a correct record of the proceedings of the Association, conduct the correspondence, give not less than ten days' notice of all meetings to the members, and specify the business of special meetings.

11. The Directors, touching the conduct of the Association, shall at all times have absolute power and control of the funds and property of the Association, subject however to the meaning and construction of the Constitution.

12. At special meetings no business shall be transacted except that stated in the Secretary's circular.

13. The order of business shall be: (1) Reading of the minutes; (2) Reading of the Directors' Report; (3) Reading of the Treasurer's Report; (4) Reading of prize essays; (5) President's Address; (6) Election of officers, and (7) Miscellaneous business.

14. These By-laws may be amended at any general meeting by a vote of two-thirds of the members present.

15. Each member of the Fruit Committee shall be charged with the duty of accumulating information touching the state of the fruit crop, the introduction of new varieties, the market value of fruits in his particular section of the country, together with such other general and useful information touching fruit interests as may be desirable, and report in writing to the Secretary of the Association on or before the fifteenth day of September in each year.

The President, Vice-President and Secretary shall be *ex-officio* members of the Board of Directors and of all Committees. The reasonable and necessary expenses of Directors and officers in attending meetings of the Board of Directors and of Committees shall be provided from the funds of the Association.

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For discussion on this paper see page 71.

ILLUSTRATIONS.

REPORT

OF THE

COMMISSIONER OF PUBLIC WORKS

FOR THE

PROVINCE OF ONTARIO

FOR THE

YEAR ENDING 31ST DECEMBER,

1889.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

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1890.

CONTENTS.

REPORT

OF THE

COMMISSIONER OF PUBLIC WORKS

FOR THE

PROVINCE OF ONTARIO,

FOR THE YEAR ENDING 31st DECEMBER, 1889.

To His Honour Sir Alexander Campbell, K. C. M. G.,
Lieutenant-Governor of the Province of Ontario, etc.

As required by the provisions of the Statute in that behalf, I beg to submit the report of the works, etc, prosecuted under the control of the Public Works Department, during the year 1889.

In the report of Architect, etc., of the Department, will be found full details of the several works in connection with the several Public Institutions, and the maintenance and repairs of the Government and Departmental Buildings.

The report of the Engineer of the Department contains details of the several works connected with the construction locks, dams, slides, etc.

The progress of railway construction throughout the Province during the year just ended, will also be found in the report.

The usual statements of the Accountant and Law Clerk, as to the expenditure of the appropriations for capital account and maintenance, contracts and bonds prepared and drainage debentures purchased, are appended to the report.

Very respectfully submitted.

C. F. FRASER,
Commissioner, etc.

Department of Public Works, Ontario,
December 31st, 1889.

REPORT

OF

THE ARCHITECT, ETC.

DEPARTMENT OF PUBLIC WORKS, ONTARIO,
TORONTO, December 31st, 1889.

SIR.—I have the honour to submit the following report :—

GOVERNMENT HOUSE.

The ceilings have been calsomined and the walls painted and papered where required, the interior having been cleaned and renovated.

The Conservatory was repaired and painted.

An addition was built to the entrance lodge, by A. Weller & Co., whose tender being the lowest, was accepted ; and the old portion was repaired, painted and papered.

The usual repairs were made to the outbuildings, and the grounds were kept in good order.

NEW PROVINCIAL PARLIAMENT BUILDINGS

The ground floor portion and nearly the whole of the second story were completed this year. Some delay was caused by the death of the contractor for the masonry, etc., Lionel Yorke, on the 13th of April last.

An agreement was made with Messrs. Carroll, Gaylord and Vick for the completion of the late Mr. Yorke's contract for the balance of the contract price payable to him.

The contract entered into by the late Mr. Yorke for the carpenter work, etc., was assumed by the Lionel Yorke estate.

The permanent Clerk of Works, who has been superintending the work on the part of the Government, Mr. J. P. O'Callaghan, died suddenly on the 5th of September last. and Mr. B. O'Byrne was appointed in his place.

OLD PARLIAMENT AND DEPARTMENTAL BUILDINGS.

The ordinary repairs have been made as required, and the grounds have been kept in good order. Furniture and furnishings have been supplied as required and the buildings are now in a comparatively good state of repair. A portion of the fence on the east side of the grounds was blown down by the severe storm of the 26th inst. It will soon be repaired.

ASYLUM FOR INSANE, TORONTO.

The entrance lodges were repaired and painted; the expenditure was charged to general repairs.

The deck roofs and slating of the main building were thoroughly repaired, also the eavetroughs and down pipes where required; and the expenditure was charged to the appropriation made for the purpose.

COTTAGES AT MIMICO.

Considerable progress was made by the contractors in the erection of these buildings, the work having been continued during the winter. Two of the cottages are completed and are now occupied with patients.

The drainage outfall is now being constructed to the extremity of the lot near the eastern boundary, and the water supply will be procured from the extremity of the western boundary, from a point 1,500 feet south from the lake shore in 20 feet of water.

The porous carbon process will be applied to the purification of the sewage, sufficient fall being available for the construction of precipitating and filtering tanks of a similar construction to those now in practical operation at the Agricultural College, Guelph.

Two additional cottages are now nearly completed, the central and rear buildings, with covered passages leading to the same, are also in a forward state, and the main building is now ready for roofing, so that the carpenter work can be completed during the winter.

The steam heating of the two north-east cottages has been completed, and the three steam boilers necessary for these buildings will soon be connected, so that these two cottages can be occupied early next month.

Water will be procured from the lake until the water supply pipes and pumping engines have been constructed. The engine house is now in progress of construction and will soon be completed.

The foundation walls of all the buildings, except the four south cottages, will be built on the rock which is about seven feet from the surface, and all the buildings will be connected by covered passages, according to detailed descriptions given in last year's report.

In sinking a well on the site near the central building, the rock was excavated over 40 feet in depth and 8 feet in diameter, and bored to the depth of 52 feet, in all 102 feet in the expectation of procuring water convenient to the boiler house.

The supply however was only 2,000 gallons a day, and being salt water it was quite unsuitable for the purpose.

The boring in the rock was continued to the depth of 1061 feet from the surface, but no greater supply of water was obtained or of suitable qnality.

Natural gas veins were struck at depths of 425 feet ,575 and 1,052 feet from the surface, in the Trenton limestone, below the Hudson river and Utica slate formations, and from the reports of experts in September last, it was considered useless to bore any deeper, with the expectation of procuring either water or natural gas in sufficient quantities. It was therefore decided to erect works for procuring water from the lake a short distance from the building and they will soon be in progress of construction.

The contractors for the drainage works are Messrs. J. & E. Dickenson; the contractors for the buildings, for the water supply and pumping engines, are the Miles Hunting Co., of Hamilton, and for the steam heating Messrs. Purdy, Mansell & Mashinter, of Toronto—the tenders of these parties being the lowest after due advertisements.

The buildings will be lighted by the incandescent system of electric lighting, a contract having been made with the Ball Electric Light Co., and arrangements will be made

so that storage batteries will be used during the night, when the dynamo engine is not running, for the supply of about 50 lights throughout the buildings.

The whole of the ceilings in the cottages will be covered with asbestos paper and sheet iron. The ceilings in the two completed cottages are satisfactory in every respect, and are a great improvement on the usual plaster or matched boarding formerly used.

Tenders were received for the erection of a Farmers' Cottage on the land north of the Asylum buildings, and the tender of H. Martin being the lowest was accepted.

The work was completed in October and handed over to the Asylum authorities for occupation.

The whole of the works connected with the completion of the eight cottages, main, central and rear buildings, are specified to be completed on or before the 1st day of September, 1890, and the works connected with the drainage, water supply and steam heating for the above buildings, on or before the 1st of December, 1890, under the usual penalties for non-completion.

By the construction of the additional storey in the rear of each of the four front cottages, which was recommended by the Department of Asylums, Prisons and Public Charities, and approved of by you, accommdation will be afforded for thirty-two additional patients in separate apartments, making a total of 432 patients, besides the necessary apartments for the medical staff and attendants in the main building. The work has been superintended by Mr. R. Chisholm, Clerk of Works.

ASYLUM FOR INSANE, LONDON.

The works connected with the reconstruction of the additions in the rear of the buildings, for the fire protection and sewage disposal, were continued during the early portion of the year, and completed in reasonable time.

The steam heating of the additions consisting of the assembly hall, kitchen and worshops, was reconstructed, the steam pipes having been connected with the new boiler which was supplied for the fire protection and sewage disposal pumps.

The additions were completed in May, and the fire protection pumps and hydrants were tested by myself on the 29th of March, and were found satisfactory according to contract. The works were superintended by Mr. O'Byrne Clerk of Works.

The sewage disposal works were completed under the superintendence of Mr, Horetzky of the department, and tested on the 5th of July, the Commissioner of Agriculture, the Inspector of Prisons, the city authorities, county officials, representatives of the Provincial Board of Health, Col. Waring, the Engineer in charge, and other officials being present.

The test was considered to be quite satisfactory, and the system has been continued to the present time.

Col. Waring's report will be found in Appendix A.

The report of the Committee, by permission of the Provincial Board of Health, will be found in Appendix B.

Since the completion of the works there has not been any complaint as to nuisance, in fact there is little or no effluent, the porous nature of the soil and extensive distribution of the sewage over the filtering beds, being sufficient to absorb the entire sewage.

The rain water pipes, and surface water are still connected with the original drains, which discharge into the creek below the Governors road, or Dundas street, and as the sewage and refuse from the kitchen, laundry and other sinks are connected with the new system, there is no further nuisance in the creek.

On the 27th of January, a fire occured in the centre cottage, a detached building north-west of the main building, and at a considerable distance from the same. The roof was destroyed and considerable damage done on the upper story in the rear portion

Workmen were at once engaged and the roof was reconstructed by Mr. Purdom contractor for the additions, in six weeks after the occurrence of the fire.

The patients were not disturbed, but continued to occupy the building ; the attendants only had to be supplied with other quarters for a time.

The fire was prevented from spreading to the lower stories and the wings of the cottage, by means of the hydrant attached to the large pumps, and the exertions of the City of London fire brigade who rendered efficient service.

The roof of the boiler house in the rear of the refractory ward building was reconstructed with slate and galvanised iron, and the eaves and down pipes repaired.

By the construction of partitions across the old assembly hall, additional rooms have been provided for patients, the work connected with the same was done by the Asylum authorities, under the Inspector of Prisons, the plans etc., having been prepared by the Department.

The timbers supporting the iron tank in the central building having been reported to be in a decaying condition were examined, and it was found necessary to place rolled iron beams under the same. The bath room and w. c. in the Medical Superintendent's residence were, on examination, found to be in a defective condition, and with your sanction the fittings are now being reconstructed, and the cost will be charged to general repairs. The water-closet for the officials in the central portion of the Refractory ward building was also reconstructed.

ASYLUM FOR INSANE, HAMILTON.

The pumping engine connected with the new water supply pipes from the engine house on Queen street, to the tank at the Asylum, was completed in April, and has been in constant use since that time. A considerable saving in fuel has been effected as the time occupied in pumping has been reduced to about one-half, owing to the efficiency of the engine and larger pipes.

Automatic levers were placed in the air ducts of the orchard house, to regulate the supply of air to the indirect radiators, and additional steam direct radiators were placed in the end rooms of the wings to complete the steam heating.

Tenders were received for the construction of a hot water apparatus for the medical superintendent's residence, that of Messrs. King & Sons, of Montreal, being the lowest was accepted.

The apparatus after due test has been found satisfactory.

On inspection by the permanent Clerk of Works, it was found that the eavetroughs and down pipes of the main and outbuildings were much in want of repair. The repairs have been made and the eaves, drains etc., are now in good condition.

The tile drains leading from the down pipes were also found to be choked, during the progress of the above mentioned repairs, and several of the tile pipes had to be taken up and replaced. Some repairs and painting were required at the pumping engine house which is now in good order.

The terraces round the orchard house were completed by the asylum authorities with the labor of the patients, which, with the planting of trees, add much to the appearance of this new building for 300 patients.

ASYLUM FOR INSANE, KINGSTON.

The roof of the assembly hall in the rear of the main Asylum building, having been injured by severe gales in the early part of the year, were repaired under the superintendence of the permanent Clerk of Works.

The wharf which was injured was also repaired. A new duplicate pump was placed in the pumping engine house, and a new boiler for the heating apparatus in the medical superintendent's residence was also supplied. Repairs were not required at the branch Asylum.

ASYLUM FOR IDIOTS, ORILLIA.

Tenders were received in April for the construction of the main front building, to afford accommodation for 300 additional patients, and the tender of Mr. John Forin, Belleville, being the lowest was accepted. The work was immediately commenced and continued during the year, the basement, first and second storeys having been completed.

The whole of the work is specified to be finished on or before the 1st of November, 1890

The total frontage will be 313 feet, by 255 feet in depth, including the tower 14 feet.

The steam heating pipes and indirect radiators will be placed in the basement, which will also afford space for store rooms, etc.

The ground floor is divided into 18 class and teachers' rooms, 30 feet by 20 feet each, two large dining rooms, 75 feet by 30 feet, two gymnasiums, 44 feet by 30 each, and two dining rooms for officers and attendants 28 feet by 20 feet.

The centre projection, 62 feet by 55 feet, will contain the superintendents and public offices, dispensary, reception, matrons and bursar's rooms. Bath and wash rooms, also w c's, 18 feet by 18 feet, are placed at the junction of passages between the dining-halls and wings.

The passages are 7 feet in width and are two storeys in height, connecting the wings and assembly hall, 75 feet by 70 feet, on the second storey, with four staircases.

The corridors in the main building are 10 feet wide, with five staircases to second and third storeys, besides those from assembly hall.

The second and third storeys will contain thirty-two dormitories, 30 feet by 20 feet each, besides attendant's rooms and store rooms.

Two hospitals, 44 feet by 30 feet each, are placed on the third storey, with verandahs for patients.

The second and third storeys of the centre building are arranged for sitting and bed-rooms for the officers and attendants.

An addition will be built to the present boiler house for three boilers, for steam heating on the low pressure system.

A farmers' house and piggery were built on the adjoining lot, the tender of James Sinclair being the lowest, after due advertisement was accepted. The work has progressed in a satisfactory manner under the superintendence of Mr. J. Patton, Clerk of Works.

REFORMATORY FOR BOYS, PENETANGUISHENE.

Plans and specifications were prepared for the addition to the pumping engine house and for a new duplicate steam boiler, and after due advertisement, the tender of Messrs. Craig and Payette of Penetanguishene, being the lowest, was accepted. The works are now nearly completed, having been superintended by Mr. B. O'Byrne, permanent Clerk of Works.

There has been no expenditure on account of general repairs, the ordinary repairs having been attended to by the superintendent.

REFORMATORY FOR FEMALES, TORONTO.

The alterations required for the coal cellar in the Refuge were made, and the necessary alterations in the dormitories of that portion of the building and repairs to stairway were made by the carpenter of the Institution, his time and the cost of the

materials having been charged to the appropriation for the purpose. Some repairs were required for the water-closets in the main building, and for the drains, which were made The roofs and eaves were also repaired.

CENTRAL PRISON, TORONTO.

Some painting was required to preserve the cut stone of the porch from decay, the cost of which was charged to general repairs.

Plans and specifications were prepared for a new slaughter-house south of the Prison in place of the building on the Asylum grounds, which had to be removed in consequence of the sale of land east and west of the grounds during last year. The work was done by Prison labor, under the superintendence of the Prison officials. The slaughter-house is now in full operation.

DEAF AND DUMB INSTITUTE, BELLEVILLE.

A refrigerator-room was constructed near the kitchen, by Mr. J. Forin, contractor, and a new refrigerator was supplied by the Automatic Refrigerator Co., of Ottawa.

Tenders were received for the heating of the Principal's residence by means of hot water, the lowest being that of the E. and C. Gurney & Co., Toronto, and the work was done in a satisfactory manner. Additions had to be made to the basement of the residence for the hot water boiler.

BLIND INSTITUTE, BRANTFORD.

There has not been any expenditure on account of general repairs. The works connected with the improvement of the drainage were postponed, until the porous carbon system which is now in operation at the Agricultural College, Guelph, had been fully tested. A re-vote of the appropriation will be required.

AGRICULTURAL COLLEGE, GUELPH.

The plans and specifications for the new farm buildings to replace those destroyed by fire, were submitted to the Advisory Board early in the year, and several alterations having been made in the internal arrangements. These were submitted for tenders after due advertisement, and the tender of J. W. Schwendimann, Drayton, being the lowest, was accepted. The work has progressed under the superintendence of Mr. C. Bodley, Clerk of Works, and the buildings are now occupied.

An appropriation having been made for drainage works in connection with the the sewage disposal; an examination was made early in April, of the new system of purifying sewage by porous carbon, in operation at the City Hall, Toronto, and having been found satisfactory, arrangements were made with Mr. Miller, to prepare plans and superintend the construction of a tank-house and drains for the application of the system for the sewage disposal of the College buildings. Tenders were received for the tank, the lowest being that of D. Kennedy & Co., Guelph.

The works were completed early in October, under the directions of Mr. Horetzky, of this Department, and tested on the 7th of that month, in the presence of the Commissioner of Agriculture, the Provincial Board of Health, and the Boards of Health of Toronto and Guelph, and other officials.

The test so far as completed was considered satisfactory, but as some changes had to be made in the precipitating and filtering tanks, and the application of the porous carbon, the system must still be considered as under trial. Professor James, of the Agricultural College, has not yet reported on the several analyses which he has been making of the effluent, and until it is pronounced satisfactory, some further changes may be necessary in the arrangement of the tanks before final success is ensured.

The dry earth closets being a failure had to be removed, and water closets constructed in their places. The sewage and water from the kitchen and laundry were separated from the surface water and baths, in order to lessen the quantity of sewage to be treated, the surface water being allowed to discharge into the creek passing through the grounds.

Tenders were received for the construction of a hot water apparatus in the residence of the Professor of Agriculture, and the tender of King & Sons, Montreal, being the lowest was accepted, and the work has been done in a satisfactory manner and fully tested.

A portion of the basement had to be excavated to provide for the hot water boiler and the storage of coal. The work was done by Mr. Schwendimann, the contractor for the farm buildings, and has been found satisfactory in every respect.

The bath-room and w. c. in the President's departments being in an unsanitary condition, were re-constructed, and are now in good order.

The carriage-house was completed according to contract.

Mr. Miller's report and explanation of the porous carbon system will be found in appendix C. The report of the Provincial Board of Health, by permission, is included in Appendix D.

EDUCATIONAL DEPARTMENT AND NORMAL SCHOOL, TORONTO.

The drains round the Normal School building were repaired, and some portion of the basement on the south side was concreted.

The alterations in the Model Schools were completed, under the directions of the carpenter of the Education Department, plans, etc., having been provided as required.

Some repairs were made in connection with the boilers and steam-heating, but the reconstruction of the steam-heating was postponed, as the present boilers were, on examination, found to be in a sufficiently good state of repair to last for another season.

NORMAL SCHOOL, OTTAWA.

There has been a moderate expenditure for ordinary repairs and furniture.

The planking of some of the yards was repaired, and the usual repairs and painting were done throughout the buildings, and the boiler furnaces repaired.

There has not been any expenditure on account of the construction of water-closets for the front buildings, which was postponed, the present outside closets having been repaired.

SCHOOL OF PRACTICAL SCIENCE, TORONTO.

Plans and specifications were prepared for the erection for an addition on the south side of the present building. The tender of Mr. A. J. Brown, being the lowest, was accepted, after due advertisement.

The work was commenced in June, and the building is now roofed in, the whole work to be completed on the 1st of September next.

Some alterations and repairs were required in the apartments lately occupied by the Professor of Biology, who has removed to the new building lately erected. The interior work is progressing under the superintendence of Mr. W. J. Smith, Clerk of Works.

OSGOODE HALL, TORONTO.

The drains round the buildings, and the boiler-furnaces were repaired. The roofs, eaves and down-pipes were also repaired.

Some painting was required in the building, and the alterations to the desks in the several Court-rooms were completed. Some articles of furniture were provided as required.

ALGOMA DISTRICT.

Plans and specifications were prepared for the erection of an addition to the Gaol at Sault Ste. Marie, and for the Court-room and Registry office at Gore Bay, and tenders were received in June, the lowest being those of Mr. G. Ball. Barrie, and the work progressed in a satisfactory manner, under the superintendence of Mr. G. B. Angus, Sault Ste. Marie, the addition to the Gaol at Sault Ste. Marie, and the Court-room, etc., at Gore Bay having been completed and ready for occupation early this month.

Tenders were also received in August for the construction of fences round the Lock-ups at Killarney and Thessalon, the lowest being that of Mr. Jackman, of Killarney, and Mr. Miller for Thessalon. The work on those fences was completed in November last.

THUNDER BAY DISTRICT.

Some repairs were required for the Court-room and Gaol at Port Arthur, and at the Lock-up, Fort William, which were done as required. The interior of the front portion of the Lock-up at Fort William, was painted, and a woodshed constructed on the lot.

MUSKOKA DISTRICT.

Ordinary repairs were made to the Lock-up and Registry-office at Bracebridge, and some articles of furniture were provided as required.

A woodshed was constructed at the Lock-up Huntsville, and repairs were made to the Lock-up by Messrs. M. Kinton and G. Hunt, their tenders being the lowest.

PARRY SOUND DISTRICT.

Plans and specifications were prepared for the addition to the Court-room at Parry Sound, and tenders were received in June. The tender of Mr. G. Ball, Barrie, being the lowest, was accepted, and the work has progressed in a satisfactory manner, under the superintendence of Mr. W. J. McClaren, Clerk of Works the building having been ready for occupation in November.

The fence was constructed round the lot at Burk's Falls, in accordance with the tender of Mr. G. Silvester, Burk's Falls, the work was occasionally inspected by the Permanent Clerk of Works.

A platform was constructed for the well and a pump placed in it, the supply of water being now satisfactory.

NIPISSING DISTRICT.

Plans and specifications were prepared for the erection of a Lock-up Keeper's house at Sudbury, and tenders were received in June, the tender of Mr. T. McKelvey, North Bay, being the lowest, was accepted. The work progressed in a satisfactory manner under the superintendence of Mr. W. J. McLaren, Clerk of Works who was also in charge of the work at Parry Sound. The house was occupied in November.

Some repairs were made to the Lock-up and the fence round the same, which had been blown down by a storm, and some articles of furniture were supplied as required.

The fences were completed round the lot at North Bay. The tender of Mr. J. Baxter, North Bay, being the lowest, was accepted, and the work has been done in a satisfactory manner, under the occasional superintendence of the Permanent Clerk of Works.

RAINY RIVER DISTRICT.

Some repairs were made to the Lock-up at Rat Portage, and some articles of furniture supplied as required. Double windows were also provided.

MISCELLANEOUS.

Repairs were made to the fences and buildings at Brock's Monument by Mr. Goring, the Caretaker, according to tender. The joints of the cutstone of the monument were pointed with water-lime and repaired. The cutstone pillars supporting the chains round the cœnotaph at the foot of the hill, having been broken, were replaced.

The steam boilers in connection with the several Public Institutions were inspected by the late Mr. O'Callaghan and Mr. O'Byrne, Permanent Clerk of Works, and were reported in good order, with the exception of the steam pumping engine boiler at the Reformatory for Boys, Penetanguishene, which is now being repaired, being included in Messrs. Craig and Payette's contract for the new boiler, etc.

An inspection of the Lock-ups in the Muskoka, Parry Sound (at Burk's Falls), and Nipissing Districts, was made in April last by myself, in company with Mr. Christie, the Inspector of Prisons, etc., East, and an inspection of the Gaols and Lock-ups in the Algoma and Thunder Bay Districts in July last, in company with Dr. W. T. O'Reilly, Inspector of Prisons, etc., West, and any repairs or furniture that were required were attended to, after being duly reported to you for approval.

Mr. Heakes of this Department inspected the work at the Court-room, Parry Sound, also the Lock-up there and Registry office for that district.

I have the honor to remain,
Your obedient servant,

KIVAS TULLY,
Architect, etc.

Hon C. F. Fraser,
Commissioner of Public Works,
Ontario.

APPENDICES.

APPENDIX A.

LONDON ASYLUM—SEWAGE DISPOSAL.

KIVAS TULLY, Esq., Architect, etc., etc.,
Department of Public Works.

SIR,—I beg to submit herewith my final report concerning the sewerage and sewage disposal work that has been carried out under my direction at the London Asylum.

The work has been executed in all respects in accordance with my original plans and specifications, and under the immediate supervision of my representative and partner, Mr. F. W. Farquhar, the work being controlled in all technical and financial details by your own representative, Mr. C. Horetzky. It has been done to my entire satisfaction.

The work was opened and a public exhibition of its operation was given on the 5th of July.

The accompanying drawings will give a good idea as to all details.

The sewage proper has been separated from surface water and roof water at every building, and while the latter is still carried away by the original sewers and drains of the establishment, the foul sewage is all intercepted and carried away in drains laid expressly for the purpose in order that the volume to be disposed of may not be larger than necessary, and that it may be uniform in quantity from day to day, not fluctuating according to the presence or absence of storm-water.

The sewage is first carried to a central receiving and storage tank, in the rear of the administration building, which in order to give a sufficient fall to the sewage, has been built underground, and which has a capacity of 100,000 gallons to the springing line of its arches, with a view to providing ample capacity for the total product of sewage of each day. The springing line is five feet above the bottom, so that each foot in depth represents a storage capacity of 20,000 gallons. The sewers leading from the different buildings to this tank are six inches in diameter, and are laid on very good grades, most of them being steeper than 1 in 100, the flattest grade, and this in a single case, being 1 in 200.

These sewers are flushed, not only by the regular drainage output of the building, but by automatic flush tanks placed at their heads, each discharging about 150 gallons about every five hours, and discharging this volume in about sixty seconds. I make the following quotation, concerning the operation of these flush tanks, from Mr. Farquhar's report to me.

"The two automatic flush tanks are regulated to discharge about five times a day, which, I think, is necessary considering what the sewers have to transport. In testing the sewer from the cottages, before any house connections were made, I found that it took seven minutes for the water to appear at the main tank after the flushing tank went off. It took a four-inch wooden ball eight minutes to go through with the flush.

"The sewer is six inches in diameter, the distance is 1,240 feet, the lowest grade 1 in 200, the total fall is 19·97 feet, the average grade is 1 in 63.

"The ball came 1,240 feet, around five curves, at a speed of 2·6 feet per second, carried the whole distance on 150 gallons of flush tank water.

"The sewers do an extensive freight and express business, bringing into the screening chamber, straw, sticks, balls of yarn, bread, garbage and rags, some of which are a yard square, amounting to quite a bushel of trash coming through every day."

As the new work gives facilities for detecting the discharge of these improper matters, it is thought that it will now be easy to prevent a continuance of the custom. These matters are mostly thrown into the latrines from which they will hereafter be removed before they are discharged. The screen at the head of the main tank prevents their getting into the body of sewage that is to be sent to the irrigation field.

The main tank is ventilated by the use of perforated covers on the three manholes, at its receiving end, and by exhaust pipes leading to a hot flue from the three manholes near the discharging end. These latter manholes are tightly closed. Air flows in through the perforated covers and is discharged through the top of the smoke-stack. The odor, owing to the complete dilution is trifling. The tank is discharged by the working of a 6-inch Webber centrifugal pump, driven by a 25 h.p. Westinghouse engine. The machinery is of considerable more capacity than a close calculation might have called for. This secures smoothness and economy of work, without employing the full power at any time. The engine is started daily at 2 p.m., except on Sundays, when no pumping is done, and Mondays when it is started at 8 a.m. The depth of water in the tank at 8 a.m. on Monday is 3 feet; at 2 p.m. on Tuesday it is about 3 and 3 ft. 4 in.; and on other days it is about 2½ feet. It takes, at the speed employed, about one hour to pump out 2½ feet, or 50,000 gallons (42,000 Imperial gallons). This is as rapidly as it is desirable to deliver the sewage into the ditches. The delivery is through a special rivetted pipe, 8 inches in diameter leading from the pump to the corner of the disposal field, where the pipe discharges at the bottom of a wall of impervious masonry, about 6 feet deep and overflowing through a depression of its wall, at a height of about 4 feet above its bottom, it is through this, that all of the sewage is delivered into the main ditch that carries it to the different parts of the disposal field.

There is no valve at any point between the tank and the field, and the force main has a slight rise from the pump to the well. As soon as the pump stops, the entire contents of the small well, and of the force main, flows back into the tank beyond the reach of frost in the most severe weather.

The main leading ditch, starting at the well runs along the end of a filtration tract which is 234 feet wide and 610 feet long. This filtration field is occupied by nine pairs of ditches, each pair being united by a curve at the far end of the field, and each ditch is connected by a suitably arranged branch piece and stop gate with the main leader, so that sewage may be turned into any pair of ditches at pleasure. The filtration area and its ditches are absolutely level. The ditches are 8 feet wide at the top, 2 feet wide at the bottom, and 1½ feet deep. The beds between the ditches are 10 ft. wide at the top. The distance from the centre of one ditch to the centre of the next is 18 feet, each pair of ditches occupying a width of 36 feet.

The whole filtration area is underdrained by a series of tile drains, of which the collecting main is at the far end of the field, beyond the loops by which the pairs of ditches are connected.

The underdrains are laid not between each two drains, but between each pair of drains, so that it has not been necessary in any case to carry the underdrain across the ditch. This obviates the danger, sometimes serious, of direct discharge of sewage through loose filling from the surface of receiving ditches to the underdrain, which are intended only for the purified effluent. This is the rule that was followed in executing the work generally, but as a small corner of the irrigation area is on a heavy clay, it was found necessary there, to lay a short underdrain under the intermediate banks, special

precaution being taken to prevent a flow from the ditch into the filling over tile, where it crosses the ditch.

The filtration area is generally of a very light character, and the underdrains at the far end including the collecting sub-drain, pass through a light gravel or sand which is so porous as to furnish, at least in the early stages of the operation, an apparently sufficient outlet for the purified sewage. It has not thus far been found that the flow at the mouth of the underdrain is materially increased by the discharge of sewage on the tract.

This filtration area has thus far worked most satisfactory, and I see no reason to suppose that it will not do so permanently.

The eighteen ditches are treated in three different series, six being used together and on successive days. That is, one-third of the area is brought into use once in three days after the water dries away, the bottoms and sides of the ditches are gone over with a garden rake, which prevents a slimy deposit, which might somewhat retard the absorption of the next dose of sewage.

It is found that at the expiration of the two days interval before the application of the next dose of sewage, the earth at the bottom of the ditches has no odor whatever, being in appearance like rich garden mould. The whole process is practically odorless, and with careful attention on the part of the man in charge, it should remain so permanently.

The sewage in these ditches affords an excellent illustration of what is meant by the term "fresh sewage," that is, sewage which has undergone no putrefaction. It is simply dirty water, being entirely unlike the blackened and offensive flow of foul sewers, in which organic matter has been allowed to purify.

It is not worth while to make a prediction as to the manner in which this system will work during severe winter weather, further than to express every confidence that the warm sewage delivered into the ditches will find its way into the ground here, as it does elsewhere under equally difficult conditions.

The increased fertility of these beds, might, with advantage, be applied to the cultivation of suitable crops, giving a valuable turn from a productive capacity, which is now manifesting itself in a rank growth of weeds.

By reference to my previous report, it will be seen that the estimate for the total cost of the work was $13,401.75, aside from engineering and superintendence.

The cost of the work as actually carried out, aside from the cost of engineering and supervision, has been $20,529.71.. No provision had been made in the original estimate for duties on the machinery imported from the United States, and the cost of the execution of the work has been materially increased by the excessively rainy season.

In addition to the filtration area provided, a series of three surface irrigation ditches have been established in the field below, in order that sewage may at any time be used for fertilization or irrigation of that land. It is not likely that it will be necessary to make use of this field for purpose of disposal. Neither is it at all likely that it will become necessary for purposes of disposal, to make use of other land available north of the hospital buildings, though provision has been made for sending the sewage in this direction, if for agricultural or other reasons, it shall ever become desirable to do so.

The following are the items of construction:

The main collecting tank, underground	70 ft. × 40 ft.
8 inch overflow to old sewer	20 "
10 inch earthenware vent pipe	67 "
15 inch " "	43 "
Pumping chamber containing pump, engine und fittings	
10 inch cast iron section pipe	37 "
18 inch cast iron force main	16 "
8 inch spiral rivetted force main	1,519 "
1 4-ft distributing well	

18 inch channel pipe	320 ft.
Settling ditches	10,800 "
Irrigating ditches	2,900 "
Cobble stone paving	1,350 sq. ft.
Sodding	30,000 "
6 inch sewers	3,892 ft.
4 inch sewer connections	618 "
2 automatic flush tanks	
3 inch tile underdrains	3,000 "
4 "	2,700 "
6 "	1,250 "

The grading of the filtration area involves the removal of 3,000 cubic yards of earth, and the desired accuracy of the work involved the placing of about 4,000 stakes set to both grade and line, about 1,000 stakes to grade only, and about 1,000 stakes to line only.

I desire to recur to the question of the interior plumbing of the Asylum buildings, which in my former reports I condemned as not being suitable. I was very far from intending to imply in those remarks, the least criticism of the manner in which the plumbing work had been designed and carried out, the manner usual in good practice of that day.

Since that day very great progress has been made in the art of sanitary drainage and the importance has been emphasized of many things, which at that time were not at all understood.

What I did intend, was to urge what seems to me a very proper view, that in an institution like this, everything having so direct a bearing on the health of its inmates, as has the method of removing waste matters, should be regarded as of vital importance.

However good this work was when it was constructed, and however much in advance of the local custom of that time, it is not such work as it is now considered best to have. And I venture to repeat my recommendation, that early attention be given to its modification.

The accompanying drawings show the arrangements of all parts of the work described above.

Respectfully submitted,

GEO. E. WARING, Jr.

Newport, R.I., August 3rd, 1889.

APPENDIX B.

To the Chairman and Members of the Provincial Board of Health :

Gentlemen,—Your Committee on Sewage and Water Supply was last autumn directed to consider certain plans for a system of irrigation, known as the Alternate Filtration system, which system the forwarders of the plans intended to apply to the disposal of the sewage of the "Asylum for the Insane," near London.

Your Committee examined these plans and having been led to a favorable conclusion regarding them, reported to the Board accordingly, and its report was adopted by the Board.

Your Committee has now much pleasure in reporting farther that the works there proposed for construction have been completed and that they have been formally opened

on the 5th of July in the presence of Government Inspector O'Reilly, Engineer Kivas Tully, Colonel Waring the engineer of the Works, Hon. Mr. Drury, Minister of Agriculture Mayor Taylor of London, and large deputations from the City Council, the London Board of Trade, the Hospital Trust Board, the Board of Health and of citizens of the town and county.

Your Committee was also present, having been invited with the other members of the Provincial Board of Health, by the courtesy of Inspector O'Reilly, and it begs to report :

We had already become familiarized with the plans. We now listened to the demonstration of these, in their several details, by Colonel Waring, and having farther looked into every part of them in actual operation, we were persuaded that the system of "Intermittent Downward Filtration" presents a long desired solution of a hitherto formidable difficulty on sewage. It seems to offer the means for thorough disposal of sewage, so that the material is not only inocuous and inoffensive, but is made to be most useful as a fertilizer of the soil.

For the knowledge of the process here employed we seem to be indebted to the French. When apprehended it is seen to be a process of great simplicity. Contemplating it one is reminded of a forecast of the late Professor Sir James Simpson regarding the successful treatment of certain as yet incurable diseases. The knowledge of the modes of cure, the Professor said, would be found to lie just beneath the surface. It has been so with that of the safe and useful disposal of the life-destroying sewage.

We have been within a hand's breadth of this knowledge for the past fifty or sixty years. The mode by which the end desired is accomplished is by the application in a new direction of the principles of thorough draining. Some of us are old enough to remember when the practice of thorough draining the fields first came into use and the rationale given to us of its results. We were told that by thorough underdraining not only was the superfluous water carried away through the soil, but farther, that wherever water could pass air would follow, and that air was not only itself useful but was moreover a great decomposer and disintegrator of the soil.

We knew a good deal in those days about oxygen and its affinity for so many substances, but we did not believe that its power of affinity was sufficient to change the composition of town sewage in a short time, and so the utilization of sewage, although it occurred to many, was passed by by general consent as being not a very clean or very safe proposal. It was long before we became acquainted with bacteriæ, only lately have we known how beneficient many of them are and potent because of their abundance in certain soils to transform in such soils a noxious and disagreeable material into one which is most useful. With this knowledge on our part, without a doubt a much more extended field of usefulness will be opened up for these little organisms.

The sewage of the London Asylum may be described as follows : The material is conveyed from the various buildings of the institution by means of vitrified pipes which are kept abundantly flushed to an underground brick tank seventy feet in length and about ten feet in breadth, which is capable of holding a much greater quantity of water than the daily supply of the asylum. The bottom of this tank is fifteen feet below the surface. The contents of the underground pipes leading to the tank have, owing to its depth, a fall into it of many feet. They feed into a small chamber at one end of the tank partitioned off from the main body of it at one end by a wire screen or net, the meshes of which allow no solid particles of any size to pass through them into the main body of the tank. By the fall from the pipes into the tank the solid matters in the sewage are broken up and are thus permitted to pass through the meshes of the wire net into the main body of the tank along with the fluid matter. At the opposite end of the tank to that where the sewage enters there is a pump into which the sewage gravitates and from which it is drawn through an iron pipe by the action of a centrifugal pump driven by a 25 h. p. engine. The suction is so arranged that the tank can be pumped dry every day. Farther, the tank is well ventilated, having manholes to the surface and pipes which run into the chimney of the pump house.

Arriving at the pump the matter from the tank is farther churned and thoroughly broken up and is forced through well rivetted iron pipes to the disposal field, about a

quarter of a mile away. At the disposal field the matter, now quite fluid. is received into a brick well from which it overflows into an open channel lined with earthenware pipe. The channel runs along the end of the tract of land which has been prepared for the reception of the sewage, the soil and the situation of the tract having been found adapted to that end. At right angles to this open channel there run along the prepared land open ditches, eighteen inches deep, two feet wide. At the bottom and at the top their sides gradually merging into the surface of the ridges between them, those sides are about ten feet wide. These are connected with the open channel at the end of the field but the connection can be cut off at will by gates. The sewage of one day is run into six of these ditches; next day into six others, and that of the third day into the remaining six. By the fourth day the land intersected by the first six is ready to receive and to decompose its proportion again.

In being prepared for receiving in this manner and decomposing the sewage safely and inoffensively, the land has been carefully levelled and underdrained. In its way from the superficial ditches to the deep tile drains lying equidistant between them the sewage is exposed to the action of the bacteriæ with which the soil of the chosen field is known to abound and finally escapes into the tile drains from which it finally passes as harmless water, as is usual in thorough drained fields.

The position of the London Asylum is such as that it cannot avail itself of gravitation to run off its sewage, hence the necessity for steam power to elevate the material to the field of distribution. No doubt this is to be counted as an additional expense in the draining of this place, but the expense is not by any means to be regarded as wasted. As far as your Committee could judge the more complete comminution of the more solid constituents of the sewage by the action of the pump is no small advantage, for the discharge from the distributing well is here perfectly fluid, whitish like soapy water and free from offence to sight or smell, and, your Committee, would suppose, much more ready to yield to the agencies in the soil which are ready to deal with it.

It may not be within the limits of the duty of your Committee to deal with the question of cost, yet it has to be said that the safe disposal of sewage is a matter of ever increasing moment, and that with regard to it we have but a choice of evils on the one hand, costliness in money on the other, costliness in life and health and also of money. Which of the evils shall our cities, towns and villages choose to meet?

The deadly results of sewage pollution need hardly in this day be insisted on. Too many are familiar with the diseases which arise from this cause. They have seeen their children and their youth, especially their young women, die under the sufferings of diphtheria, and the friends from early life to the verge of old age sink under typhoid fever. These are not the only diseases which are consequent in the vicinity of filth, they are mentioned as examples of suffering thus brought about. If much money is needed to remove the material which is a fruitful source of these and other fatal ailments, and to reduce it not merely to a state of harmlessness but to a condition of usefulness, it is surely money well spent.

Farther, if there are fanciful or questionable ways of disposing of corporation funds such ways should not be permitted to interfere with the expenditure necessary for saving from death the multitudes who are every year destroyed in our families by breathing and drinking the products of the fermentations of the excrement of man and beast.

May we venture to recommend that all parties unite to arrange by legal enactment that municipalities shall provide for the quick removal from the neighborhood of all ordure, whether scattered on their streets, lying in heaps in secluded places or issuing from their drains and for its immediate and complete decomposition. Should we not also use our utmost influence to re-enforce the existing law against sewage being run into streams and watercourses.

(Signed), J. D. MACDONALD,
" H. M. MACKAY.

Adopted

(Signed), FRANCIS RAE,
Chairman.

Supplementary to the foregoing report your Committee would say that at the meeting of the Association of the Executive officers of Health at Brockville, in August, the Association, of which your Committee forms a part, examined the system of drainage being at the time put in construction in that town.

Brockville is putting in operation the "Separate System" of drainage, using the old drains of the town to carry off the rainfall only, and your Committee had the opportunity of looking into that system in practice there.

The town is well adapted for it, being not very large and having an excellent fall toward the river. The sewage pipes were cleaned in the presence of the members of the Association by the passage through them of a metal ball of nearly the same diameter with them while they were being flushed from an automatic flush tank. The ball thus nearly filling the pipe, and being carried along with the flushing water, stirred up and caused to flow away any sediment which might have been deposited in the pipes. The sewerage ends in a pipe which, as we were informed, is carried far out into the river to where there is a great depth of water, nearly 100 feet, and a rapid flow of the stream, and where the sewage arrives in a few minutes (90) after it leaves the closets or other receptacles into which it is cast at the first and there mixes with matter at a temperature of 45 or 50 in the summer. The river widening much below Brockville and there being no town on the shore in that direction nearer than twelve miles on either side of the river it is thought, and no doubt correctly, that the dilution and destruction of the sewage is sufficient, so that there is no danger of evil from drinking the waters resulting to the people living along the river below.

At the same time your Committee would recommend that the pouring of sewage into rivers, even large rivers, be always discountenanced by the Board as well to prevent the pollution of the rivers as to discourage the waste of an immense amount of useful material.

The St. Lawrence for a long time may be safe from being rendered impure, but the smaller rivers, the volume of which changes greatly, as the season may be moist or dry, may not long be a safe depository for impure matter. The banks of these streams drying will every summer, more or less, cause a bad sanitary condition of the country on both sides for a very long way.

As to Brockville your Committee has to report that its drainage, as now going on, will be of a very perfect and satisfactory kind.

Adopted

(Signed), JAMES RAE,
Chairman P. B. H C.

APPENDIX C.

Department of Public Works, Ontario,
Toronto, April 13th, 1889.

Kivas Tully, Esq., C.E.,
Architect, P.W.D., Toronto.

Sir,—Acting under your instructions I visited the Ontario Agricultural College, near Guelph, on the 4th instant with Mr. Horetzky of your Department.

My object was to ascertain the possibility of using the *Porous Carbon* precipitating process for sewage at the outfall of the college sewers, so as to prevent the crude sewage from polluting the small rivulet into which it now discharges.

I beg to report that there is every facility in the way of levels, etc., for carrying out such a scheme in a cheap and efficient manner, and I have no doubt that most successful arrangements can be made.

I find the amount of sewage discharged in the twenty-four hours is about 3,500 gallons. This would be increased by rains to probably 5,000 gallons. So that to carry out an alternate working of our system, two tanks of a capacity each of 3,000 gallons would be required.

These tanks should be placed at the outfall of the sewers which must be concentrated together at one point.

Below these tanks, *i. e.*, on a level with the bottom of same, two carbon filters should be placed so as to allow the clear affluent after percipitation, to be purified still further, after which it can be allowed to flow away into the creek free of smell.

By this arrangement a continuous and almost automatic working of the tanks will be obtained.

The tanks can be made of wood, say 3-inch stuff, bolted together and lined inside and out with Victoria roofing cement, which will preserve them from rotting for years to come.

In order to protect them from frost, a building of stone with concrete floor and frost proof roof will be needed.

I would recommend that the "Heaps" dry earth closets be altered to water-closets, which change can be effected for about $400, and including the sewer alterations done to the tanks, and all other costs for buildings, tanks, filters, etc., I consider that $2,000 should cover the whole matter.

The running expenditure per annum will be, for carbon, about $\frac{3}{4}$ ton, or 1,500 lbs., which I could deliver for about $25.

The attendance of a man for about two hours per day is all that will be required to look after the carbon supply, empty sludge, etc., and if the "Heaps" earth closets are altered as I suggest, the time of the man now attending to these can be transferred to the tanks, so that the running costs will be very small and will be almost covered by the value of fertilizer obtained.

In conclusion, I may say that I have every confidence, that, should the plan be adopted, it will find a solution of the sewage difficulty easy and practicable.

I have, etc.,

F. STRAITH MILLER.

P. S.—I would remark that the water from the laboratory must be kept separate from the other sewage flowing into the tanks, as the chemicals used would interfere with a regular and constant precipitation. I would therefore say that this be allowed to flow into a catch-tank and thence directly into the river. The cost of this will be included in the amount stated in estimate.

F. STRATH MILLER.

Rough Estimate of Cost of Tanks, Buildings, etc., for the Ontario Agricultural College

For two tanks, two filters, sewer alterations, altering of "Heaps" closets to water-closets, stone buildings with frost proof roof and concrete floor, etc	$2,000 00
Superintendence, plans	100 00
Total	$2,100 00

F. STRAITH MILLER.

APPENDIX D.

To the Chairman and Members of the Provincial Board of Health :

Mr. Chairman.—On the 7th of October last, your committee on drainage and water supply, by invitation from the Hon, Chas. Drury, Minister of Agriculture, proceeded to Guelph, for the purpose of being present at, and of inspecting the drainage of the Ontario Agricultural College. These works were to be, that day, formally opened.

They had been under construction by Mr. Straith Miller, and the nature of their operations was said to be such, that, at little expense the sewage was so dealt with by decomposition and precipitation, that the effluent fluid, after those processes were undergone, consisted of water pure enough for any purpose. The substance employed for these purposes is called *Porous Carbon*, and consists of a lignite, rich in sulphates of iron and alumina. It is obtained by quarrying or mining out in Devonshire, England, and is meanwhile so cheap that we were assured by Mr. Miller, that a sufficiency for all the purposes of the College for a year, could be laid down there for twenty-five dollars, your committee has since been informed that the amount here stated will not be sufficient now.

There were present on the occassion the Hon. Minister of Agriculture, the Hon. the Provincial Treasurer, a large number of official and prominent gentlemen from the Counties of Wellington and Waterloo, from the city of Guelph, including gentlemen of the Press from that city, as also the Superintendent of the Asylum for the Blind at Brantford, and the Superintendent of the Asylum for the Deaf and Dumb, near Belleville. This Board was represented by the Chairman and Secretary, as well as by your committee.

Your committee was kind and courteously shewn over the works by Mr. Miller, and had every explanation afforded them.

Mr. Miller first led down a gentle slope behind the College, for a hundred yards or so, and first stopped at what seemed a covered manhole. Removing the cover he showed us a small vault 9 or 10 feet long, and 5 or 6 feet broad, in the bottom of this vault lay a double vessel, oval in shape, not unlike an ordinary kitchen boiler with another within it, having a space of a few inches between the sides of the outer and inner vessel. Into this space at what was the higher end of the oval, the sewage from the College was conducted by an underground pipe, and flowed through it to the other and lower end of the oval, in its course through getting mixed with the *Porous Carbon*. This substance had been placed in the form of a coarse powder in the inner vessel, the sides of which were perforated near the bottom.

Into this inner oval box, there fell from a height of several feet, a stream of water from a pipe placed in the side of the vault. The fall of water was high enough to churn the contents of the box and to dissolve or suspend much of the *Porous Carbon*, so that it could escape with the water through perforations in the sides of the vessel, and so in the interspace between the vessels, become mixed with the sewage which was to be decomposed.

Leaving the vault by a pipe at its lower end, the sewage and *Porous Carbon* were conveyed underground to a small stone building, not many yards down the slope. This building is the tank house. In it are three tanks, two larger placed side by side, and occupying two thirds or more of the building, and one smaller tank at a lower level, and occupying a portion of the remaining space. The two former are the settling tanks, which are used alternately, one being filled with the mixed sewage and *Porous Carbon*, while the mixed material with which the other has been filled is settling and decomposing. As soon as the settlement is complete, the fluid is run off clear into the third tank.

For the satisfaction of the curious and the sceptical, a glass tumbler had been kept here by Mr. Miller, and your committee was invited to test the purity and potability of the water, called by Mr. Miller, the "effluent."

The fluid seemed sufficiently clear, clearer indeed than the glass in which it was held up for inspection, but your committee did not consider that the parties present were sufficiently high in office to make the test proposed of any value, and so they were not forward to make it.

It was stated that the solid matter precipitated in the settling tank, formed a very valuable manure, which on being used and powdered might best be used by being dibbed in with the plant seed.

. . . . . .

Respectfully submitted,

J. D. MACDONALD.

Report adopted,

FRANCIS RAE,
Chairman, P. B. H. D.

REPORT

OF THE

ENGINEER OF PUBLIC WORKS.

Department of Public Works, Ontario,
Toronto, 31st December, 1889.

Hon. C. F. Fraser, *Commissioner of Public Works, Ontario:*

Sir,—I have the honour to submit the following report respecting the construction and maintenance of Public Works, and the extension of railways throughout the Province during the year 1889.

PENINSULA CREEK IMPROVEMENT.

As stated in my report for 1888, this improvement was practically completed when operations were suspended in the month of September of that year, but in order to make provision for the removal of material which it was expected would find its way from the newly formed banks into the channel during the spring freshet, a re-vote of the small unexpended balance of the appropriation was taken.

The work, therefore, attended to during the present year consisted of giving additional slope to the banks where found necessary, and in the removal of material which had fallen in; additional depth being given to the channel at points where obstructions had collected, or where the nature of the soil in the banks seemed to indicate a likelihood of further material finding its way into the channel, which, if left unprovided for, would form obstructions and interfere with navigation. Operations were commenced in the early part of July, and continued until the 5th of August, when a depth of not less than six feet of water had been provided.

SCUGOG RIVER WORKS.

The enlargement of the channel excavated by the Department some years ago, from Scugog River to Drummond's Bay was, as previously reported, continued last year until the 17th of November, when owing to the severity of the weather operations had to be suspended.

The work was resumed on the 12th of April of the present year, and continued until the 24th of June, when the improvement was completed.

The channel now has a uniform width of 85 feet, with a cutting about 25 feet in width in the centre, excavated from end to end to a depth of 9 feet.

After the completion of the Drummond's Bay channel, the dredge was taken to Lindsay, where it was engaged for some days in improving the river by providing additional width and depth immediately below the lock.

MAGANETAWAN WORKS.

The improvements and repairs which have been made during the present year in connection with these works are as follows :—

During the seasons of extreme low water navigation has in the past been rendered difficult, and at times interfered with, owing to the existence of obstructions in the river immediately below the swing bridge in Maganetawan village.

Upon examination it was ascertained that the principal obstruction consisted of a rocky shoal situated about 50 feet below the bridge which extended from the southerly shore, and obstructed the steamboat channel to such an extent as to render it almost impossible at times to avoid striking.

This shoal has been blasted and removed for a length of 25 feet, a width of 8 feet and an average depth of 3 feet 6 inches, which it is expected will prove sufficient to do away with the difficulty and inconvenience previously experienced at this point. A quantity of loose boulders which obstructed the channel a short distance further down stream have also been removed.

The swing-bridge has been adjusted and painted two coats of white paint, the oak capping on the upper chord fastened with 4 inch screw nails, and repairs made to the southerly approach. A guide-boom has been constructed and placed on the southerly side of the channel below the lock to facilitate the passage of the steamers into it during boisterous weather. The boom extends from the lower end of the lock-wall to the guide piers below, and is 145 feet in length, and 3 feet in width, constructed of 12 x 12 inch square pine timber fastened together with one inch bolts.

Two stop-log openings have been constructed in the wing-dam on the westerly side of the lock to provide additional outlet for the water of Se-se-be Lake during the time of freshet. The openings are 20 feet in width and 3 feet in depth, floored with 3 inch planking, and are supplied with the stop-logs, platforms, windlasses, etc., necessary to enable them to be opened or closed as desirable.

MUSKOKA LAKES WORKS.

The following works have been attended to out of this appropriation during the present year :—

The steamboat channel known as "Jennete's Narrows"—which is one of the outlets of Lake Muskoka into Bala Bay, has been enlarged by sub-marine rock excavation to a width of about 50 feet, and to a similar depth to the lower mitre-sill of the lock at Port Carling, and a breastwork, constructed of 12 x 12 inch square timber, 62 feet in length, 16 feet in width, and 9 feet in height, has been built on the southerly side of the channel, the cribbing being compactly filled with stone and rock bolted.

A boom 75 feet in length and 3 feet in width, has also been provided and placed so as to extend from the lower end of the cribbing to a point of rock below.

These improvements will enable the largest steamers at present on the Muskoka Lakes to proceed to Bala with safety, whereas formerly, owing to the contracted channel and rocky banks it was not deemed safe to attempt to navigate these narrows except with the smaller class of vessels. Consequently, parties desiring to reach this point at times, suffered inconvenience which can now be greatly lessened, if not entirely done away with.

At Port Carling, the fixed bridge across the Indian River has been entirely re-constructed, the old one having become decayed to such an extent as to leave it in an unsafe condition. In the construction of the new bridge, the pier which formerly occupied a position in the centre of the river has been done away with in order to facilitate the passage down the stream of the large quantities of saw-logs and timber which are annually brought from around the shores of both Lakes Rosseau and Joseph. The new structure rests upon cribwork piers splayed on the up-stream ends, the piers being 27 feet in length, 10 feet in width, and about 8 feet in height, constructed of 12 x 12 inch

square pine timber, and compactly filled with stone. The new bridge is built on the "Howe Truss" principle, having a total length of 75 feet, and a clear span between the abutments of 65 feet, the width of the roadway between the chords being 12 feet. Suitable approaches with handrailings have been provided at each end, and the old approaches gravelled where necessary.

In order that the public should suffer no inconvenience, a temporary bridge was erected across the stream before the taking down of the old one was commenced, the temporary structure, of course, being removed after the completion of the permanent new one.

In addition to the foregoing, the following repairs and improvements have been made to works in this locality out of the maintenance appropriation.

The dam at Port Carling has been supplied with four new windlasses and two chains, and repairs have been made to the stop-log platform.

The swing-bridge has been adjusted and thoroughly painted, and the oak capping on the top chord re-fastened with screw nails four inches in length. The turn-table has been supplied with two new shafts, and some new bolts have been put in the racking.

Repairs have been made to the cribwork and planking of the lock, and new bolts have been put in the valves of both the upper and lower gates, and some gravel and stones removed from in front of the mitre-sills. The Port Sandfield swing-bridge has been adjusted, and the oak capping on the top chord secured with screw nails. The approach at the easterly end has been lowered, repairs made to the turntable and bridge, and some additional ballast put in.

At Bala, the westerly dam has been supplied with two new stop-logs, and one new windlass, and repairs have been made to the bridge.

GULL AND BURNT RIVER WORKS.

The work attended to out of this appropriation consisted of the construction of a glance pier on the southerly bank of the river between Maple and Beech Lakes in the township of Stanhope, county of Haliburton.

The pier is 200 feet in length, and 5 feet in height, constructed of 10 x 12 and 12 x 12 inch square hemlock timber, the cribwork being filled with stone.

The timber was delivered in the month of April; but in order to take advantage of low-water, the work was not proceeded with until the season was well advanced, the improvement being completed in the month of September.

KUSHOG LAKE DAM.

A re-vote of the appropriation of $300 granted in 1888 to aid the County of Haliburton in the re-construction of the dam at the outlet of Kushog Lake, was taken last Session. The dam is intended to serve both navigation and the lumbering interest, and is situated in the Township of Snowdon, about six miles easterly from the village of Minden.

The work of re-construction was not commenced until the season of 1888 was well advanced, consequently it was not completed until the latter part of December of that year. Application was made to the Department for the payment of the appropriation in the month of January of the present year, and the amount was accordingly handed over to the County.

GEORGIAN BAY IMPROVEMENT.

The work attended to out of this appropriation consisted of rock excavation at a point known as the "Two Mile Narrows," situated on the inner steamboat channel between Midland and Parry Sound.

Operations were commenced on the 24th of April and continued until the 8th of June, when a channel, having a depth then of six feet six inches of water, had been provided.

MISSISSIPPI RIVER IMPROVEMENT.

A channel has been excavated through a rocky shoal situated in the Township of Ramsay, about three miles down stream from the Village of Carleton Place. In order to take advantage of the season of low-water, operations were not commenced until the latter part of July and were continued until the early part of October, when the channel for about 525 feet in length and 60 feet in width, was deepened.

LAKE OF BAYS DREDGING.

This work consisted of the excavatien of a channel through a shoal of gravel, which extended across the river at the outlet of the lake, causing navigation to be seriously interfered with during the seasons of low water.

Operations were commenced on the 25th of July and continued until the 10th of September, when a cutting 145 feet in length, 40 feet in width, and an average depth of three feet had been excavated, and a depth of nine feet of water provided.

As steam plant could not be obtained in this locality the work was carried out with a horse-power dredging apparatus belonging to the Department.

HEAD RIVER IMPROVEMENT.

An appropriation of $1,300 was granted last Session to remove rock obstructions from the bed of this river, in the townships of Carden and Laxton.

Operations were commenced in the early part of August and continued until the 20th of September, the following being the works attended to.

Two channels have been excavated through rocky shoals, situated on Lot 23 in the 10th Concession of the township of Carden.

On Lot No. 11 in the 1st Concession of the township of Laxton, a rock cutting has been made 88 feet in length and 22 feet in width, and the channel on the easterly side of the river has been cleaned out and enlarged by the removal of an old coffer-dam and a quantity of loose rock and boulders, etc.

At a distance of 30 feet below the above improvement, a rock cutting 18 feet in length and 22 feet in width has been made, and a quantity of loose stone and boulders removed from the river-bed immediately below.

Several projecting points of rock and boulders, which formed obstructions a short distance below the highway bridge, have also been blasted and removed from the river.

RIVER BEAUDETTE WORKS.

An appropriation of $1,500 was granted last Session to aid in dredging and removing obstructions from the River Beaudette.

Application having been made to the Department by the Treasurer of the united counties of Stormont, Dundas and Glengarry, for the payment of the appropriation, and a properly certified statement shewing an expenditure of $4,323.19 up to 15th of October, having been furnished by the County Treasurer, the appropriation was handed over in discharge of the liability assumed by the Province in connection with this improvement. It is expected that the cost of the works undertaken and contracted for by the united counties will not be less than from $10,000 to $12,000.

MAINTENANCE LOCKS, DAMS AND SWING BRIDGES.

In addition to the repairs and improvements already referred to in connection with other works, the following have been attended to out of this appropriation :—

Mary's and Fairy Lakes Lock, Dam and Swing Bridges, etc.

Repairs have been made to the planking on the upper lock gates and also to that on top of the lock walls, and a quantity of gravel and other debris, which had collected in the channel below the lock to such an extent as to interfere with navigation, has been removed by dredging.

The guard-timbers extending along the easterly side of the canal above the lock have been straightened and repaired, and those on the westerly side have been renewed for a length of 40 feet, and sheeted in with two-inch planking, to prevent saw-dust and other debris from falling into the canal from the adjoining mill.

Repairs have also been made to the pier at the head of the canal, and a leakage stopped by removing the filling, sheeting the inside of the pier with two-inch planking and refilling it with concrete.

The swing bridge has been adjusted and repairs made to the turntable, and the fixed bridge across the river a short distance above has been provided with coverings for the corbels so as to protect them from the weather, where exposed between the chord pieces, and lessen their liability to decay.

The dam has been supplied with two new windlasses, one new windlass frame and two new stop-logs, and repairs have been made to the flooring of the stop-log platform.

Swing Bridges at Lindsay.

The repairs made to these bridges consist of several new needle-beams and floor stringers and five new wheels for the turntables. The bridge south of the town has received two coats of paint and repairs have been made to the turntable and trussing.

Booms and Piers in Cameron Lake.

These works are situated at the mouth of the Burnt River, in the township of Fenelon. Three piers, one at the sorting jack 14 by 16 feet square, and two which are required to hold the boom in place 18 by 20 feet square, have been rebuilt for a height of about four feet above the water, and sufficient additional stone put in to fill the crib work ; some repairs have also been made to the booms.

Rosedale Swing Bridge.

The face of the pier, at the southerly end of this bridge, has been re-built five feet in height, the guard-pier and rail repaired and the bridge given two good coats of white paint.

Norland Dam and Slide.

This dam has been supplied with three new stop-logs and some new staples have been provided for the old ones. The stop-log platform has also been repaired with a new stringer and some new planking, and repairs have been made to the windlasses.

Horse Shoe Lake Dam.

The dam at the outlet of this lake has been gravelled to make it watertight and repairs have been made to the planking of the slide at Workman's Mills, situated on the Gull River near the village of Minden.

Hall's Lake Dam.

The stop-log platform has been replanked and the dam supplied with two new stop-logs and two new windlasses.

Hawk Lake Dam and Slide.

This slide has been extended a length of 80 feet, the width being 14 feet and the sides 5 feet in height, constructed of 12x12 inch pine timber. The cross sills are of flatted pine, rock bolted with $1\frac{1}{4}$-inch iron bolts, and the flooring is of birch and maple securely fastened with oak trenails. A quantity of rock which had fallen from the adjacent banks was also blasted and removed from the bed of the river. The dam has been supplied with two new stop-logs and the stop-log platform refloored with two-inch planking.

Some slight repairs have also been made to the dam at the outlet of Paint Lake.

Redstone Lake Dam.

The westerly end of the dam constructed in 1880 across a channel extending from Redstone to Eagle Lake, and situated on lot No. 30 in the 8th concession of the township of Guilford has been repaired and extended so as to prevent the water from finding a passage around the end of the structure. The dam has also been gravelled to make it watertight.

Eagle Lake Dam.

The dam at the outlet of this lake, in the Township of Guilford, having become in a worn out and leaky condition, has been entirely reconstructed.

The new dam has a total length of about 260 feet in which there is one slide opening 24 feet 6 inches in width formed with piers constructed of pine, cedar, and hemlock square timber, compactly filled with stone. The piers are 50 feet in length, 11 feet 6 inches in width and 9 feet in height, and the slide is floored with birch and maple plank 6 inches in thickness. The remaining portions of the dam are in the form of embankments, constructed with stone and gravel obtained in the locality ; the southerly portion extending from the slide pier to the river bank being 183 and the northerly portion 29 feet in length, the entire face or upper side being protected from injury by the water with rip-rap stone.

This improvement not only serves the purpose of a dam which enables the waters of both Eagle and Moose Lakes to be reserved and controlled as required, but is also utilized as a portion of the highway which extends northerly from Haliburton to Little Redstone Lake in the township of Havelock. In order to render it safe for public travel, sills of fatted cedar have been bedded in below the surface of the embankment about 12 feet apart from centres having vertical posts framed into them, and guard rail formed on each side of the roadway. The embankments will average about 20 feet in width at the base, and the roadway on top is about 12 feet in width. Operations were commenced during the month of April and the work was completed about the 20th of July.

Oblong, Otter and Grace Lake Dams.

The dam at the outlet of Oblong lake has been supplied with two new stop-logs and the Otter lake dam has been raised 2 feet in height in front and gravelled, and repairs have been made to the windlasses of the Grace lake dam.

Bear and Stormy Lake Dams.

Little Bear lake dam has been extended 24 feet at the westerly end, gravelled and supplied with one new windlass. Big Bear lake dam has been provided with 3 new stop-logs and new windlasses and frames, and the stop-log platform repaired. A piece of timber 29 feet in length has also been put in at the westerly end, some gravelling done,

and glance pieces provided to protect the stop-log posts from injury. The bottom and sides of the slide have also been re-pinned. The timberwork of Stormy lake dam has been taken down and rebuilt from the water up and the dam refilled with stone.

Scott's Slide.

This slide, situated on Bear creek at the head of what is known as the "big marsh," has been provided with three new stop-logs, the sides braced, and repairs made to the flooring.

The dam at the foot of the "big marsh" has been supplied with three new stop-logs, and two new windlasses and frames, the easterly side of the slide opening faced with oak planking and the flooring of the slide repinned. The sides of the slide at the outlet of Bear creek into Pine lake have also been taken down and rebuilt.

Devil's Creek Dam and Slide.

A glance piece has been put on to protect the stop-log post from being injured by saw-logs and three new stop-logs have been provided. Round poles have also been pinned on the slide flooring to protect it from injury.

Young's Point Swing Bridge, &c.

This bridge has been supplied with a new floor of 3-inch planking, and the foot-walks on the upper lock gates have been renewed.

The following are the Lockmasters' returns of the lockages made at the different locks during the present year:

Port Carling Lock—1,695 steamers, 1360 small boats, 403 scows and 447 cribs of timber.

Mary's and Fairy Lakes Lock—88 steamers, 4 small boats, 52 scows and 3 cribs of timber.

Maganetewan Lock—537 steamers, 26 small boats, 38 scows and 22 cribs of timber.

Lindsay Lock—165 steamers, 174 scows and 208 cribs of timber.

Young's Point Lock—1,043 steamers, 110 small boats, 259 scows and 244 cribs of timber.

Balsam River Lock—280 steamers, 20 small boats, 115,000 saw-logs and 1,000 pieces of boom timber.

EXTENSION OF RAILWAYS IN 1889.

The construction of railways during the present year has been confined principally to the extension and improvement of lines previously reported upon, the details of the work done, as far as could be ascertained, being as follows:—

Napanee, Tamworth and Quebec Railway.

The extension of this railway from Tamworth to Tweed, a distance of 20 miles, which was commenced during the latter part of 1888, was continued during the present year, the line being now completed and open for traffic.

The construction of a line from Yarker to Harrowsmith, a distance of seven miles, was commenced in the early part of the present year, and this is also completed, trains, I am informed, being now run from Tweed to the city of Kingston, as well as to Napanee.

South Norfolk Railway.

The construction of this railway which extends from the town of Simcoe to Port Rowan, a distance of 17 miles, was commenced during the month of July, 1888, and I am given to understand that the line was completed at the close of that year, and has since been open for traffic.

Lake Erie, Essex and Detroit River Railway.

At the close of 1888, I am informed, this railway was completed from its northerly terminus at Walkerville to a point two miles beyond the village of Ruthven. Construction work was continued during the present year, and the line is now, I understand, completed and open for traffic to Leamington, the total length being 38 miles.

Ontario and Quebec Railway—Detroit Extension.

The construction of this railway has been steadily proceeded with during the present year, and I am informed that the entire line extending from London to Windsor, a distance of 112½ miles, is now completed, but will not be opened for traffic until the coming spring

Ontario and Quebec Railway—Don Branch.

The construction of this branch has been continued during the present year, and I am informed that the track is now laid from the point of departure on the Ontario and Quebec Railway to the head of the Don improvement, a distance of about two and one-half miles, and also along the city front from York to Berkeley Streets, a distance of about one and one-quarter miles. The unfinished portion will, I understand, be proceeded with immediately a settlement of the difficulty, between the railway and the municipal authorities, respecting right of way over the Don improvement is arrived at.

South Ontario Pacific Railway—Toronto Branch.

Construction work has not been proceeded with on this railway during the present year, but surveys have, I understand, been made between Toronto and Hamilton with a view to improving the location, and it is expected that construction will be resumed during the coming spring.

Brockville, Westport and Sault Ste. Marie Railway.

Construction work was continued on this railway during the present year between Lyn and Brockville until the early part of June, when, I understand, the line was completed from Brockville to Westport, a distance of 45 miles, and that trains have since been running regularly over it between these points.

Operations have not yet been proceeded with beyond Westport, but is expected that construction will be commenced during the present winter.

Port Arthur, Duluth and Western Railway.

The construction of this railway has been commenced during the present year.

The line is intended to run from Port Arthur to Gun Flint Lake, the latter point being situated on the boundary line between the State of Minnesota and western Ontario, the length being 84¾ miles.

Construction was commenced in October at the easterly end of the line, and the work has been since so vigorously prosecuted, that I understand, 21 miles have been graded and 15 miles of rails laid, the ballasting of the latter distance being also well advanced.

It is expected that 50 miles will be completed and opened for traffic about the month of August next, and that the remaining portion will be completed about midsummer of 1891.

The following revised statement to the close of 1889 gives in detail the mileage of each railway in Ontario, distinguishing between those constructed prior to and after confederation :—

REVISED STATEMENT.

No.	Name of Railway.	Terminal Points. From.	Terminal Points. To.	Completed prior to Confederation. Length in miles.	Completed since Confederation. Length in miles.	At present under Construction or Contract. Length in miles.
1	Grand Trunk Railway, Main Line	Eastern Province Boundary	Point Edward	457		
2	do Buffalo & Lake Huron Branch	Fort Erie	Goderich	158		
3	do London Branch	St. Mary's	London	23		
4	do Galt & Doon Branch	Galt	Berlin	7	4.5	
5	do Toronto & Nipissing Branch	Toronto	Coboconk		88	
6	do Midland Railway, Main Line	Port Hope	Midland City	65	54.53	
7	do do Peterboro' Branch.	Millbrook	Lakefield	13	9	
8	do Lake Simcoe Junction	Stouffville	Jackson's Point		26.5	
9	do Whitby, Port Perry & Lindsay	Whitby	Lindsay		46	
10	do Victoria Railway	Lindsay	Haliburton		55.81	
11	do Grand Junction Railway	Belleville	Peterborough		64.65	
12	do Belleville & North Hastings	Grand Junction Railway	Madoc		22	
13	do Toronto & Ottawa, Main Line	Peterborough	Casselman		9	173
14	de do Manilla Link	Wick	Manilla		6.5	
15	do do Omemee Link	Omemee	Peterborough		14	
16	do Port Dover & Lake Huron	Port Dover	Stratford		63	
17	do South Norfolk Railway	Simcoe	Port Rowan		17	
18	do Chemong Branch	Peterborough	Chemong Lake		9	
19	do Stratford & Huron	Stratford	Wiarton		106.27	
20	do Georgian Bay & Wellington	Palmerston	Durham		26	
21	Grand Trunk Railway, Great Western Div. Main Line	Suspension Bridge	Windsor	229		
22	do Toronto & Hamilton Branch	Toronto	Hamilton	39.5		
23	do Loop Line Division	Glencoe	Fort Erie		145	
24	do Sarnia Branch	Komoka	Sarnia	51		
25	do Petrolia Branch	Wyoming	Petrolia	7		
26	do Brantford Branch	Harrisburgh	Brantford	8		
27	do Brantford & Norfolk	Brantford	Tilsonburgh		35.88	
28	do Wellington, Grey & Bruce	Harrisburgh	Southampton	27	102	
29	do do S. Extension	Palmerston	Kincardine		66	
30	do London, Huron & Bruce	Hyde Park Junction	Wingham		69.75	
31	do London & Port Stanley	London	Port Stanley	25		
32	do Welland Railway	Port Colborne	Port Dalhousie	25		
33	Northern Railway, Collingwood Line	Toronto	Meaford	94	21	
34	do Muskoka Branch	Barrie	Gravenhurst		53	
35	do Hamilton & Northwestern, Main Line	Port Dover	Allandale		135.3	
36	do do Collingwood Branch	Clarksville	Collingwood		40	
37	do North Simcoe Junction	Colwell	Penetanguishene		33.34	
38	Northern & Pacific Junction Railway	Gravenhurst	La Vause		111.5	

REVISED STATEMENT.—*Continued.*

No.	Name of Railway.	Terminal Points. From.	Terminal Points. To.	Completed prior to Confederation. Length in miles.	Completed since Confederation. Length in miles.	At present under Construction or Contract. Length in miles.
39	Canadian Pacific Railway, Main Line	Ottawa	Western Province Boundary	57	1144	
40	do Algoma Branch	Sudbury Junction	Sault Ste. Marie		180.25	
41	do Brockville & Ottawa Railway	Brockville	Carleton Place	46		
42	do St. Lawrence & Ottawa Ry. and Chaudiere Branch	Prescott	Ottawa	59.5		
43	do Ontario & Quebec Railway	Toronto Junction	Eastern Province Boundary.	12	281.25	
44	do do Don Branch	Main Line	Toronto			5
45	do do Detroit Extension.	London	Windsor		112.50	
46	do Credit Valley Ry., Main Line	Toronto	St. Thomas		119.13	
47	do do Orangeville Branch	Streetsville	Elora and Orangeville		62.83	
48	do do Guelph Branch	Campbellville	Guelph		15	
49	do Toronto, Grey & Bruce, Main Line.	Toronto	Owen Sound		122	
50	do do Teeswater Branch.	Orangeville	Teeswater		73	
51	do do Wingham Branch.	Glenarman	Wingham		4.75	
52	do West Ontario Pacific Railway	Woodstock	London		27	
53	do South Ontario Pacific Railway	Toronto	Hamilton			40
54	Canada Southern Railway, Main Line	Fort Erie	Amherstburgh		229	
55	do St. Clair Branch	St. Thomas	Courtwright		62	
56	do Essex Cut-off	Essex Centre	Sandwich		15.5	
57	do Niagara Branch	Niagara	Fort Erie	30		
58	Canada Atlantic Railway	Ottawa	Eastern Province Boundary.		68.08	
59	Cobourg, Peterboro' & Marmora Ry., Marmora Line	Cobourg	Harwood	22		
60	Kingston & Pembroke Railway	Kingston	Renfrew		103	
61	Prince Edward County	Picton	Trenton at G. T. R		32.44	
62	Central Ontario Railway	Trentan at G. T. R	Coe Hill		74	
63	Erie & Huron Railway	Rondeau	Sarnia		70.47	
64	Napanee, Tamworth & Quebec Railway	Napanee	Tweed		50	
65	do do Harrowsmith Branch	Yarker	Harrowsmith		7	
66	Bay of Quinte Railway	Deseronto	Grand Trunk Railway		3.5	
67	Nosbonsing & Nipissing Railway	Lake Nipissing (S. E. Bay).	Lake Nosbonsing		5	
68	Ontario & Sault Ste. Marie Railway	Sault Ste. Marie	Spanish River			125
69	Irondale, Bancroft & Ottawa Railway	Kimmount	Bancroft		10	40
70	Brockville, Westport & Sault Ste. Marie	Brockville	Sault Ste. Marie		45	455
71	St. Catharines & Niagara Central Railway	Niagara Falls	Toronto		12.5	62.5
72	Lake Erie, Essex & Detroit River Railway	Walkerville	Leamington		38	
73	Port Arthur, Duluth & Western Railway	Port Arthur	Gun Flint Lake			84.75
				1455.00	4401.73	985.25

The laying of double track has been continued on the Grand Trunk Railway during the present year, and I nnderstand that the line has been completed and opened for traffic between Bainsville and Wales, a distance of $28\frac{64}{100}$ miles, and also between Iroquois and Brockville, a distance of $26\frac{1}{3}$ miles. The total mileage of double track now laid on this railway amounts to $107\frac{93}{100}$ miles, of which $103\frac{68}{100}$ is between the easterly Province boundary and Toronto, and the balance between Toronto and Point Edward.

I have the honor to remain, Sir,
Your obedient servant,

ROBERT McCALLUM,
Engineer, Public Works.

STATEMENTS

OF THE

ACCOUNTANT

AND

LAW CLERK.

No. 1.—Statement of the Expenditures on Public Buildings and Works in 1889, and Total Expenditures up to the 31st of December, 1889—(Capital Account.)

NAME OF WORK.	Expenditures from 1st July, 1867, to 31st Dec., 1887.	Expenditure, 1888.	Expenditure, 1889.		Totals.
	$ c.	$ c.	$ c.		$ c.
Government House	164,864 59	1,987 38	2,712 00		169,563 97
Parliament and Departmental Buildings	85,285 98				85,285 98
New Parliament and Departmental Buildings, Queen's Park:					
Lionel Yorke on contract for masonry	147,627 39	96,725 98	15,967 40	See Note.★	260,320 77
Carroll, Gaylord & Vick, on contract for masonry			69,895 26		69,865 26
Lionel Yorke, on contract for carpentry and iron work		8,531 41	174 12		8,705 53
Lionel Yorke Estate, on contract for carpentry			6,397 08		6,397 08
Lionel Yorke, for bricks furnished	5,433 05	6,604 00			12,037 05
Central Prison, " "			30,000 00		30,000 00
St. Lawrence Foundry Co., on contract for iron work		10,019 24	17,187 61		27,206 85
Payments to Mr. Waite, as Architect	7,500 00	5,000 00	3,500 00		16,000 00
Sundry other expenditures (*re* competitive plans, water mains, drains, advertising tenders, etc, etc.)	18,882 89	2,322 60	75 88		21,281 37
Asylum for the Insane, Toronto	274,651 94	13,784 50	9,821 56		298,258 00
" " " Mimico Branch		6,034 10	172,062 94		178,097 04
" " London	654,574 99	44,929 88	35,896 08		735,400 95
" " Hamilton	558,619 71	83,257 57	21,383 03		663,260 31
" " Kingston	310,914 46	6,545 63	3,628 13		321,088 22
" (Branch) " "	9,366 94	55 88			9,422 82
Asylum for Idiots, Orillia	187,294 91	47,190 51	57,596 30		292,081 72
Deaf and Dumb Institute, Belleville	222,009 18	5,150 17	6,697 45		233,856 80
Blind Institute, Brantford	228,167 70	3,687 30	1,760 45		233,615 45
Reformatory for Boys, Penetanguishene	126,914 87	8,670 76	4,725 85		140,311 48
Central Prison, Toronto	609,985 88	4,310 73	63,375 05		677,671 66
Agricultural College, Guelph	308,529 99	7,363 96	28,980 64		344,874 59
School of Practical Science, Toronto (old building)	59,100 26				59,100 26
" " " " (new building and addition)	53,510 64	1,701 59	33,117 31		88,329 54
Andrew Mercer Reformatory for Females, Toronto	107,708 94				107,708 94
" " " " "	44,438 65	5,643 82	34,262 83		84,345 30
Educational Department and Normal and Model Schools, Toronto	74,439 90	31,963 26	7,000 00		113,403
Normal and Model Schools, Ottawa	149,723 44	1,407 15	2,941 70		154,072 16
Government Farm, Mimico	51,646 34				51,646
Osgoode Hall, Toronto	110,819 01	2,559 05	3,691 18		117,060 34
Agricultural Hall, Toronto	324 00				324
Brock's Monument, Queenston Heights	3,245 06	197 90	193 80		3,
					636 76

★NOTE.—*These items cover the expenditures by Public Works Department in respect of the construction of the new buildings, but do not include the amount paid to Toronto University for the old Asylum premises. The quantity of bricks for which payment has been made to Mr. Yorke is to be deducted from the quantity which, by the contract, is agreed to be furnished from the Central Prison.*

No. 1.—Statement of the Expenditures on Public Buildings and Works—(Capital Account).—*Continued.*

NAME OF WORK.	Expenditures from 1st July, 1867, to 31st Dec., 1887.	Expenditure, 1888.	Expenditure, 1889.	Totals.
	$ c.	$ c.	$ c.	$ c.
Niagara River Fence	8,025 43			8,025 43
Muskoka District—Immigration Sheds at Gravenhurst	355 00			355 00
" Registry Office and Lock-up, Bracebridge	6,709 20	459 88	177 03	7,346 11
" Lock-up and Court Room at Huntsville	7,130 02		253 65	7,383 67
Algoma District—Court House, Gaol and Registry Office, Sault Ste. Marie	9,403 01	1,075 53	7,082 92	17,561 46
" Residence for Gaoler, Sault Ste. Marie	1,895 95			1,895 94
" Grand Manitoulin Island—3 Lock-ups—(Gore Bay, Little Current and Manitowaning	8,434 86	18 50	5,049 28	13,502 64
" Lock-up at Killarney	729 99	224 98	318 00	1,272 97
" " Bruce Mines	3,063 63	48 85	5 00	3,117 48
" " Thessalon	844 09		339 70	1,183 79
Thunder Bay District—Registry Office and Lock-up, Port Arthur	20,483 99	81 00		20,564 99
" Addition to Gaol and Court House, Port Arthur	15,294 79	47 00	62 92	15,404 71
" Lock-up at Fort William	4,825 88	2,269 19	462 16	7,557 23
" Lock-up at Silver Islet, Lake Superior	2,304 79			2,304 79
Parry Sound District—Registry Office, Lock-up, etc., Parry Sound	8,226 30	49 84	7,209 37	15,485 51
" Lock-up at Maganetawan	585 66		45 74	631 40
" Lock-up and Court Room at Burk's Falls	4,679 68	377 33	483 38	5,540 39
Nipissing District—Lock-up at Mattawa	3,090 19	179 97	13 25	3,283 41
" Lock-up and Court Room at North Bay	2,445 11	8,130 75	4,684 55	15,260 41
" Registry Office at North Bay	2,789 95			2,789 95
" Lock-up at Sudbury	53 45	293 28	1,831 70	2,178 43
Rainy River District—Lock-up, Court Room and Gaoler's Residence at Rat Portage	17,682 41	1,735 32	542 44	19,960 17
County of Haliburton (Provisional)—Registry Office at Minden	3,749 62			3,749 62
Lock at Young's Point	30,892 72			30,892 72
Lock at Balsam and Cameron Lakes	23,959 02			23,959 02
Lock and Works, Mary's and Fairy Lakes	45,955 81	7,394 94		53,350 75
Maganetawan Works—Lock, Dam and River, and Dam and Slide rt Deer Lake	44,595 45	3,012 07	279 36	47,886 88
Georgian Bay Works	1,595 30	2,822 53	667 54	5,085 37
Landing Pier at Port Elgin	1,000 00			1,000 00
" Southampton	300 00			300 00
Muskoka Lakes Works	7,963 40	216 38		8,179 78
" Locks and Bridges at Port Carling	41,200 94		989 77	42,190 71
" Cut and Bridges at Port Sandfield	16,842 86			16,842 86
" Muskoss Falls Works and Bridge at Bala	7,223 96			7,223 96
" To improve Jenette's Narrows			1,623 92	1,623 92
Nipissing Lake Works	9,182 17			9,182 17
Couchiching Lake Works	427 84			427 84
Mud Lake Works, Township of Dalton	1,502 32			1,502 32
Kushog Lake Dam			300 00	300 00
Lake of Bays, Dredging Mouth of River at Outlet of			581 82	581 82
Peninsula Creek Improvement	14,589 31	3,701 02	717 07	19,007 40

Stony Creek Works, Township of Ops	828 25			828 25
Scugog Lake Works, Dredging at Port Perry	977 53			977 53
Gull and Burnt River Works	68,226 57		300 00	68,526 57
Muskoka River Works	38,198 93			38,198 93
Sydendam "	2,156 26			2,156 26
Nottawasaga River Works	5,915 09			5,915 09
Kaministiquia "	22,865 02			22,865 02
Scugog " (including Lindsay Lock and Swing Bridges)	79,462 18	3,787 62	2,083 52	85,333 32
Pigeon "	4,999 62			4,999 62
Otonabee "	4,962 42	2,304 24		7,266 66
Balsam "	8,804 45	6,788 50		15,592 95
Wye "	5,176 98			5,176 98
Nation "	10,877 23			10,877 23
Beaudette " (to aid dredging, etc)			1,500 00	1,500 00
Mississippi River Improvements (below Carleton Place)			1,464 35	1,464 35
Head " (Township of Laxton and Carden)			976 82	976 82
Moira " (Township of Thurlow)	2,135 22			2,135 22
Trent River Bridge	2,000 00			2,000 00
Washago and Gravenhurst Road	32,792 12			32,792 12
Washago Wharf	489 22			489 22
Portage du Fort Bridge	5,247 99			5,247 99
Des Joachim's Rapids, Bridge and Approaches	5,937 72			7,937 72
Surveys, Inspections, Arbitrations and Awards	41,330 65	945 71	480 00	42,756 36
Maintenance of Locks, Dams, Slides, etc	54,084 79	7,905 70	7,117 99	69,168 48
Roads in Township of Ryerson	7,295 06			7,295 06
Clearings and Log House on Free Grant Lands (Settlers' Homestead Fund)	16,780 75			16,780 85
Aldborough Drainage Works	7,199 02			7,199 02
Brooke "	34,747 73			34,747 73
Delaware "	5,740 93			5,740 93
Dunwich "	10,105 86			10,105 86
Ekfrid, Caradoc and Metcalfe Drainage Works	13,667 66			13,667 66
Grey Drainage Works	8,175 47			8,175 47
Moore "	17,091 58			17,091 58
Mosa "	12,714 75			12,714 75
Nissouri West Drainage Works	8,178 50			8,178 50
Raleigh Drainage Works	36,409 64			36,409 64
Russell "	11,543 77			11,543 77
Sarnia "	40,540 55			40,540 55
Sombra "	53,169 04			53,169 04
Tilbury East "	35,297 62			35,297 62
Tilbury West "	31,577 06			31,577 06
Williams East "	2,221 75			2,221 75
Surveys and Drainage of Swamp Lands, Provincial Account	36,448 51			36,448 51
Totals	5,741 988 34	459,505 50	680,656 90	6,882,150 74

Department of Public Works, Ontario,
Toronto, *January*, 1890.

J. P. EDWARDS,
Accountant Public Works.

No. 2—Statement of Drainage Debentures purchased by the Government, on recommendation of the Public Works Department, in 1889.

MUNICIPALITY.	No. of By-Laws.	Amount.
		$ c.
Township of Bosanquet	By-law 251	245 00
" Ekfrid	By-law 432 (cumulative), consolidating by-laws 429, 430 and 431	617 50
" West Zorra	By-law 3, of 1888, and amending by-law 2, of 1889	3,166 38
" Logan	By-law 289	2,553 00
" Moore	By-law 20, of 1888	1,678 00
" West Flamboro'	By-law 441	6,920 00
" Elma	By-law 261 and amending by-law 267	2,100 00
" East Zorra	By-law 381 and amending by-law 384	448 00
Total		17,727 88

J. P. EDWARDS,
Law Clerk, Public Works.

Department of Public Works, Ontario,
Toronto, January, 1890.

No. 3.—Contracts and Bonds entered into with Her Majesty in 1889.

Date.	Work.	Subject of Contract.	Contractors.	Sureties.	——	Amount.
1889.						$ cts.
Jan. 22...	Asylum for the Insane, London.	Re-enforcement of brick walls of sewage tank.	John Purdom, of London.	None.....	....	165 00
March 1..	Mimico Branch—Asylum for the Insane, Toronto.	Drilling artesian well at Mimico for cottages.	Peter McEwan, of Goderich.	None.	For first 500 feet	1,000 00
					" second 500 "	600 00
					" casing	100 00
March 23.	Mimico Branch—Asylum for the Insane, Toronto.	Construction of metal ceilings at cottages.	Thomas Douglas, Asa Matthews and Walter Bell (Douglas Brothers), all of Toronto.	None.	($750 each for eight cottages)	6,000 00
April 3...	Mimico Branch—Asylum for the Insane, Toronto.	Electric lighting for cottages, main building, central building and rear building.	The Ball Electric Light Company, Limited, of Canada.	None.	4 cottages, central building and rear building	5,021 00
					4 cottages and main building	2,184 70
					Total	7,205 70
April 17..	Asylum for Idiots, Orillia.	Erection of main front building and connections with kitchen and wings.	John Forin, of Belleville.	Charles F. Smith and Robert Templeton, both of Belleville	....	139,390 00
April 17..	Agricultural College, Guelph.	Reconstruction of farm buildings (destroyed by fire).	F. W. Schwendimann, of Drayton.	Robert McWilliam, M.D., and William H. Whealey, both of Drayton.	....	16,827 00
April 17..	Mimico Branch—Asylum for the Insane, Toronto.	Erection of farmers' house.	Henry Martin, of Toronto.	George Gall, of Toronto	....	1,415 00

No. 3.—Contracts and Bonds entered into with Her Majesty in 1889.—*Continued.*

Date.	Work.	Subject of Contract.	Contractors.	Sureties.	——	Amount.
1889.						$ cts.
May 7....	Asylum for the Insane, Toronto.	Repairing roofs of east and west wings of main building.	John Duthie and George Duthie, jr., (G. Duthie & Sons) of Toronto.	None		250 00
June 18 ..	Agricultural College, Guelph.	Construction of a tank house for sewage disposal.	David Kennedy and John Kennedy (D. Kennedy & son), of Guelph.	James Innis and Thomas Gowdy, of Guelph.		894 00
June 18..	District of Nipissing.	Construction of an addition to the lock-up at Sudbury.	Thomas McKelvey, of North Bay.	John Bourke, James Purvis and David Purvis, all of North Bay ...		1,975 00
June 18..	School of Practical Science, Toronto.	Construction of an addition.	Alexander J. Brown, of Toronto.	John T. Pearce and James J. Brown, both of Toronto.		50,275 00
June 18..	Government House, Toronto.	Construction of an addition to the entrance lodge.	Albert Weller and James Stanes (A. Weller & Company), of Toronto.	Daniel Kennedy and John Kennedy, both of Toronto.		932 00
June 18..	District of Parry Sound.	Construction of an addition to the Court room at Parry Sound.	George Ball, of Barrie.	Oliver Hammon Lyon and Charles Hammond Ross, both of Barrie ...		5,190 00
June 18..	District of Algoma.	Construction of an addition to gaol at Sault Ste. Marie.	George Ball, of Barrie.	Oliver Hammon Lyon and Charles Hammond Ross, both of Barrie ...		6,562 00
June 18..	District of Algoma.	Construction of a Court room and of a registry office at Gore Bay, Manitoulin Island.	George Ball, of Barrie.	Martin Johnston and Henry Sewrey, Both of Barrie.		5,680 00

June 18 ..	Agricultural College, Guelph.	Roofing new farm buildings with galvanized iron shingles.	The Metallic Roofing Company of Canada, Toronto.	Emanuel Samuel and Alfred D. Benjamin, both of Toronto.....	.....	2,125 00
June 27 ..	District of Nipissing.	Construction of a fence around the Court room and registry office at North Bay.	James Baxter, of North Bay.	None	.....	295 00
June 27 ..	District of Parry Sound.	Construction of a fence around the Court room lot at Burk's Falls.	George Silvester, of Burk's Falls.	None	.....	230 00
June 27 ..	District of Muskoka.	Construction of a wood-shed, new fencing and sundry repairs to Court room and lock-up at Huntsville.	Mackie Kinton, of Huntsville.	None	.....	160 00
June 27 ..	District of Muskoka.	Painting fence, wood-shed, etc., to lock-up at Huntsville.	George Hunt, of Huntsville.	None	.....	62 00
July 11 .	Agricultural College, Guelph.	Construction of hay fork tracks and lifters in the new farm building.	Richard Pigott, of Guelph.	None	.....	304 55
July 22...	Normal School, Ottawa.	Coal supply for season 1889-90.	C. C. Ray & Co., of Ottawa.	John W. McRae and J. H. Salmon, both of Ottawa.	Large egg or grate (Scranton or Pittston coal) per ton...	6 01
July 22...	Normal School, Ottawa.	Wood supply for season 1889-90.	John Heney, of Ottawa.	C. Neville and John O'Reilly, both of Ottawa.	Hard Wood, per cord..... Pine " "	4 60 3 00
July 22...	Parliament and Departmental Buildings and Institutions, Toronto.	Coal and wood for season 1889-90.	The Conger Coal Company, of Toronto (Limited).	Asa E. Minkler and Thomas A. Lytle, both of Toronto.	Scranton or Pittston coal, large and small egg, per ton Stove or nut " Briar Hill soft coal " Hardwood, per cord..... Pine wood " ..... Charcoal, per bbl	5 45 5 70 5 25 5 25 4 25 1 40

No. 3.—Contracts and Bonds entered into with Her Majesty in 1889.—*Continued.*

Date.	Work.	Subject of Contract.	Contractors.	Sureties.	——	Amount.
1889.						$ cts.
Aug. 7 ...	Agricultural College, Guelph.	Hot water heating apparatus at residence of Prof. of Agriculture.	Warden King and James Cochran King (Warden King & Son), of Montreal.	None	... ...	595 00
Aug. 7 ...	Asylum for the Insane, Hamilton.	Hot water heating apparatus at Medical Superintendent's residence.	Warden King & Son, of Montreal.	None	... ...	780 00
Aug. 7 ...	Deaf and Dumb Institution, Belleville.	Hot water heating apparatus at the Institute.	The E. & C. Gurney Company, Limited, of Toronto.	None	... ...	650 00
Aug. 15 ..	Deaf and Dumb Institution, Belleville.	Excavating, masonry and other works for boiler of heating apparatus in the principal's residence.	John Forin, of Belleville.	None	... ...	150 00
Aug. 15 ..	Deaf and Dumb Institution, Belleville.	Construction of an addition to the kitchen.	John Forin, of Belleville.	None	... ...	400 00
Aug. 15 ..	District of Algoma.	Construction of a fence round lock-up at Killarney.	T. H. Jackman, of Killarney.	None	... ...	240 00
Aug. 15 ..	District of Algoma.	Construction of a fence round lock-up at Thessalon.	W. J. Miller, of Thessalon.	None	... ...	284 00

Aug. 29 ..	Asylum for Idiots, Orillia.	Erection of a house for farmers and of a piggery.	James Sinclair, of Orillia.	Thomas Dunn and James Thomson, both of Orillia.	....	2,191 00
5 (P.W.) Oct. 1....	Mimico Branch—Asylum for Insane, Toronto.	Construction of steam boilers and heating apparatus for cottages, main building, central building and rear building.	Alexander S. Purdy, William Mansell and Watson Mashinter, all of Toronto.	James Morrison, of Toronto, and the E. & C. Gurney Company, Ltd., of the same place.	....	36,130 00
Oct. 1 ...	Mimico Branch—Asylum for Insane, Toronto.	Construction of steam pumps and other works for water supply and fire protection.	Miles Augustus Hunting and Ernest George Barrow (Miles Hunting & Co.) of Hamilton.	Alexander Gartshore and Eli Van Allen, both of Hamilton.	....	26,500 00
Oct. 1....	Mimico Branch—Asylum for Insane, Toronto.	Construction of drains cisterns and pumping engine house.	John Dickenson and Edward Dickenson, junior, both of North Glanford.	Edward Dickenson, senior, of North Glanford, and Henry Dickenson, of Woodstock.	....	17,507 00
45 Oct. 1....	Reformatory for Boys, Penetanguishene.	Construction of a pumping engine house and of a new steam boiler.	George A. Craig and Peter Payette, both of Penetanguishene.	Philip H. Spohn and Charles Beck, both of Penetanguishene.	.....	2,050 00

DEPARTMENT OF PUBLIC WORKS, ONTARIO,
TORONTO, *January*, 1890.

J. P. EDWARDS,
Law Clerk, Public Works.

REPORT

OF THE

COMMISSIONER OF CROWN LANDS

OF THE

PROVINCE OF ONTARIO,

FOR THE YEAR

1889.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

TORONTO:
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1890.

CONTENTS.

REPORT

OF THE

COMMISSIONER OF CROWN LANDS

OF THE

PROVINCE OF ONTARIO,

FOR THE YEAR 1889.

To His Honor the Honorable Sir Alexander Campbell, K. C. M. G.
Lieutenant Governor of the Province of Ontario.

May it Please Your Honor :

As required by law, I submit for the information of your Honor and the Legislative Assembly a Report for the fiscal year ending on the 31st December 1889, of the management, etc. of the Crown Lands of the Province.

CLERGY LANDS.

The area of these lands sold during the year was 1279 acres, aggregating in value $1262.25. The amount collected on account of these and former sales was $3,972.34. (See Appendix No. 3, page 6.)

CROWN LANDS.

The area of Crown Lands sold during the year was 53,640 acres, aggregating in value $71,765.63. The collection on account of these and sales of former years amounted to $66,888.54. (See appendix No. 3 page 6.)

COMMON SCHOOL LANDS.

The area of these lands sold during the year was 2 acres, aggregating in value $80. The collection on account of these and former sales amounted to $14,418.29. (See Appendix No. 3, page 6.)

GRAMMAR SCHOOL LANDS.

The number of acres sold during the year was 503, aggregating in value $280.80. The collection on account of these and former sales was $962.42. (See Appendix No. 3, page 6.)

RAILWAY LANDS.

Under "Railways Aid Act" of 1889, 52 Vic., Chap. 35, certain lands were set apart to be sold for the purpose of forming a fund to recoup the Province in respect of monies expended in aiding Railways—of these lands 2874 acres were sold aggregating in value $5,748.50, all of which was collected. (See Appendix No. 3, page 6.)

COLLECTIONS AND REVENUE.

The total collection of this Department on account of all sources of Revenue was $1,204,639.32. (See Appendix No. 4, page 7.)

DISBURSEMENTS.

The total disbursements of the Department on account of all services and expenditures was $236,336.69. (See Appendix No. 6 page 9.)

WOODS AND FORRESTS.

The total collection for the year was $1,078,598.12, which includes $66,058,-16 on account of bonuses, leaving the net collection on account of timber dues ground rent etc. to be $1,012,539.92.

FIRE RANGING.

This service continues to give satisfaction and is more largely taken advantage of from year to year. There were few fires of importance during the past year, and it is expected all the damaged timber will be cut during this winter.

There were 75 Rangers on duty during the dangerous part of the season and the total cost of the service was $15,468.82, one half of which is refundable by the licensees.

FISHERIES.

The reports received from Crown Land Agents, Fishery Overseers and others, leads me to believe the law was fairly well observed.

The Revenue from permits etc. was $305.10.

The Regulations, reports of Overseers etc., will be found in Appendices No. 10 to 14 inclusive at pages 20 to 24 inclusive.

GAME LAWS.

Under the amendment to the Game Law which requires foreigners to take out permits to hunt deer, 14 permits were issued, the revenue from which amounted to $140.

FREE GRANTS.

There were 133 townships open for settlement last year—during this year 20 townships were added in the Rainy River District.

During the year just closed 858 locations were made on 114,050 acres of land, and 84 locatees purchased 3,708 acres ; 386 patents were issued to locatees. (See Appendix No. 9, page 16.)

CROWN SURVEYS.

The following surveys of townships have been carried out during the year. In the District of Nipissing the township of Niven has been subdivided into farm lots of 100 acres each ; the townships of Beauchamp, Bryce, Hammell, Henwood, Marquis, Osborne, Pacaud, Robillard and Savard, also in the District of Nipissing, have been subdivided into farm lots of 320 acres each ; the township of Craig in the District of Algoma has been subdivided into lots for mining purposes of 320 acres each ; and the township of Scoble in the District of Thunder Bay has been subdivided into farm lots of 320 acres each. The outlines of eight townships, at the head of Lake Temiscaming, on the Upper Ottawa, have been run.

Several minor surveys have also been executed.

The particulars of the surveys, so far as the returns have been received, will be found in Appendices Nos. 18 and 19, pages 29 and 30.

The Surveyors' reports will be found in Appendices Nos. 24 to 38. Pages 37 to 52.

MUNICIPAL SURVEYS.

The Department has, during the year, issued instructions for twelve surveys on the petitions of the Municipal Councils of the townships of Barton, Etobicoke, Harwich, Nepean, Niagara, South Norwich, Pelham, Pickering, South Plantagenet Windham, Zone, the towns of Lindsay and Niagara and the Village of Tilbury Centre, and has during the year, confirmed three Municipal Surveys in the Townships of Arthur, East Wawanosh and York.

The particulars relating to these surveys will be found in Appendices 16 and 17, pages 26 to 28 inclusive.

MINERAL SURVEYS.

The General Mining Act requires that applicants, to purchase mining lands in the unsurveyed territory, shall file surveyor's plans field notes and descriptions of their mining locations in the Department before any sale is carried out. Under this Statutory Regulation a number of applicants have filed plans etc., of locations in the Districts of Algoma, Nipissing, Rainy River and Thunder Bay, and an area of 18,414 acres has been sold and patented for the sum of $36,829.00.

The particulars relating to these surveys and sale will be found in Appendices Nos. 20 and 21, pages 31 to 33 inclusive.

COLONIZATION ROADS.

The work performed during the year was as follows :—Miles of new road constructed—138 ; Miles of road repaired—404 ; Bridges erected—18—in addition a number of Bridges were repaired. The work done was inspected and reported to be of a satisfactory character.

The total expenditures for the year is $103,666.63 the details of which will be found in the report of the Superintendent of Roads in Appendix No. 39—pages 53 to 73.

Respectfully submitted,

A. S. HARDY,
Commissioner.

Department of Crown Lands,
Toronto, 31st December, 1889.

APPENDICES.

APPENDIX NO. 1.

Return of Officers and Clerks in the Department of Crown Lands, for the year 1889.

Branch.	Name	Designation.	When Appointed.	Salary per Annum.	Remarks.
				$ c.	
	Hon. T. B. Pardee	Commissioner	1873, December 4	4,000 00	Resigned 19th Jan., 1889.
	Hon. A. S. Hardy	Commissioner	1889, January 19	4,000 00	
	Aubrey White	Assistant Commissioner	1882, January 1	2,800 00	
	George Kennedy	Law Clerk	1872, February 1	2,000 00	
	F. Yeigh	Shorthand Writer and Clerk	1880, March 1	1,200 00	
Free Grants and Sales	A. Kirkwood	Chief Clerk	1854, March 21	1,900 00	
	J. J. Murphy	Clerk in charge of Free Grants	1872, May 1	1,300 00	
	Julian Sale	Clerk	1871, August 5	900 00	
	E. F. Stow	Clerk	1878, March 1	750 00	Resigned 30th May, 1889.
	John J. Kelly	Clerk	1888, March 19	700 00	
Surveys, Patents and Roads	G. B. Kirkpatrick	Chief Clerk	1866, January 30	1,900 00	
	W. Revell	Clerk	1871, October 2	1,200 00	
	W. F. Lewis	Clerk	1872, February 5	950 00	
	J. M. Grant	Chief Clerk, Patents	1860, May 12	1,400 00	
	Pedro Alma	Clerk	1871, August 1	1,200 00	
	Henry Smith	Superintendent of Colonization Roads	1881, January 1	1,900 00	
	C. Cashman	Clerk	1872, September 1	1,150 00	
	J. H. Bradshaw	Clerk	1884, June 1	800 00	
Woods and Forests	G. B. Cowper	Chief Clerks	1857, October 14	2,000 00	
	J. A. G. Crozier	Clerk	1867, December 1	1,350 00	
	Theo. C. Taylor	Clerk	1888, August 1	1,250 00	
	H. R. Hardy	Clerk	1883, November 1	1,000 00	
	H. E. Rudge	Clerk	1881, September 1	850 00	
	P. J. Durkin	Clerk	1888, October 1	700 00	

APPENDIX NO. 1.—*Continued.*

RETURN of Officers and Clerks in the Department of Crown Lands, for the year 1889.

BRANCH.	Name.	Designation.	When Appointed.	Salary per Annum.	Remarks.
				$ c.	
Accounts	D. G. Ross	Accountant	1861, April 15	1,700 00	
	R. H. Browne	Chief Clerk, Agents Returns	1862, May 14	1,400 00	
	C. P. Higgins	Clerk	1873, July 1	950 00	
	E. Leigh	Clerk	1873, December 20	850 00	
	J. Morphy	Registrar	1851, June 1	1,600 00	
	J. Bradshaw	Office Keeper	1852, March 27	500 00	
	A. Macdonald	Messenger	1862, May 19	550 00	
	R. Burroughes	Fireman	1868, June 1	550 00	Resigned June 30, 1889.
	D. Kinnan	Night Watchman	1873, September	500 00	

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 2.

List of Crown Land Agents for the Disposal of Free Grants, 1889.

Name.	District or County.	Date of Appointment.	Salary per Annum.	Remarks.
			$ c.	
Anderson, D	Part of Peterborough	1870, November 21	500 00	
Best, S. G	" Parry Sound District	1875, March 23	500 00	
Brown, C. P	" Algoma District	1872, June 25	500 00	
Cockburn, J. D	" Nipissing District	1884, May 21	500 00	Agent for sale of lands.
Day, J. F	" Algoma District	1875, July 19	500 00	
Dawson, G. W	" Frontenac and Addington	1882, February 17	500 00	
Dill, J. W	" District of Muskoka	1888, August 1	500 00	
Duncan, A. G	St. Joseph Island	1883, December 23	200 00	
Fielding, W	Part of Victoria	1882, February 23	500 00	
Gilligan, B. J	" Nipissing District	1884, March 26	500 00	
Handy, E	" Parry Sound District	1879, January 3	500 00	
Kennedy, J. D	" Renfrew	1885, October 30	500 00	
Mackay, T	" Parry Sound District	1881, December 5	500 00	
Macpherson, R	" Frontenac	1871, July 18	500 00	Agent for sale of lands.
Margach, W	" Thunder Bay District	1886, August 31	250 00	Resigned 16th May, 1889.
McDonald, D. G	" Algoma District	1888, December 3	500 00	Agent for sale of lands.
Nichols, W. L	" Algoma District	1885, August 27	500 00	
Reeves, J	" Nipissing District	1872, February 12	500 00	
Ruttan, J. F	" Thunder Bay District	1889, May 16	400 00	Agent for sale of lands.
Ryan, T. J	" Algoma District	1888, June 15	500 00	
Scarlett, J. S	" Parry Sound District	1880, June 17	500 00	
Stewart, C. R	" Hastings and Peterborough	1882, May 1	500 00	
Tait, J. R	" Hastings	1869, May 28	500 00	
Whelan, J	" Renfrew	1884, September 19	500 00	

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Assistant Commissioner.

Department of Crown Lands,
Toronto, 31st December, 1889.

APPENDIX NO. 3.

STATEMENT of Land Sold, Amount of Sales and Amount of Collections for the year 1889.

SERVICE.	Acres Sold.	Amount of Sales.	Amount of Collections.
		$ c.	$ c.
Crown Lands	53,640	71,765 63	66,888 54
Clergy Lands	1,279½	1,262 25	3,972 34
Common School Lands	2	80 00	14,418 29
Grammar School Lands	503	280 80	962 42
Railway Lands	2,874¼	5,748 50	5,748 50
Total	58,288¾	79,137 18	91,990 09

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX NO. 4.

STATEMENT of the Gross Revenue of the Department of Crown Lands for the year 1889.

SERVICE.	$ c.	$ c.
Land Collections:		
Railway Lands	5,748 50	
Crown Lands	66,888 54	
Clergy Lands	3,972 34	
Common School Lands	14,418 29	
Grammar School Lands	962 42	
Rent	200 00	
In Suspense	22,722 95	
		114,913 04
Woods and Forests:		
Timber Dues	947,883 41	
Ground Rent	64,656 55	
Bonus	66,058 16	
		1,078,598 12
Casual Fees	358 59	
Surveyors' Fees	176 50	
Fishing License Fees	305 10	
Hunting License Fees	140 00	
		980 19
Expenditure Refunds:		
Forest Fire Prevention	6,802 55	
Destitute Settlers	304 27	
Settlers' Homestead	100 00	
Inspection	57 10	
Colonization Roads	1,394 49	
Surveys	1,489 56	
		10,147 97
		1,204,639 32

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, December 31st, 1889.

APPENDIX NO. 5.

STATEMENT of the Receipts of the Department of Crown Lands which are considered as Special Funds, 1889.

SERVICE.	$ c.	$ c.
Clergy Lands:		
Principal	2,195 16	
Interest	1,777 18	
		3,972 34
Common School Lands:		
Principal	5,776 26	
Interest	8,642 03	
		14,418 29
Grammar School Lands:		
Principal	545 90	
Interest	416 52	
		962 42
		19,353 05

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1888.

APPENDIX No. 6.

STATEMENT of the Gross Disbursements of the Department of Crown Lands for the Year 1889.

SERVICE.	$ c.	$ c.	$ c.
AGENTS' SALARIES AND DISBURSEMENTS.			
Salaries—Land.			
Anderson, D.	500 00		
Best, S. G.	500 00		
Brown, C. P.	500 00		
Cockburn, J. D.	500 00		
Dawson, G. W.	500 00		
Dill, J. W.	500 00		
Day, J. F.	500 00		
Duncan, A. G.	200 00		
Fielding, W.	500 00		
Gilligan, B. J.	500 00		
Handy, E.	500 00		
Kennedy, J. D.	500 00		
Macdonald, D. G.	538 88		
Mackay, T.	500 00		
Macpherson, R.	500 00		
Nichols, W. L.	500 00		
Reeves, J.	500 00		
Ruttan, J. F.	250 00		
Ryan, T. J.	500 00		
Scarlett, J. S.	500 00		
Stewart, C. R.	500 00		
Tait, J. R.	500 00		
Whalen, J.	500 00		
		10,988 88	
Salaries—Timber.			
Barnes, Geo.	450 00		
Campbell, P. C.	1,600 00		
Margach, W.	1,600 00		
Macdonald, D. F.	1,600 00		
Macdonald, W. J.	875 00		
Darby, E. J., Clerk	425 00		
Mackay, Jno.	400 00		
Nicholson, B., Clerk	112 50		
Munro, H.	750 00		
McWilliams, J. B.	2,000 00		
Tassé, D.	100 00		
Way, J. F.	840 00		
		10,752 50	
Salaries—Fisheries.			
Flanagan, W.	50 00		
Moore, F. J.	50 00		
Willmott, J. H.	50 00		
		150 00	
Agents' Disbursements.			
Anderson, D.	19 58		
Best, S. G.	33 59		
Brown, C. P.	10 00		
Campbell, P. C.	496 50		
Cockburn, J. D.	24 22		
Dawson, G. W.	17 43		
Dill, J. W.	33 84		
Duncan, A. G.	9 17		
Fielding, W.	5 16		
Handy, E.	26 88		
Kennedy, J. D.	5 75		
Mackay, T.	19 15		
Mackay, John.	310 09		
Macpherson, R.	12 90		
Carried forward			

APPENDIX No. 6—*Continued.*

STATEMENT of the Gross Disbursements of the Department of Crown Lands for the Year 1889.

SERVICE.	$ c.	$ c.	$ c.
Brought forward			
Agents' Disbursements—Continued.			
Macdonald, D. F.	51 49		
Macdonald, W. J.	1,449 83		
Macdonald, D. G.	7 48		
McWilliams, J. B	285 74		
Moore, F. J	42 36		
Munro, Hugh	500 00		
Nichols, W. L.	19 65		
Poupore, J.	10 33		
Reeves, J	3 50		
Ryan, T. J.	18 90		
Scarlett, J. S.	27 49		
Stewart, C. R	13 79		
Tait, J. R.	10 70		
Whalen, J.	7 57		
Way, J. F.	80 50		
Willmott, J. H.	38 65		
		3,592 15	
Miscellaneous.			
Cameron, A. J., inspection	37 00		
Cowper, G. B., travelling expenses	31 60		
Carpenter, W. H., investigating disputed claims, Rainy River	264 50		
Crozier, J. A. G., travelling expenses	32 45		
Kirkpatrick, G. B., do	27 50		
Kirkpatrick, G. B., investigating disputed claims, Rat Portage	675 00		
Nickerson, W., inspection	12 00		
Martin, T. S., do	10 00		
Ryan, W. H., do	22 00		
Stewart, E., survey Whitefish Reserve	823 96		
Stewart, Hugh, investigating disputed claims, Rainy River.	733 75		
Stewart, E., inspection.	10 00		
Sheppard, J., do	10 00		
Taylor, T. C., do	176 00		
do removal expenses	35 20		
White, Aubrey, travelling expenses	136 75		
		3,037 71	
Wood Ranging and Inspection of Timber Lands.			28,521 24
Barnes, Geo	758 49		
Bick, Geo	1,158 21		
Brady, Jno.	805 00		
Brennan, P.	725 00		
Brooks, A.	520 00		
Christie, P. C	457 74		
Coville, Jno	144 00		
Crawford, A. C.	100 00		
Cunningham, J.	655 50		
Dulmage, A. F.	505 00		
Foote, W. E.	292 00		
Fraser, D	930 00		
Halliday, J.	787 00		
Halliday, F	1,293 25		
Johnson, S. M.	1,658 71		
Kennedy, Jno	1,070 82		
Ludgate, T.	1,249 55		
Margach, W.	3,282 44		
Moore, D. H.	1,143 82		
McGown, T	775 85		
McGown, W.	1,554 91		
Carried forward			

APPENDIX No. 6—*Continued.*

STATEMENT of the Gross Disbursements of the Department of Crown Lands for the Year 1889.

SERVICES.	$ c.	$ c.	$ c.
Brought forward			
Wood Ranging and Inspection of Timber Lands—Continued.			
McCogherty P.		1,018 50	
McSherry, P.		519 20	
Paget, Geo.		1,457 00	
Robinson, W.		106 00	
Regan, J.		971 41	
Russell, W.		1,718 86	
Saunders, J. B.		24 50	
Smith, J. W.		1,131 00	
Shaw, Jos.		1,485 15	
Stewart, H.		98 25	
Turgeon, J. B.		700 00	
White, J. B.		575 00	
			29,666 16
Fire Ranging.			
Assaut, T.		126 00	
Billingham, S.		113 00	
Bromley, T.		131 00	
Bowland, W.		234 00	
Bremner, W.		180 00	
Bell, J.		248 00	
Blanchet, O.		160 00	
Borron, E.		246 00	
Conway, J.		200 00	
Coghlan, J.		262 00	
Cochrane, J.		353 00	
Clarke, J. S.		149 25	
Duford, I.		385 87	
Donally, R. S.		336 00	
Donnelly, P.		431 50	
Evans, J.		238 00	
Elmhurst, W.		255 00	
Elliott, W		174 00	
Flanagan, W.		328 00	
Garvey, P.		457 12	
Gagne, F.		122 00	
Green, W. H.		86 00	
Galna, J		16 25	
Hawden, F.		262 00	
Haley, C.		262 00	
Harvey, A.		172 00	
Henderson, C.		196 00	
Johnson, R. W.		206 00	
Johnston, W.		131 00	
Johnson, E.		212 00	
Laselle, H		176 00	
Lavendière, F.		138 00	
Link, A		204 00	
Majeau, A.		174 00	
Mitchell, J. C.		172 00	
Maves, A.		104 00	
Maves, W.		362 00	
Morrison, W.		100 00	
Marshall, W.		171 00	
McGown, W.		36 00	
McNab, W. C.		268 00	
McFarlane, J.		186 00	
McFarland, W.		25 00	
McBrian, H		236 00	
Carried forward			

APPENDIX No. 6—*Continued.*

STATEMENT of the Gross Disbursements of the Department of Crown Lands for the Year 1889.

SERVICES.	$ c.	$ c.	$ c.
Brought forward ...	...	...	...
Fire Ranging—Continued.			
McQuey, D		473 37	
McDonald, A		406 49	
McKinnon, R		208 00	
McPhee, A		172 00	
McCallum, A		212 00	
McKay, A		196 00	
O'Neil, A. J		104 00	
Oram, J		262 00	
Oakes, M		210 00	
Penault, W. H		131 00	
Porter, J		130 00	
Prince, A		263 00	
Ritchie, A. W		68 00	
Reilly, M. M		214 00	
Robertson, J		184 00	
Robinson, W		206 00	
Streatfield, L		292 00	
Skuce, T		517 50	
Sage, N		94 00	
Sedgewick, J		164 00	
Shiels, J. A		243 50	
Scantlin, J		114 47	
Thompson, F. H		300 00	
Vannier, N		168 00	
Vankoughnet, J		40 00	
Welsh, J		262 00	
Woods, R		172 00	
Wilson, C		262 00	
Wilcox, G		120 00	
Wilcox, T		8 00	
Young, W		264 50	
			15,468 82
Refunds			13,018 15
Colonization Roads			105,047 52
Surveys			34,540 01
Board of Surveyors			364 00
Contingencies.			
Printing and binding		1,086 43	
Stationery		1,988 78	
Postage and Telegraphing		1,270 25	
Officekeeper		500 00	
Messenger		550 00	
Firemen		769 00	
Nightwatchman		500 00	
Subscriptions and advertising		2,252 27	
Sundries		776 06	
			9,692 79
			236,336 69

D. GEO. ROSS,
Accountant.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 7.

Woods and Forests.

Statement of Revenue collected during the year ending 31st of December, 1889.

——	$ c.	$ c.
Amount of Ottawa collections	336,397 24	
" " " at Quebec	43,714 49	
		380,111 73
Amount of Belleville District collections	158,306 11	
		158,306 11
Amount of Western Timber District collections at Department	486,165 25	
" " " " " at Quebec	54,015 03	
		540,180 28
Total		1,078,598 12

AUBREY WHITE,
Assistant Commissioner.

G. B. COWPER,
Chief Clerk in charge.

Department of Crown Lands,
Woods and Forests Branch,
Toronto, 31st December, 1889.

APPENDIX

WOODS AND

STATEMENT of Timber and Amounts accrued from Timber Dues, Ground

QUANTITIES AND

AGENCIES.	Area covered by Timber Licenses.	Saw Logs.				Square	
		White Pine.		Other.		White Pine.	
	Square Miles.	Pieces.	Feet.	Pieces.	Feet.	Pieces.	Feet.
Ottawa Timber District.....	6,547	1,982,878	237,664,827	15,445	1,426,606	33,868	1,754,382
Belleville Timber District.....	1,489¼	1,418,946	123,272,526	18,012	1,297,480	304	18,006
Western Timber District.....	9,190¼	3,400,484	364,790,280	11,344	944,027	52,059	2,887,367
Total	17,226½	6,802,308	725,727,633	44,801	3,668,113	86,231	4,659,755

GENERAL STATEMENT OF

AGENCIES.	Hemlock.		Cordwood.		Pile Timber.	Telegraph Poles.	Traverses.	Lineal Cedar.
	Pieces.	Feet.	Hard Cords.	Soft Cords.	Feet B. M.	No.	Pieces.	Feet.
Ottawa Timber District.....	12	8,326	740	583	.....	2,380	450	32,876
Belleville Timber District....	.....	.....	.....	.....	.....	.....	.....	53,742
Western Timber District.....	.....	.....	.....	1,739	37,360	.....	.....	17,441
Total	12	8,326	740	2,322	37,360	2,380	450	104,059

G. B. COWPER,
Chief Clerk in Charge.

DEPARTMENT OF CROWN LANDS, WOODS AND FORESTS BRANCH,
Toronto, 31st December, 1889.

No. 8.

FORESTS.

Rent and Bonus during the year ending 31st of December, 1889.

DESCRIPTION OF TIMBER.

Timber. Red Pine.		Boom and Dimension Timber.		Ash, Elm, Maple and Basswood.		Oak.		Tamarac.		Railway Ties.
Pieces.	Feet.	Pieces.	Feet.	Pieces.	Feet.	Pieces.	Feet.	Pieces	Feet.	Pieces.
9,860	356,787	63,855	10,880,424	B. 29 A. 174 E. 27	1,005 4,773 861	31	1,476	24	1,015	123,616
.....	.....	13,640	2,930,096	.....	.....	.....	.....	.....	.....	18,947
1,030	43,327	82,437	18,189,717	A. 77 E. 21 M. 3	2,351 927 127	.....	.....	1	36	436,638
10,890	400,114	159,932	32,000,237	A. 251 B. 29 E. 48 M. 3	7,124 1,005 1,788 127	31	1,476	25	1,051	579,201

TIMBER, Etc.—*Continued.*

Cedar Posts.	Bolts.	Spars.		Amounts Accrued.				
Cords.	Cords.	Pieces.	Feet.	Interest, Trespass, etc.	Timber Dues.	Ground Rent.	Bonus.	Total.
				$ c.	$ c.	$ c.	$ c.	$ c.
870	481	6	1,200	1,066 92	295,087 88	21,998 90	.....	318,153 70
674	107	.....	.....	108 84	128,212 43	4,870 00	.....	133,191 27
.....	3,253	.....	.....	11,056 34	478,742 76	32,561 60	66,058 16	588,418 86
1,544	3,841	6	1,200	12,232 10	902,043 07	59,430 50	66,058 16	1,039,763 83

AUBREY WHITE,
Assistant Commissioner.

APPENDIX No. 9.

RETURN of 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 1889.

TOWNSHIP.	DISTRICT OR COUNTY.	AGENT.	Number of persons located.	Number of acres located.	Number of purchasers.	Number of acres sold.	Number of lots the locations of which have been cancelled.	Number of patents issued.
Baxter	Muskoka	J. W. Dill, Bracebridge	13	1538	.....	.....	.....	.....
Brunel			4	668	.....	.....	1	3
Chaffey			9	1070	.....	.....	12	4
Draper			6	863	1	23	8	2
Franklin			12	1161	2	134	11	2
Macaulay			2	200	.....	.....	2	2
Medora			6	970	2	97	9	5
Monck			.....	.....	.....	.....	.....	.....
Morrison			8	840	1	25	3	1
Muskoka			.....	.....	1	100	.....	1
McLean			6	540	.....	.....	7	.....
Oakley			6	571	.....	.....	1	5
Ridout			.....	.....	.....	.....	.....	2
Ryde			9	1128	.....	.....	10	1
Sinclair			3	440	1	28	3	5
Sherborne			.....	.....	.....	.....	.....	.....
Stephenson			10	1121	.....	.....	7	3
Stisted			3	412	.....	.....	.....	.....
Watt			6	571	1	96	5	3
Wood			8	915	1	11	13	1
Cardwell	Parry Sound	Mrs. T. Mackay, Parry Sound.	13	2049	.....	.....	11	3
Carling			7	985	.....	.....	10	4
Christie			1	99	.....	.....	1	3
Ferguson			1	200	1	57	2	1
Foley			4	461	1	66	2	3
Hagerman			.....	.....	.....	.....	.....	3
Humphry			13	1746	.....	.....	15	7
Monteith			.....	.....	.....	.....	3	5
McConkey			1	100	.....	.....	.....	1
McDougall			3	447	.....	.....	3	1
McKenzie			1	98	.....	.....	2	5
McKellar			2	200	.....	.....	2	3
Shawanaga			1	109	.....	.....	.....	.....
Wilson			3	321	.....	.....	.....	.....

Chapman	Parry Sound	S. G. Best, Maganetawan	21	2497	1	26	4
Croft			9	1165		9	4
Ferrie			2	365			1
Gurd			6	1002	2	3	3
Lount			11	1713		12	2
Machar			20	3499	1	99	32	7
Mills			5	834			6	
Pringle			1	200				1
Ryerson			13	1902			11	10
Spence			11	1312			16	3
Strong			23	3425	4	314	18	19
Armour	Parry Sound	E. Handy, Emsdale	7	1045			11	10
Bethune			5	744	1	8	7	7
Joly			12	1597	1	2	12	1
McMurrich			5	600			4	7
Perry			4	548	1	100	6	7
Proudfoot			2	400			6	5
Hardy	Parry Sound	J. S. Scarlett, Powassan	1	200				
Himsworth			26	4557	2	253	30	7
Laurier			19	3012			11	
Nipissing			4	564	1	4	5	5
Patterson								
Anson	Haliburton	Wm. Fielding, Minden						1
Glamorgan			9	1177	2	88	5	4
Hindon			1	100				
Lutterworth			6	621			1	2
Minden			2	200				3
Stanhope			2	166				1
Snowdon			9	1157	2	111	7	5
Anstruther	Peterboro	D. Anderson, Apsley	5	577			7	2
Chandos	do		11	1713	2	29	7	11
Cardiff	Haliburton		4	515			2	2
Monmouth	do		10	1583			14	
Galway	Peterboro	C. R. Stewart, Haliburton	11	1129	2	137	3	9
Bangor	Hastings		17	1993			10	1
McClure	do							
Wicklow	do		1	100				
Carlow	Hastings	J. R. Tait, L'Amable	2	200			4	4
Cashel			1	150				5
Dungannon			8	1114			3	7
Faraday			33	4978	5	207	17	4
Herschel			14	1652			6	2
Limerick			8	1064			1	3
Mayo			4	619			6	2
Monteagle			12	1675			3	5
Wollaston			5	573			5	11

APPENDIX No. 9—*Continued.*

RETURN of the number of locatees and of acres located, etc.

TOWNSHIP.	DISTRICT OR COUNTY.	AGENT.	Number of persons located.	Number of acres located.	Number of purchasers.	Number of acres sold.	Number of lots the locations of which have been cancelled.	Number of patents issued.
Abinger	Addington	G. W. Dawson, Plevna	13	1993	3	11	4	2
Denbigh	do		34	4058	12	131	19	4
Canonto, South	Frontenac		1	100			2	2
do North	do							
Clarendon	do		25	3094			19	11
Miller	do		13	1835			5	2
Palmerston	do		3	393	1	1	2	4
Algona, North	Renfrew	Jas. Reeves, Eganville	2	112	2	51	1	
do South			6	800	2	200	3	9
Brougham			8	990	1	6	4	2
Grattan			5	732	4	46	1	11
Hagarty			15	1811			12	5
Richards								
Wilberforce			3	447			2	9
Brudenell	Renfrew	John Whelan, Brudenell	4	528			7	2
Griffith			2	150	1	97	1	3
Lyndoch			2	228	1	3		1
Matawatchan			9	956			3	2
Radcliffe			1	54				1
Raglan			21	2754			3	3
Sebastopol			3	287				1
Sherwood			4	587			1	1
Alice	Renfrew	J. D. Kennedy, Pembroke	7	707			4	3
Buchanan			2	292	2	153	3	2
Fraser								
Head								2
Maria			1	108	1	8		
McKay								
Petewawa			14	1829	2	2	13	2
Rolph			3	354	2	12		
Wylie			1	100	2	170	4	1
Cameron			1	85			1	

Bonfield	Nipissing	B. J. Gilligan, Mattawa	12	1498			5	4
Calvin			9	1076			6	1
Ferris			13	1484	2	105	3	3
Mattawan			1	99	1	1	1	
Papineau			9	1304	1	106	6	2
Aweres	Algoma	C. P. Brown, Sault Ste. Marie						
Korah			7	840			5	1
Parke			1	160			1	
Prince			6	833	1	34	5	1
Plummer	Algoma	J. F. Day, Bruce Mines	1	136			1	3
St. Joseph Island	Algoma	A. G. Duncan, Marksville	12	1155	1	100	9	10
Blake	Thunder Bay	J. F. Ruttan, Port Arthur	1	160			1	
Conmee								
Crooks								
Dawson Road								
Gillies			5	655			2	
Lybster								
Oliver			11	1761	3	478	10	10
O'Connor			14	2043			13	
Paipoonge			10	1402			8	
			858	114050	84	3708	657	386

JOSEPH J. MURPHY,
Clerk in Charge.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, December 31st, 1889

APPENDIX No 10.

FISHERY OVERSEERS,

UNDER THE ONTARIO FISHERIES ACT.

NAME.	DISTRICT.	POST OFFICE ADDRESS.	SALARY.
Newton Flanagan	River Nepigon, Lake Nepigon and adjacent waters	Nepigon	$50 00
John H. Willmott	District of Muskoka	Beaumaris	50 00
Francis James Moore	County of Victoria, County of Peterborough and Provisional County of Haliburton	Lakefield	50 00
Norman Clark	County of Lanark and all those parts of the Counties of Frontenac and Addington lying north of the southerly limits of the Townships of Bedford, Hinchinbrooke and Sheffield	Mississippi Station	50 00
John J. Little	District bounded on the west by the east limit of the Garden River Indian Reserve produced north from the north-east angle thereof, and on the east by the east limit of the Township of Long produced north	Day Mills	50 00
Samuel R. McKewen	Manitoulin Island	Tehkummah	50 00
Benjamin McDermott	District of Parry Sound	Sundridge	50 00
Robert R. Smith	County of Renfrew	Eganville	50 00

A. KIRKWOOD,
Chief Clerk in charge.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 11.

NEPIGON, Ont., 13th December, 1889.

SIR,—I have the honour to respectfully submit for your consideration my annual report as Fishery Overseer of the Lake and River Nepigon District.

Fishing for pleasure with fly and hook and line have been the only methods practiced here during the past season. No netting or other illegal means of procuring fish have been resorted to. In this connection I have no complaints to make, nor has any infringement of the fishery laws been brought to my notice.

The River Nepigon was throughout the season in very fair condition for fly fishing the water being low and remarkably clear. Any quantity of fish was in the stream, still complaints were made that the trout would not rise readily to the fly. Many fine catches, however, were made and large fish taken.

Not so many anglers visited the Nepigon the past season as during the previous year, owing in a great measure to the exorbitant charges made during 1888, by the Indians and half-breeds, who act as guides and boatmen. This great objection was, however, much mitigated during the past season by having men brought in from other localities.

The sum of three hundred and sixty-five dollars ($365) was received for special permits issued, all of which has been transmitted to your department along with statements, permit books, etc.

I have the honour to be, Sir,

Your very obedient servant,

(Signed) NEWTON FLANAGAN,

Fishery Overseer.

To the Honourable,

The COMMISSIONER OF CROWN LANDS,

Toronto.

APPENDIX No. 12.

BEAUMARIS, 23rd December, 1889.

SIR,—I have the honour to submit to you my annual report respecting the fisheries in the district over which I am overseer.

During the past season anglers have met with fair success, although there have been complaints of the scarcity of bass; this is accounted for by the fact that this variety of fish have certain feeding grounds and never leave such localities, consequently portions of the lakes are fished out, whereas in other portions, not frequented by anglers, the supply is as good as ever. Should Lakes Muskoka, Rosseau and Joseph be restocked, which is strongly urged by many persons, a judicious distribution of the "Fry" would be necessary.

The law relative to sawdust and mill rubbish is as a rule well observed, only two cases of violation having come under my notice during the past season, and the parties at my request immediately took steps to stop the nuisance.

Netting as a rule is not practiced, but I regret to say that parties encourage it, by buying fish which they know have been netted.

I would respectfully again call your attention to the close season for salmon trout, viz. :—1st to 30th November. The close season for this district should certainly be a month earlier for this variety of fish, as this fall they were at the height of spawning about the 8th October, and were over by the 20th of that month. The Indians place the spawning season for this fish at the full moon of October, and by personal observation for some years past, this has been the time at which they were at the height of spawning.

At the request of several parties on Trading Lake, I procured a quantity of whitefish spawn, and forwarded it to Baysville for distribution in the lake. Residents also on the shores of Mary Lake are anxious to have some deposited in that lake, for this purpose I intend procuring some next fall. As whitefish is one of the staple fish of Ontario, I think it advisable to distribute it as much as possible.

I have the honour to be, Sir,

Your obedient servant,

(Signed) JOHN H. WILLMOTT,

Fishery Overseer.

The Honourable,

The Commissioner of Crown Lands,

Toronto.

APPENDIX No. 13.

Lakefield, Ont., December 31st, 1889.

Sir,—I have the honour to submit for your consideration my annual report of the the fisheries in the district of which I am overseer, viz :—Counties of Peterboro', Victoria and Haliburton.

During the past season fishing has been exceedingly good. Trolling with spoon, and rod and line, are the only means used for taking fish. The law has been tolerably well observed. I have succeeded in putting down the use of snares to a great extent. I have prosecuted several parties for illegal fishing which will be found in my report of convictions, and have forwarded to your department $3.50 for fines. During the season I have collected for 37 permits issued to Americans $37, which has been duly forwarded to your department,

I beg to suggest that the following changes be made in the law as regards this district.

That the price of permits to foreigners be $5. The only way that I can collect for permits is to personally visit the parties. They seem to think that $1 for permission to fish means nothing, and unless made to understand that they will be prosecuted unless they obtain permits, will pay no attention to the law and use the argument that if your government meant them to pay for permits, it would make the charges something worth collecting.

That the close season for salmon be from 15th October to 30th of November, for the reason that these fish spawn between those dates in the waters of this district. During the summer and fall I visited officially the waters of this district. To properly look after the fisheries in this district would require all my time, during the close season,

and at midsummer, to collect for permits when foreigners are visiting these waters. I am creditably informed that Americans shipped large quantities of bass and maskilongé to the States during the summer and fall. I have done all possible to put down illegal fishing with as little expense as possible.

I have the honour to be, Sir,

Your obedient servant,

(Signed) F. J. MOORE,

Fishery Overseer.

To the Honourable,

The Commissioner of Crown Lands,

Toronto.

APPENDIX NO. 14.

Copy of an Order-in-Council, Approved by His Honour the Lieutenant-Governor, the 26th day of May, A. D. 1887.

Upon the recommendation of the Honourable the Commissioner of Crown Lands, the Committee of Council advise, that the accompanying regulations under the "Ontario Fisheries Act, 1885," be approved of and established by Your Honour.

Certified,

J. LONSDALE CAPRÉOL,

Assistant Clerk Executive Council,

Ontario.

The Honourable

The Commissioner of Crown Lands.

The Commissioner of Crown Lands has the honour to recommend to the Executive Council that the following regulations be made under "The Ontario Fisheries Act, 1885," namely :—

1. That leases granted for the purpose of conveying the fishing rights pertaining to public lands adjoining the rivers, streams and lakes of the Province, shall be for the depth of one chain inland from the water's edge.

2. Such leases shall be granted as far as practicable to responsible parties, able and willing to improve the lakes and rivers and guard them well. Applicants having in view the personal use and enjoyment of the fishing rights to be generally preferred to such as may offer higher rents with a view to farming or sub-letting the right to fish. Care to be taken that residents in the Province be allowed to enjoy a due proportion of the fishing rights.

3. That the valuation of the lands for rent shall be based on the character and condition of the rivers, streams and lakes which they adjoin, as made known to the Department of Crown lands by reports of official inspectors or private individuals, all such reports to be considered confidential, and not to be communicated to other parties without the express authorization of the Commissioner of Crown lands. Offers made by applicants for leases not to be communicated to other applicants.

4 That leases of lands made and granted under the provisions of "The Ontario Fisheries Act" shall not be held to convey the right to work any mine that may be found on such lands, or to cut any timber thereon.

5. That licenses and permits to fish shall be granted upon the payment in advance of such fees as the Commissioner of Crown Lands may from time to time determine, and shall be valid until the close of the angling season of the year in which it is granted.

6. That excessive or wasteful fishing, or killing of fish, shall involve the cancellation of the lease, license or permit covering the waters in which it has taken place.

7. That it be obligatory upon any person who has no domicile in the Province of Ontario, and who desires to fish in the rivers, streams or lakes under the control of the Province, to procure a permit or license to that effect from the Commissioner of Crown Lands before beginning to fish.

8. That no person shall, except under authority of a fishery lease, fishing license, or permit, fish for, catch or kill any fish in any inland lake, river or stream adjoining the ungranted lands of the Province.

9. That no person shall, without lawful authority, fish for, catch or kill, by any device or means, any fish during their spawning time, or disturb or destroy their spawn or spawning-beds.

10. That it shall not be lawful to fish for, catch, or kill, brook trout, salmon trout, white fish, bass, pike, pickerel, maskinongé, tulibee, grayling, herring, or perch, in any inland lake, river or stream under the control of the Province, by any device or means other than by hook and line or angling, except in waters leased or licensed for the express purpose of net fishing.

11. That it shall not be lawful to use any explosives, or chemical material, or compound, for the purpose of killing or catching fish.

12. That fishing by torch-light, or other artificial light, placed in or above the water, is prohibited.

13. That no person shall fish for, catch, kill, buy, sell, or have in possession, any fish at times when the taking or killing of fish is prohibited by lawful authority.

14. That parties holding leases under the provisions of "The Ontario Fisheries Act" shall not have any recourse against the Government of the Province for any hindrance to their use and enjoyment of the fishing rights pertaining to the lands leased, by the operation of any law enacted or that may be hereafter enacted by the Parliament of Canada, or by any action of the Government of Canada, or any person employed thereunder.

15. It shall not be lawful to use or set in any of the inland rivers, streams or water courses within the Province, any net, rack, trap, weir, or obstruction for the purpose of catching fish, or whereby the free passage of fish up and down the same may be obstructed or prevented.

16. The catching, killing, or molesting of fish when passing or attempting to pass through any fishway or fish-pass, or in surmounting any obstacle or leaps, the use of any invention to catch, kill, or molest fish in the mill-heads and water-courses appurtenant thereto, are hereby forbidden.

17. It shall not be lawful to put into any waters in any inland river, stream or lake in the Province where fish are taken, any offal, blood, putrid brine, putrid fish, or other deleterious substance; and all fish, offal, or filth of any description whatsoever accruing from the catching and curing of fish, shall be burned or buried twenty yards distant from the water's edge of said river, stream or lake.

Close Seasons.

It shall not be lawful to fish for, catch, kill, or have in possession:
Speckled Trout, between the 15th September and 1st May.
Pickerel (doré), between the 15th April and 15th May.
Bass and maskinongé, between the 15th April and 15th June.
White fish and salmon trout, between the 1st November and 30th November.

ARTHUR S. HARDY,
Commissioner of Crown Lands.

APPENDIX NO 15.

STATEMEMT of the number of letters received and mailed by the Department in 1887, 1888 and 1889.

YEARS.	Sales and Free Grants.	Accounts.	Surveys.	Woods and Forests.	Colonization Roads.	Transferred to other Departments.	Totals.	Names Indexed.	Enclosures.	Orders in Council.	Returned—not called for at address.	Mailed from the Department.
1887	7,427	1,112	2,031	3,059	2,535	9	16,173	2,100	31,000	17	21	21,250
1888	7,548	1,040	2,248	3,160	2,373	10	16,379	2,300	33,000	21	12	18,272
1889	6,757	926	2,600	3,621	2,353	8	16,257	2,30	33,000	20	27	20,135

JOHN MORPHY,
Registrar.

AUBREY WHITE,
Assistant Commissioner.

TORONTO, December 31st, 1889.

APPENDIX. No. 16.

STATEMENT of Municipal Surveys for which Instructions were issued during the year 1889.

No.	Name of Surveyor.	No.	Date of Instructions.	Description of Survey.	Date when Confirmed.
1	F. F. Passmore.....	558	27th April, 1889	To survey lots numbers 14 and 15 in the 4th Concession of the Township of Barton and to plant durable monuments at the north-west angle of lot number 14 and at the north-east angle of lot number 15 in said Concession.	
2	T. Harry Jones	559	21st June, 1889	To survey that part of the town line between the Townships of Windham and South Norwich opposite the 6th Concession of Windham, and to plant stone monuments at the angles of the 6th Concession marking the westerly limit of said township, and also at the corresponding corners of any concession lines in South Norwich abutting thereon, marking the easterly limit of said township.	
3	J. B. Lewis	560	22nd June, 1889..	To survey lots numbers 10 to 23 inclusive on the lines between the 14th and 15th Concessions and between the 16th and 17th Concessions of the Township of South Plantagenet, and to plant durable monuments at the angles of the lots on said concession lines as the same were originally planted.	
4	Coad & Robertson.....	561	3rd July, 1889.	To survey the base line across the 4th Concession of the Township of Zone and to plant durable monuments to define the same.	
5	Coad & Robertson	562	3rd July, 1889	To survey Canal Street, in the Village of Tilbury Centre, and to plant durable monuments, one at the south-west angle of lot number 1, corner of Queen and Canal Streets, Stewart's survey, another at the north-west angle of lot number 1, corner of Queen and Canal Streets, Carlen survey north, another at the north-east angle of an unnumbered lot in Stewart and Marshall survey at the east end of said Canal Street, and a fourth at the east end of said Canal Street on the north side of said street opposite said unnumbered lot	
6	Augustine McDonell	563	4th July, 1889	To survey the road allowance between lots numbers 18 and 19 in the 2nd Concession, west of the communication road, in the Township of Harwich, and to plant stone or other durable monuments at the front and rear angles of said lots.	

7	George Ross	564	7th October, 1889.....	To survey the road allowance between lots numbers 11 and 12 in the 2nd Concession of the Township of Pelham and to plant stone or other durable monuments at the north-west and south-west angles of said lot number 11, and at the north-east and south-east angles of said lot number 12.
8	W. E. Yarnold.....	565	7th October, 1889.....	To survey lots numbers 7 and 8 in the 8th Concession of the Township of Pickering and to plant cut stone or other durable monuments at the front and rear angles of said lots.
9	Arthur M. Bowman.....	566	8th October, 1889.....	To survey certain concessions, ranges and blocks in the Town of Lindsay and to plant stone monuments at the angles of certain streets in the said Town of Lindsay.
10	George Gibson.....	567	28th October, 1889.....	To survey the westerly boundary of the Town of Niagara, the same being the boundary between the municipalities of the Town and Township of Niagara, and to mark said line by permanent stone or iron monuments.
11	P. S. Gibson	568	19th November, 1889...	To survey a part of the original road allowance in the Township of Etobicoke, locally known as Stock's side road, said part extending from its intersection with the Lake-shore road near the mouth of the River Humber, westerly as far as the road allowance between the 3rd and 4th Ranges of the King's Mill Reserve in said township, and to define the same by stone or other durable monuments.
12	John Stewart	569	19th November, 1889...	To survey that part of the concession line between the 4th and 5th Concessions in the Rideau Front of the Township of Nepean opposite lots numbers 1 to 10 inclusive, and also part of the concession line between the 2nd and 3rd Concessions in the said Rideau Front opposite lots numbers 21 to 35 inclusive, and to plant stone or iron monuments in such positions as will show the true location of the allowance for road between the above concessions opposite above named lots.

GEORGE B. KIRKPATRICK, P.L.S.
Chief Clerk in Charge.

AUBREY WHITE,
Assistant Commissioner.

Department of Crown Lands,
Toronto, 31st December, 1889.

APPENDIX No. 17.

STATEMENT of Municipal Surveys confirmed during the year 1889.

No.	Name of Surveyor.	No.	Date of Instruction.	Description of Survey.	Date when confirmed.
1	F. F. Passmore	546	24th January, 1888	To survey the concession line or side road line along the southerly limit of lot number 1 in the 2nd concession, west of Yonge Street, in the township of York, and to mark it by permanent stone or iron boundaries	13th May, 1889.
2	H. B. Proudfoot	544	2nd June, 1887	To survey lots numbers 28 and 29 in the 3rd and 4th concessions of the township of East Wawanosh, and to plant durable monuments at the front and rear angles thereof	15th November, 1889.
3	C. J. Wheelock	550	25th April, 1888	To survey that part of the blind line between the 7th and 8th concessions of Arthur forming the westerly limit of lots numbers 15 and 16 in the said 7th concession and the rear line of lots numbers 16, 17 and 18 in the 8th concession, and to plant stone monuments along said blind line	23rd December, 1889.

GEORGE B. KIRKPATRICK, P.L.S.
Chief Clerk in Charge.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT of CROWN LANDS,
TORONTO, 31st December, 1889

APPENDIX No. 18.

STATEMENT of Crown Land Surveys in progress and amounts advanced up to date during the year 1889.

No.	Date of Instructions.	Name of Surveyor.	Description of Survey.	Amount Advanced.
				$ c.
1	31st May, 1887.	Joseph DeGurse	Township of Garson	Nil.
3	29th May, 1888	Isaac L. Bowman	" Hess	800 00
2	29th May, 1888	Joseph DeGurse	" Craig	1,000 00
4	31st May, 1889	J. W. Fitzgerald	" Niven	3,200 00
5	11th June, 1889	E. J. Rainboth	" Marquis	1,475 00
6	11th June, 1889	Jas. S. Laird	" Pacaud	1,500 00
7	11th June, 1889	H. DeQ. Sewell	" Scoble	1,200 00
8	18th June, 1889	H. DeQ. Sewell	Re-survey of part of the township of Paipoonge	500 00
9	8th August, 1889	B. J. Saunders	Township of Robillard	1,600 00
10		M. J. Butler	Re-survey of Kennebec	150 00
11		J. F. Whitson	Timber limits in Rainy River District	100 00
12		James Dickson	Inspection of Surveys, 1889	900 00
			The Copp Clark Company for township maps	500 00
				$12,925 00

GEORGE B. KIRKPATRICK, P.L.S.
Chief Clerk in Charge.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 19.

STATEMENT of Crown Land Surveys completed and closed during the year 1889.

No.	Date of Instructions.	Name of Surveyor.	Description of Survey.	Amount Paid.	No. of Acres.
				$ c.	
1	1st May, 1888	Russell & Co.	Survey in connection with trespass on Rainy Lake	216 25	
2	22nd May, 1888	Thomas Byrne	Township of Dickson	692 96	51,328
3	29th May, 1888	Alex. Baird	" Notman	612 17	23,021
4	29th May, 1888	D. L. Sanderson	" Chamberlain	207 69	22,969
5	29th May, 1888	J. M. Tiernan	" Dack	515 18	23,074
6	29th May, 1888	Jas. Dickson	Inspection of Surveys, 1888	426 16	
7	4th September, 1888	William Bell	Outlines of Timber Berths, Algoma District	719 77	
8	8th February, 1889	B. J. Saunders	Islands in Rideau Lake	783 82	
9	17th May, 1889	Alexander Niven	Outlines of Townships near head of Lake Temiscamingue (120 miles)	3,600 00	
10	11th June, 1889	J. K. McLean	Township of Savard	1,611 47	23,021
11	11th June, 1889	A. W. Campbell	" Bryce	1,610 84	23,012
12	11th June, 1889	Frank Purvis	" Henwood	1,621 41	23,163
13	11th June, 1889	H. B. Proudfoot	" Beauchamp	1,614 34	23,062
14	11th June, 1889	W. R. Burke	" Osborne	1,594 67	22,781
15	12th September, 1889	J. J. McKenna	" Hammell	1,616 65	23,095
16		James Dickson	Inspection of water privileges at Sault Ste. Marie	333 50	
17		James Dickson	As Commissioner in Kennebec	520 25	
18		David Beatty	Establishing corners of streets in the townplot of Carrington	150 00	
19		Elihu Stewart	Survey of claims at Rat Portage	1,626 38	
20		F. L. Foster	Drawing Maps	270 00	
21		Chas. Unwin	12th February, 1889, copy of plan of Toronto Marsh	20 00	
			10th June, 1889, Alfred Barlow, two tracings of Lake Temiscamingue region	15 00	
			29th October, 1889, Department of Interior, 492 Maps of Townships in Rainy River District	123 00	
			17th December, 1889, Jas. Foster, Optician, one Solar Compass	300 25	
			The Copp Clark Co., Maps of Province, Townships, etc	677 00	
			Map & School Supply Co., mounting Maps	130 25	
			J. L. Morris, Litho Maps of Pembroke	6 00	
				$21,615 01	258,526

GEORGE B. KIRKPATRICK, P.L.S.,
Chief Clerk in Charge.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 20.

STATEMENT of Mineral Lands which have been patented in Unsurveyed Territory in the District of Rainy River during the year 1889.

No.	No. of Description.	PATENTEE.	Designation of Mining Lands.	Acres.	Amount.	Date of Patent
					$	
	R. R. 19	Jacob H. Henesy	Mining Location, 246P, on Lake-of-the-Woods	97	194	2nd April, 1889.
	" 20	S. V. Halstead *et al*	" " 82V, south-east of Tache Station, on the C.P. Railway	80	160	2nd April, 1889.
	" 21	William J. Franks	" " X 90, on Lake-of-the-Woods	336	672	18th April, 1889.
	" 22	Alexander Rankin	" " 258P, on Lake-of-the-Woods	50	100	29th April, 1889.
	" 23	Harding Rideout	" " X 21, north of Hudson's Bay Block, Rat Portage	160	320	29th April, 1889.
	" 24	John T. Horne and John McKellar	" Locations, 21E, 22E, 23E, 24E, 25E, 26E, 27E, on Atic-Okan River	501	1,002	7th May, 1889.
	" 25	Richard R. Paulison	" " R210, on Ottertrack Lake; Hunter's Island.	61	122	25th May, 1889.
	" 26	James McCahill *et al*	" " 170P, 171P, 181P, 182P, 183P, on Rainy Lake.	1,222	2,444	7th June, 1889.
	" 28	William Young	" Location, 221P, Pine Portage Bay, Lake of the Woods.	48	97	11th October, 1889.
	" 29	Oswald Montgomery *et al*	" " 259P, N. E. of the Town of Rat Portage	47	94	16th November, 1889.
				2,602	$5,205	

GEORGE B. KIRKPATRICK, P.L.S.
Chief Clerk in Charge.

AUBREY WHITE,
Assistant Commissioner.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 21.

STATEMENT of Mineral Lands which have been patented in Unsurveyed Territory in the Districts of Thunder Bay, Algoma and Nipissing during the year 1889.

No.	No. of Description.	PATENTEE.	Designation of Mining Tract.	Acres.	Amount.	Date of Patent.
					$	
1	2341	Frederick T. Sibley	Mining Location, R 258, west of the Township of Strange	80	160	15th January, 1889.
2	2343	Greene Pack	" " 14T, east end of Arrow Lake	51	102	18th January, 1889.
3	2348	Alice Dickinson	" " 80E, in the unsurveyed portion of the Township of Dorion	80	160	5th February, 1889.
4	2352	J. B. Klock, R. A. Klock and E. B. Haycock	" Locations, 3, 4, 5, 6, on the Tamagamingue branch of the Montreal River	394	788	8th February, 1889.
5	2354	Richard R. Paulison	" " 32x, 33x, west of the Township of Strange	240	480	14th February, 1889.
6	2356	The Wahnapitae Mining Company	" Location, F 3, south side of Lake Wahnapitae	163	326	21st February, 1889.
7	2360	Maria McCutcheon, J. C. Vivian and A. G. Grover	" " 48E, south of the Township of Paipoonge	80	160	13th March. 1889.
8	2361	Charles R. Gehl	" " R 325, west of the Township of Strange	80	160	16th March, 1889.
9	2364	James Moiles	The Moiles Mill Location, east end of John Island, Islands and parts of Islands adjacent, Lake Huron	272	544	1st April. 1889.
10	2369	Herbert N. Nichols	Mining Locations, R 349 and R 350, north-west end of Whitefish Lake	254	508	12th April, 1889.
11	2372	Richard R. Paulison	" " 52x, 53x, 54x, 55x, 56x, 57x, on Sand River, west of the Township of Strange	782	1564	16th April, 1889.
12	2373	Richard R. Paulison	" " 36x, 45x, 46x, Little Gull Lake	496	992	16th April, 1889.
13	2374	Richard R. Paulison	" " 38x, 39x, 40x, 41x, 42x, 43x, 44x, west of the Township of Strange	1303	2606	16th April, 1889.
14	2375	Richard R. Paulison	" " 34x, 35x, 37x, west of the Township of Strange	746	1492	16th April, 1889.
15	2376	Richard R. Paulison	" " 47x, 48x, 49x, 50x, south-east of Little Gull Lake	493	986	16th April, 1889.
16	2377	Richard R. Paulison	" Location, 51x, north-west of Little Gull Lake	160	320	16th April, 1889.
17	2380	Richard R. Paulison	" " R 277, north shore of Arrow Lake	33	66	29th April, 1889.
18	2381	Richard R. Paulison	" " R 346, north-east of Sand Lake	80	160	27th April, 1889
19	2385	Albert F. Olmsted	" " 46E, south of the Township of Gillies	80	160	11th May. 1889.
20	2386	Thomas H. Hulbert	" " R 213, north-west of Whitefish Lake	80	160	27th May, 1889.
21	2387	Richard R. Paulison	" Locations, 58x, 59x, 60x, 61x, 62x, on North Lake, north-west of Arrow Lake	719	1438	25th May, 1889.
22	2388	Richard R. Paulison	" Location, 86x, north of Arrow Lake	160	320	27th May, 1889.
23	2389	Richard R. Paulison	" " R 326, north of Arrow Lake	80	160	27th May, 1889.
24	2390	Richard R. Paulison	" " 85x, north of Arrow Lake	80	160	27th May, 1889.
25	2391	Richard R. Paulison	" Locations, 78x, 80x, 81x, south-west of Caweacaw Lake, north of Arrow Lake	477	954	27th May, 1889.
26	2392	Richard R. Paulison	" " 75x, 76x, 77x, 79x, north of Arrow Lake	539	1078	27th May, 1889.

APPENDIX 21—*Continued.*

No.	No. of Description.	Patentee.	Designation of Mining Tract.	Acres.	Amount.	Date of Patent.
					$	
27	2393	Richard R. Paulison	Mining Locations, 82x, 83x, 84x, on Cawcacaw Lake, north of Arrow Lake	507	1014	27th May, 1889.
28	2394	Richard R. Paulison	" " 63x, 64x, 65x, 66x, 69x, north-west of Arrow Lake	561	1122	27th May, 1889.
29	2395	Richard R. Paulison	" " 67x, 68x, 70x, 71x, north-west of Arrow Lake.	477	954	27th May, 1889.
30	2396	Richard R. Paulison	" " 72x, 73x, 74x. south of Lake Addie, north of Arrow Lake	667	1334	27th May, 1889.
31	2400	Charles M. Parkhurst	" " R 320, R 321, north of Arrow Lake	160	320	7th June, 1889.
32	2402	Roderick R. Macfarlane	" Location, R 398, on east shore of Black Bay	305	610	15th June, 1889.
33	2405	Edward L. Toomey	" " R 392, south-east of Whitefish Lake	80	160	4th July, 1889.
34	2406	The Spanish River Lumber Company	" " 7P, 8P, on Aird Island, Lake Huron	395	790	26th June, 1889.
35	2415	Herbert N. Nichols	" " R 385, R 386, west of the Township of Strange	182	364	10th July, 1889.
36	2417	Marshall T. Getchell	" " R 278, east of and adjoining the Township of Gillies	80	160	10th July, 1889.
37	2441	Andrew G. Ross	" " R 347, west of the Township of Strange	62	124	20th September, 1889.
38	2442	Hugh Dunfield	" " 201E, south of the Township of Lybster	80	160	26th September, 1889.
39	2443	Isaac F. Toms	" " 9P, south of the Township of May	160	320	26th September, 1889.
40	2444	Jas. Symon, W. Montgomery and T. Hall	" " 98E, in the unsurveyed portion of Conmee	80	160	26th September, 1889.
41	2448	Andrew G. Ross	" " R 353, west of the Township of Strange	81	162	10th October, 1889.
42	2449	Isaac F. Toms	" " W 8, south of the Township of May	80	160	17th October, 1889.
43	2451	John Drouillard	" " 96x, 98x, north of Arrow Lake	719	1438	11th October, 1889.
44	2452	John Drouillard	" " 129x, north of Arrow Lake	160	320	11th October, 1889.
45	2453	John Drouillard	" " 130x, north of Arrow Lake	320	640	11th October, 1889.
46	2454	John Thomas Power	" " 87x, 88x, north-east of North Lake	220	440	12th October, 1889.
47	2455	John Thomas Power	" " 89x, 90x, north-west of Arrow Lake	500	1000	11th October, 1889.
48	2456	John Thomas Power	" " 91x, 92x, north of Arrow Lake	638	1276	12th October, 1889.
49	2457	John Thomas Power	" " 93x, 94x, north of Arrow Lake	545	1090	12th October, 1889.
50	2459	R. McConnell and John B. Hall	" " W 1, W 2, W 3, in Townships 49 and 57 Nipissing	364	728	21st October, 1889.
51	2460	William B. McArthur	" " R 351, west of the Township of Strange	85	170	21st October, 1889.
52	2461	Wallie D. Middaugh	" " R 300, on Arrow Lake	61	122	21st October, 1889.
53	2462	Edgar J. Jarvis	" " W 7, in Township 58, District of Nipissing	80	160	21st October, 1889.
54	2470	James Walsh	" " 10P, in the Township of McKinnon	161	322	14th November, 1889.
				15812	$31624	

GEORGE B. KIRKPATRICK, P.L.S., Chief Clerk in Charge.

AUBREY WHITE, Assistant Commissioner.

Department of Crown Lands,
Toronto, 31st December, 1889.

APPENDIX No. 22.

STATEMENT OF PATENTS ISSUED BY THE PATENTS BRANCH DURING THE YEAR 1889.

Crown Lands	272
School "	76
Mining "	139
Public " (late Clergy Reserve)	34
Free Grant Lands A. A.	105
" " under Act of 1880	234
Rainy River "	11
License of occupation	1
Total	872

AUBREY WHITE,
Assistant Commissioner.

JOHN M. GRANT,
Chief Clerk in Charge.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

APPENDIX No. 23.

STATEMENT OF THE NAMES OF CANDIDATES WHO HAVE PASSED THEIR EXAMINATIONS BEFORE THE BOARD OF EXAMINERS OF LAND SURVEYORS FOR ONTARIO DURING THE YEAR 1889.

PRELIMINARY CANDIDATES PASSED.

John Drummond Anderson.
Leander Meyer Bowman.
Thomas Alexander Harvey.
William Charles Perceval Heathcotte.
Walter Francis O'Hara.
George Alexander Sharpe.
John Watson.
Murdoch John McLennan.

FINAL CANDIDATES PASSED AND SWORN IN AS PROVINCIAL LAND SURVEYORS.

David Benjamin Brown
Alfred John Cameron.
Recard Watson De Morest.
Robert Thornton Johnson.
Edward Charles Steele.
John Absalom Wilde.
Frederick William Farncomb.
George Walter McFarlen, Graduate School of Practical Science.
John Harrison Moore, Graduate School of Practical Science.
Charles Hugh Wallace, B.A., B.E., T.C.D.

The Board of Examiners of Land Surveyors, for Ontario, meets at the office of the Commissioner of Crown Lands, on the first Monday in each of the months of April and November, in every year, unless such Monday be a holiday (in which case they shall meet on the day next thereafter, not being a holiday). Section 6, Chapter 152, Revised Statutes of Ontario of 1887.

PRELIMINARY EXAMINATION.

All persons, with the exception of Graduates of the Royal Military College at Kingston, and of the Ontario School of Practical Science, before they can be apprenticed to a Provincial Land Surveyor, must pass a satisfactory examination before the Board of Examiners in the following subjects: Penmanship, Orthography, Fractions, Decimals, Square Root, Logarithms, Algebra (including Equations to the first degree, Euclid (first four books), Plane Trigonometry, the Rules for Spherical Trigonometry, Mensuration of Superficies, the use of Ruling Pen and construction of Plain and Comparative Scales.

FINAL EXAMINATION.

Final Candidates, before obtaining a License to practice, undergo a strict and searching examination before the Board of Examiners in the following subjects, viz.: Geometry, including the first six books of Euclid (with the exception of the last thirteen propositions of the Fifth Book); Algebra, including Progressions, Plane and Spherical Trigonometry,

Mensuration of Superficies; Laying out and dividing up of Land; Descriptions by metes and bounds for Deeds and other Documents; the Use and Adjustment of Surveying and Levelling Instruments: the laying out of Curves; Practical Astronomy, including finding of time, latitude, longitude, Azimuth, Variation of the Compass, and drawing Meridian lines; the Acts relating to the Survey of Lands in Ontario, the general Mining Act, the Registry Act (so far as it refers to Plans), the Municipal Acts (so far as they relate to Roads, Surveys and Drainage), the Ditches and Water Courses Act; the Theory and Practice of Levelling; the Principles of Evidence; Drawing of Affidavits; Taking of Field Notes and Preparing Plans; the Rudiments of Geology and Mineralogy, and the Sufficiency of their Surveying Instruments.

AUBREY WHITE,
Assistant Commissioner.

GEORGE B. KIRKPATRICK, P.L.S.,
Chief Clerk in Charge.

Department of Crown Lands,
Toronto. December 31st, 1889.

SURVEYOR'S REPORTS.

(*Appendix No. 24.*)

DISTRICT OF NIPISSING,

Township of Dack.

Tilbury Centre, Ontario,
February 5th, 1889.

Sir.—I have the honour to submit the following report of the survey made by me of the township of Dack, in the district of Nipissing, in accordance with instructions received from your office bearing date the 31st day of May, 1888.

I started from Toronto on the 11th day of August, *via* the Northern and North-Western Railway, to North Bay, thence by the Canadian Pacific Railway to Mattawa; here I procured men and supplies and started up the Ottawa River and Lake Temiscamingue, by way of the Lake Temiscamingue Colonization Company's steamers and tramways, to Baie des Peres, and I procured a small steamer here to take us up to North Temiscamingue and also up the Blanche River about twenty five miles. We then proceeded up the river and its south branch in an eight-oared boat, to the east boundary of the township of Dack. I then retraced said boundary south, to Provincial Land Surveyor Niven's post, planted in front of the second concession, and commenced the actual survey of the township from this point.

I ran the concession lines and side lines as directed in the instructions; as the weather was very wet and cloudy at nights, I did not get an observation of Polaris until night of the 30th day of August.

There are about one-half of the township brulè, which is growing up with underbrush of poplar, tamarac, spruce, balsam, willow and birch, as shown on the timber plan. The principal timber in the green bush is tamarac, spruce, balsam, balm of gilead and birch, with a few white pine, varying in diameter from six inches to two feet.

There is about three-fourths of the township well adapted for agricultural purposes as the greater part of the soil is clay and clay loam of an excellent quality, with a small portion of sandy soil mixed with clay in the swamps and along the flats of a large creek, which enters the township about the centre of concession one, lot number twelve, and runs in a north-easterly direction across lots numbers twelve, eleven, ten, nine, eight and seven, and enters the south branch of the Blanche River in the fourth concession.

The south branch of Blanche River enters the township in lot number twelve in the fourth concession, and flows in an easterly direction crossing the east boundary of the township in the north part of the third concession. There are eleven falls on the river across the township, varying from five to thirty feet, which makes it very inconvenient for canoeing and packing in supplies. There is also a log jam in the river, four or five chains in length, on lot number five, concession number four. The average width of the river is about one and a half chains.

The township would be very easily drained as there are numerous small spring creeks running through it, and also quite a number of water courses which are dry at the present time; all of which have a natural incline toward the river.

There were no minerals of any commercial value met with in the township. The principal kind of rock is gneissoid, which abounds chiefly in the south-east and eastern portions of the township.

Accompanying this report are plans and field notes of the township, which I trust you will find satisfactory.

I have the honour to be, Sir,
Your obedient servant,

JOS. M. TIERNAN,
Provincial Land Surveyor.

The Honourable A. S. HARDY,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 25.*)

DISTRICT OF NIPISSING.

TOWNSHIP OF NOTMAN.

LEAMINGTON, ONTARIO,
December 29th, 1888.

SIR.—I have the honour to report that I have, in compliance with instructions dated the 29th day of May, 1888, made a survey of the township of Notman in the district of Nipissing. I proceeded from here by railway to the village of North Bay, situated on the Canadian Pacific Railway, and from thence by wagon along the colonization road northward to the north-east angle of the township of Merrick, from which point I walked the balance of the way along the north boundary of this township to the stake at its north-west angle, which was to be the starting point of my survey. Having there obtained an observation of Polaris, I proceeded and laid out the township of Notman, as directed in my instructions, running the lines for the front of the several concessions due west astronomically, and the side lines between the alternate lots due north astronomically.

The land throughout this township, although generally undulating and stony, may be termed level, as but very few large hills or high elevations were found, and road making will not be difficult.

The soil is of a light sandy nature, and where not interspersed too thickly with stones and rocks is adapted for agricultural purposes.

Rock crops out in only a few places and is generally found along the shores of the lakes in the township and is known as the granite or gneiss rock.

The timber throughout the township is balsam, spruce, tamarac, hemlock, cedar, birch, hard maple and pine. The latter is found scattered over nearly the entire township and is of a good merchantable quality, and can be readily floated during the spring freshets through the creeks and lakes to the railway.

No indications of minerals were found in the township, and the disturbance of the magnetic needle was but slight during the survey.

Indications of the existence of bear, moose deer and beaver were seen in the township, but no animals were seen during the survey.

No fish of large size inhabit the waters of the lakes and creeks throughout the township.

Accompanying you will find field notes and plans, etc., of this survey, which I trust you will find correct and meet with your approval.

I have the honour to be, Sir,
Your obedient servant,

ALEXANDER BAIRD,
Provincial Land Surveyor.

The Honourable T. B. PARDEE,
Commmissioner of Crown Lands,
Toronto.

(*Appendix No. 26.*)

DISTRICT OF NIPISSING.

Township of Robillard.

Brockville, Ontario,
January 2nd, 1890.

Sir.—I have the honor to submit the following report of the survey of the township of Robillard in the district of Nipissing, in accordance with instructions from your department, bearing date the 8th day of August, 1889.

I proceeded to Mattawa on 27th August, thence by Lake Temiscamingue Col. Co's steamers and railway to Gordon Creek, where I engaged the steamer "Dora" to take myself and party to the head of Lake Temiscamingue and up the Blanche River as far as navigation would permit at that late season of the year. We succeeded in getting up about twenty-five miles from the head of the lake with the steamer, when recourse was had to our six-oared boat and canoes. After some slight difficulty in the rapids of the south branch of the Blanche River we reached the foot of the "Big Portage," near the east boundary of the township of Dack, on the 2nd day of September. Our six-oared boat was left here. By noon on the 4th day of September we arrived with all our supplies at the east boundary of the township of Robillard and camped on the south side of the river Blanche (south branch).

The work of subdividing the township was commenced by running the different concession lines west from the east boundary, according to instructions. The lines in front of concessions three and five and those between lots four and five and eight and nine were made bases for their respective adjoining lines.

Owing to continued rainy and cloudy weather during the greater portion of the survey I was unable to check my work by astronomical observations as often as I desired, and in consequence, to obviate errors, I started nearly all the lines from the south and west boundaries as well as from the east.

The south branch of the Blanche River, in the form of a long, narrow lake, enters the township at the west boundary in concession number five, flows south-easterly across concessions numbers five, four and three, then back to concession number four, in which concession it leaves the township at the east boundary. It has a width varying from one and a half to thirty chains, and a depth of twenty-five to fifty feet. It has neither rapids or any perceptible current during its passage through the township, and is free from all obstructions Its waters are dark but clear, and, unlike the main Blanche River, are free from floating mud.

It abounds with fish, doré and pike being the most plentiful. The shores are densely wooded to the water's edge.

There are two other lakes in the township, both of which are of small area. They lie in concessions numbers one and two. Their waters flow to the Blanche River.

The whole township is well watered by numerous creeks, as will be seen by reference to the plan. The water from most of these flows directly to the Blanche River.

That portion of the township to the north of the river consists of level and undulating country, with good clay soil throughout. The level portions are generally swampy. There are no hills of greater elevation than fifty feet. That portion to the south of the river is more broken and rocky, especially in the south-westerly part of the township, with rocky hills along the south shore of the river one hundred and fifty to two hundred feet high.

The timber consists chiefly of spruce, balsam, tamarac, cedar, birch, poplar and pitch pine, with some merchantable white pine in the south portions and along the Blanche River.

There is also a large tract of brulè extending across the whole northern portion of the township.

Moose are very plentiful, as also are beaver and otter.

I consider at least seventy-five per cent. of the township, as far as soil is concerned, to be adapted to agricultural purposes.

No economic minerals were met with.

The average magnetic declination was 7° 20' west, although the needle was subject to fluctuations varying from 4° west to 11° west.

Accompanying this report will be found field notes, plans, accounts, etc.

I have the honour to be, Sir,
Your obedient servant,

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

B. J. SAUNDERS,
Provincial Land Surveyor.

(Appendix No. 27.)

DISTRICT OF NIPISSING.

Township of Osborne.

Ingersoll, Ontario,
November 13th, 1889.

Sir.—I have the honour to report that I have completed the sub-division survey of the township of Osborne, according to your instructions dated the 31st day of May, 1889.

I secured men and provisions, etc., at North Bay and proceeded to my township from North Bay *via* the North Bay and Temiscamingue road.

The greater part of the township is flat or very gently undulating, the only hills of any consequence being in the south-east corner. The soil is sandy and rather rocky but in some places is well adapted for agricultural purposes.

There are several small lakes in the south and east. The largest, about two and a half miles long, is called Jocko Lake, and is the source of the Jocko River or Creek. This creek flows in a north-easterly direction, and is about two chains wide as it leaves the lake but gradually becomes narrower and swifter until it crosses to the eastern boundary of the township; there it is not more than seventy or seventy-five links wide.

There are two other creeks of some importance, one flowing from the north-west corner and entering the Jocko River near the north end of the lake. The other flows south-easterly from a lake on the north boundary, about a mile and a half from the north-east angle, and entering the Jocko River near the east boundary of the township.

There is a belt of green timber all along the westerly side of the township, but the rest of the township, except the south-east corner, has been burned some years ago and is now covered with small poplar and cherry. The green woods are chiefly birch, balsam, tamarac and spruce, with a few scattered pines.

In the north-west corner is a very long tamarac and spruce swamp, but the timber is not large. The Government road to Lake Temiscamingue crosses the township in a northwesterly direction, entering near the south-east corner, and makes the township easily reached by settlers. There is one settler where the road crosses the Jocko River, but his clearance is quite small.

The mile posts planted on my south boundary correspond with those planted for the north boundary of the township of Stewart, so no jogs occur. The township of Hammell, to the west of me, was not surveyed when I finished my work, so I am unable to give the jogs that the posts planted for that township might make with the concession posts on my west boundary. I saw no valuable mineral.

The general magnetic variation is 7°, 22' west.

I have the honour to be, Sir,
Your obedient servant,

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

W. R. BURKE,
Provincial Land Surveyor.

(*Appendix No 28.*)

DISTRICT OF NIPISSING.

Township of Savard.

Elora, Ontario,
November 11th, 1889.

Sir.—I have the honour herewith to submit to you the following report on the township of Savard in the district of Nipissing, surveyed by me this season in conformity with your instructions.

Proceeding from Mattawa, where I procured supplies, by steamer and railway to the head of Lake Temiscamingue, I there procured a small steamer by which I was enabled (the water being high) to go about thirty miles up the Blanche River; or about three miles above the junction of the west branch with the main river. Thence, by canoes and portages, I reached a point on the north boundary of the township of Chamberlain, four miles east of the north-east corner of the township of Savard.

I found it tedious work getting supplies moved from this point and distributed through the township.

The concession lines I ran west from the posts planted by Provincial Land Surveyor Niven, and the side lines as instructed.

The township is almost entirely drained by Blanche Creek (a branch of Blanche River) and its tributaries. This creek enters in lot number five, concession number one, running due almost north to the line between concessions numbers two and three; thence in an easterly direction, crosses the east boundary, and enters the township of Chamberlain in the third concession. It is about forty links in width, with an average depth of about four feet and without any falls or rapids.

The greater portion of concessions numbers one, two and three are timbered with large balsam, spruce, tamarac, poplar, and balm of Gilead. Some of the two last are exceedingly large, running sixty feet without limbs. The spruce and tamarac are also of good size, being from eighteen inches to two feet in diameter.

The balance of the township now consists of brulè, grown up with poplar and birch on the high lands and tamarac and spruce on the low lands. A heavy growth of alder underbrush covers almost the entire surface.

Except concession number six and a portion of concession number five, this township is well adapted for agricultural purposes, the soil being clay or clay loam; in fact, I should say eighty-five per cent. would be good agricultural land.

Judging from crops at the head of Lake Temiscamingue this portion of the district of Nipissing should present a good field for settlers. At that place I saw wheat nearly five feet high ripening nicely. Potatoes also were a fine crop, in fact as good specimens were seen there as I have seen in any part of Ontario.

I have the honour to be, Sir,
Your obedient servant,

J. K. McLEAN,
Provincial Land Surveyor.

Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 29.*)

DISTRICT OF NIPISSING.

Township of Henwood.

Eganville, Ontario,
November 11th, 1889.

Sir.—In accordance with instructions, dated the 11th day of June, 1889, to sub-divide the township of Henwood, in the district of Nipissing, into farm lots of three hundred and twenty acres each, I beg to report having done the same in strict conformity with said instructions, and herewith hand in plans and field notes, trusting the same will meet with your approval.

My route to the work was *via* Lake Temiscamingue by steamer, up Wahbee Creek with canoes, to the line between concessions numbers one and two, township of Kerns; thence by portage westerly, along said concession line, six miles, to the east boundary of the township of Henwood.

Although the southern portion of the township of Henwood is somewhat stony and broken by rocky ridges, running in a northerly and southerly direction, I consider fully seventy five per cent. (75 per cent.) of the township good arable land and capable of sustaining a large population, the soil being mostly clay loam of excellent quality. Some of the pitch pine lands and a few of the swamps are sandy, but the area of the sand is small in comparison to the whole.

The timber is principally spruce, tamarac, white birch, whitewood and pine. The rocky ridges in the south are covered with a dense growth of scrubby pitch pine of no commercial value, while scattered white, red and pitch pine of good quality are to be found on the eastern, central and northern portions of the township.

Considering the good facilites for getting timber to market, the creeks being well adapted for driving saw-logs, the township of Henwood will eventually form the centre of a limit of considerable value.

The rock formation is that usually found in that district.

Game was abundant, especially bear, moose and cariboo.

Unlimited water of good quality can be found almost anywhere throughout the township.

All doubts as to climate of that portion of Ontario were dispelled by a visit to Mr. C. C. Farr's garden, Lake Temiscamingue, south shore, on my way down. The garden contained everything that a well ordered garden in a civilized country should. I found in it as good vegetables as ever I saw, except at fairs Mr. Farr told me he had no trouble in ripening melons, tomatoes, celery, in fact, everthing nsually grown in a garden in northern Ontario. He has a small orchard planted which also appears to be doing well.

The more one sees of the Lake Temiscamingue country the more its advantages become apparent, and I do not think it takes much of a prophet to predict a bright and prosperous future for it.

I have the honour to be, Sir,
Your obedient servant,

FRANK PURVIS,
Provincial Land Surveyor.

Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(Appendix No. 30.)

DISTRICT OF NIPISSING.

Township of Hammell.

Durlin, Ontario,
December 19th, 1889.

Sir.—I have the honour to submit the following report on the township of Hammell, surveyed by me in conformity with your instructions dated the 12th day of September, 1889.

I proceeded by rail to North Bay, thence by the Government road through the township of Widdifield, and so on to the south boundary of the township of Osborne by wagons. Thence west along this boundary, carrying my supplies five and one-half miles, to the south-east angle of the township of Hammell, the west boundary of the township of Osborne having been recently surveyed.

I commenced my survey at the south-east angle of the township, as directed by the instructions, brushing out and measuring along the northern boundary of the township of Notman as the front of my first concession, and making the lots forty chains in width, to the line between lots numbers four and five. Here an observation of Polaris was obtained on the night of the 29th September, and the line between these lots runs north astronomically to the north boundary of the township, making this a base line.

The survey was then carried on to completion, the concession lines being run east and west and the side lines north and south astronomically, and the lots laid out forty chains in width by eighty chains in depth.

The north boundary was run west astronomically from the post at the north-west angle of the township of Osborne, and the west boundary north astronomically from the post at the north-west angle of the township of Notman.

Observations were taken as the work progressed the details of which will be found in the field notes.

This township contains about fifty per cent. of farming land, the soil of which is a sandy loam. In some places it is comparatively free from stone and in others very stony, while the granite frequently comes to the surface. Although a number of quartz veins were seen no traces of minerals were observed.

The township is comparatively level, lying as it does on the water shed between the Sturgeon and Ottawa Rivers, the north-west portion of the township draining into the latter and the remainder of the township into the former. Spruce Lake is the head waters of the Tomoko River, a branch of the Sturgeon River.

The lakes in this township are nnmerous, as will be seen by the plan. They are fine sheets of water containing the usual kinds of fish, and the one on the south boundary (Ka-o-tis-nim-i-go-wang) containing salmon trout.

The timber is of mixed variety. There is considerable white pine around most of the lakes and scattered more or less over the township, the largest and best being through the south- east portion of the township.

The streams connecting the lakes are of fair size and fit for driving purposes.

There are blocks of maple and birch almost exclusively, and flats of spruce, tamarac and cedar. The usual fur-bearing animals are comparatively plentiful, and the township is overrun with moose deer, their trails being crossed in all directions.

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

I have the honour to be, Sir,
Your obedient servant,

J. J. McKENNA,
Provincial Land Surveyor.

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 31.*)

DISTRICT OF NIPISSING.

Township of Niven.

Peterboro', Ontario,
December 20th, 1889.

Sir.—I have the honour to submit herewith the field notes and plan of survey of the township of Niven, in the district of Nipissing, performed under your instructions dated the 31st day of May 1889.

As might be expected the township in its chief features is very similar to the townships already surveyed in this vicinity, viz.: more or less rocky, broken and undulating, with patches of soil and swampy land interspersed.

With the exception of some four thousand acres (4,000 acres) in the south-west corner, the township was some twenty years ago overrun by fire which spread through a large portion of this country.

A growth of white birch, poplar and other kinds of wood grew up in the burnt places, which, in turn, also became a prey to fire in the summer of 1888. So that now nothing remains of the former woods save the debris of dead and charred pine, fallen and standing, above the burnt growth of young wood.

During the past forty years, with, I understood, little intermission, lumbering operations have been carried on in the north part of the township, under various managements, but this season I hear will be the last.

All that part of the township lying north of concession line number eight and nine is very broken and rocky.

On the north-east shore of White Partridge Lake may be found about five hundred acres of sandy land scattered over a larger area. At the outlet of the lake about sixty acres have been used for cropping and pasturage by the owners of the limits.

There is a good dwelling house, at present occupied, and five or six outbuildings on the farm.

In past years hay, oats, and root crops have been grown for supplying the shanties. This year a very fine crop of potatoes was grown on a few acres, the remainder of the farm being used for pasturage of horses and cattle.

White Partridge Creek flows out here, first in a north-easterly direction, then a little west of north, into the Petawawa River, crossing the north boundary in lot number twenty-six. It has been used for the passage of logs, and it is still used for the carriage of those taken out south of the lake.

The south west corner of the township, referred to, is covered chiefly with a rather dense growth of white and red pine which has been but partially cut out. It will average about sixteen inches in diameter but is not to be considered of the best quality.

This timber will be driven by the Bonnechere River which takes its rise in the adjacent vicinity. The river after meandering easterly through the southern concessions flows out of the township finally, crossing the south boundary at the line between lots numbers eleven and twelve.

The stream varies in width from thirty links to one chain, and in depth from one to five feet, about two feet over the greater part in ordinary seasons. There are several short rapids and light falls on its way through the township but tolerably long stretches of even flow are not infrequent. It is being largely improved this season by the limit holders, Messrs. McLaughlin Bros.

That part of the township east of side line, between lots numbers twenty-five and twenty-six, and south of concession line numbers eight and nine, contains some very fair land, though somewhat stony in places. It is of a rolling character and at points broken

by rounded hills of sand, clay and gravel, upon which is springing up a thrifty growth of young pine, white and red, which if protected must in time grow into timber. There are also comparatively level tracts of the same class of soil, etc.

There is one settler, William McIntyre, who has a clearance of about ten acres on lot number eleven in concession number one, and it is said that a fine tract of country, covered mostly with hardwood, lies south-westerly from his place.

Owing to the burnt condition of the township game of every kind is scarce. As will be seen White Partridge Lake is the only important lake, and, although I have had no fish from it, it is said that white fish and salmon trout are taken.

In the various small lakes and streams scattered over the township speckled trout and small fish are found, but not to any extent.

About forty per centum of that part of the township south of concession line numbers eight and nine, or a little more than half of the township, may be considered as fairly fit for the growth of hay, oats and root crops, and of the remainder of the township the average would not exceed fifteen per centum of the area.

An old lumber road from Eganville enters the township on lot number eleven, concession number one, and continues on to Perley's farm on White Portage Lake, previously described, thence in a north-easterly direction to Lake Traverse and Bissett's Station on the Canadian Pacific Railway.

I have the honour to be, Sir,
Your obedient servant,

(Signed) J. W. FITZGERALD,
Provincial Land Surveyor.

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 32.*)

DISTRICT OF NIPISSING.

Township of Beauchamp.

Toronto, Ontario,
December 23rd, 1889.

Sir.—I have the honour to submit the following report of the survey of the township of Beauchamp, north of Lake Temiscamingue, in the district of Nipissing, under instructions from your department dated the 11th day of June, 1889.

The township of Beauchamp is situate on a plateau between the south branch of the White or Blanche River and the Kappa-qua-big-a-gin Creek, which flows into the south branch of the White River a mile or two from the north-east angle of the township. The south-east part of the township is considerably broken by the creek aforesaid and by the small streams running into it. The timber in this part being principally balsam, birch, spruce, tamarac and cedar, with a few pine on lots numbers one and two, concessions numbers two and three. The soil for the most part clay, and sandy and stony where pine occurs.

There is a small tract of burned country in the north-east portion where the soil is very rocky. The south-westerly portion of the township is occupied by a large pitch pine flat with very little underbrush, the soil being mostly white sand.

There are several blocks in the central portion almost devoid of water, the land lying high and dry between the two watersheds to the north-west and south-east. A few small ponds are met with but no lakes of any magnitude.

Along the west boundary, and extending from a mile to two miles to the east, is a strip of very good pine land. The surface of the country in some parts of this district being very hilly, the soil almost pure sand and very stony in places.

I send herewith the plans and field notes of the township, complete.

I have the honour to be, Sir,
Your obedient servant,

H. B. PROUDFOOT,
Provincial Land Surveyor.

The Honourable A. S. HARDY,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 33.*)

DISTRICT OF NIPISSING.

TOWNSHIP OF MARQUIS.

OTTAWA, ONTARIO,
November 27th, 1889

SIR.—I have the honour to submit the following report of the survey of the township of Marquis in the district of Nipissing, according to instructions from your department dated June 11th, 1889, also the plans, field notes, and account of the same which I transmit herewith.

I proceeded from here by Canadian Pacific Railway to Mattawa, thence by line of steamers to the head of Lake Temiscamingue, and thence by canoe up the Blanche River, to the eastern outline of the township of Marquis, from which outline I commenced the subdivision of the township; which is on the whole a very fair one, containing about forty-five per cent. of excellent farming land, of the remainder about one-half is of a poorer quality and the other half is unfit for cultivation.

The country is generally undulating, some parts hilly and rocky while other parts are comparatively level. A fine tract of land extends along the Blanche River and Crooked Creek, throughout concession five and across the western halves of concessions four and three.

The Blanche River, a stream with an average width of about a chain and one-half, with a good strong current, crosses the north-east corner of the township, emptying out of Round Lake, the southern portion of which is situated in this township. Crooked Creek winds a circuituous course through the township and has an average width of about seventy-five links, with a slow current, and empties into the Blanche River on lot number four in the fifth concession. There is a fine water-power on the latter stream, on lot one in the fifth concession; also two on Crooked Creek, one on lot five, concession five, and another on lot ten, concession three.

The only lakes in the township are Round Lake, in the north-east corner of the township, before referred to, and a small one on the southern outline, on lots numbers one and two.

The land is principally a clay soil, with a heavy growth of large poplar, spruce, tamarac, birch and balsam. A few scattered white pine and cedar are met with in the vicinity of the Blanche River, but not in sufficient quantity to be of any value except to settlers. The poplar is the largest I have ever seen.

A brulè extends across the southern part of the township north-westerly, and a small patch on the north-west corner, as shown on the plans. These brulès are grown up with small pitch pines principally.

The geological formation is chiefly Huronian, but the gneissoid rocks are visible in many places. Some quartz veins were met with, but I found no traces of minerals.

Large game such as moose and bear were apparently very plentiful, but there was a general absence of small game, excepting partridge which were very numerous.

The weather was so very wet and unfavourable that I did not obtain as many astronomical observations as I desired.

All of which is respectfully submitted.

I have the honour to be, Sir,
Your obedient servant,

E. J. RAINBOTH,
Provincial Land Surveyor.

The Honourable A. S. Hardy.
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 34.*)

DISTRICT OF NIPISSING.

Township of Bryce.

St. Thomas, Ontario.
October 29th, 1889

Sir,—I have the honour to report that in obedience to your instructions, dated June 11th, 1889. I have made a survey of the township of Bryce, in the district of Nipissing, into farm lots of three hundred and twenty acres each, and beg leave to submit the following report together with the plan and field notes of the same.

I left this city on the 2nd day of August, and proceeded to the work by way of North Bay to Mattawa by rail, thence by boat up the Ottawa River and through Lake Temiscamingue to its head. Having learned that there was no navigable stream leading from this point to the southern part of the township, I concluded to follow the Blanche River which I did by canoes to its forks. I then followed the south branch of said river westerly encountering great difficulties in navigating it on account of numerous long rapids and falls to about two miles west of the east limit of the township of Robillard, here I made a portage of about one mile south and entered a lake leading south to nearly the north limit of the township of Bryce, about one and one-half miles west from the east boundary, here I stored part of my provisions and proceeded to the south-east angle of the township, being the point where you directed me to commence my survey. This I reached on the morning of the 14th day of August.

From this point I measured north along the east boundary of the township. Seventy-nine chains and sixty-two links to the post in your instructions described, planted to mark the front of the second concession. At this point I took an observation of the sun for latitude, azimuth, etc., the calculation for which you will find accompanying the field notes, and on that evening I observed Polaris at its greatest western elongation, and ran the front of the second concession west, astronomically as directed by you.

All the concession lines in the township I ran west astronomically, making the lots forty chains wide by eighty chains long, excepting those in the first concession which on account of the east end of said concession being only seventy-nine chains and sixty-two links, and the west end eighty chains, the lots are proportionally less than eighty chains in depth.

The south parts of lots numbers 7, 8, 9, 10, 11 and 12, in the first concession ; the northerly part of lots numbers 3, 4, 5, 6, 7, 8 and 9, in the fourth concession ; lots numbers 1, 2, 3, 4, 5, 6, and the south part of lots number 7, 8 and 9, in the fifth concession ; and lots numbers 1, 2, 3, 4 and 5, in the sixth concession are a good clay loam of average depth and fertility.

Some scattered surface stones were met with but not in such quantities as to interfere materially with the process of cultivation.

Lots numbers 1 to 6 inclusive, in the first concession, and the southerly part of lots numbers 1 to 6 inclusive, in the second concession are a level sandy loam, very shallow, underlaid by rock.

The remainder of the township is rocky. About thirty per cent. of the area of the township is fit for cultivation, while a considerable percentage of the remainder would answer for grazing purposes.

The whole of the township has been at different times burnt over and is now covered with scrub pine, poplar, birch, balsam and tamarac, with a few small cedar swamps. Lots numbers 9 to 12 both inclusive, in the second and third concessions have been burnt within the last few years.

There is some white pine standing throughout the township but not of much commercial value.

The surface is generally undulating, the rocky parts being very broken.

A spring creek averaging about thirty links in width runs diagonally, flowing northerly from lot number 10 in the second concession and crosses the north boundary at lot number four. This creek has several tributaries.

There are six small lakes in the township varying in area from about seven to fifty-three acres, in this way the township is fairly well watered.

I found no settlers in the township.

The variation of the needle was from 7° 30' to 8° 30' west.

Game is plentiful and the lakes abound with fish of various kinds.

The geological formation is granite, but no indications of economic minerals were met with.

All of which is respectfully submitted.

I have the honour to be, Sir,
Your obedient servant,

(Signed) A. W. CAMPBELL,
Provincial Land Surveyor.

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 35.*)

DISTRICT OF NIPISSING.

Township of Pacaud.

Essex Centre, Ontario.
December 2nd, 1889.

Sir,—Agreeable to your instructions, bearing date the 11th day of June, 1889, I have completed the sub-division survey of the township of Pacaud, in the district of Nipissing, and have the honour to report thereon.

Leaving Essex on the 2nd day of August, we proceeded by rail *via* the Canadian Pacific Railway to Mattawa, thence by steamer up the Ottawa River to the head of Lake Temiscamingue, where taking to canoes we proceeded up the Blanche River to the township.

From an observation of the Pole star we established a Meridian at the south-west angle of lot number two in the first concession. From here we proceeded with the survey, running such lines and planting such posts as directed in the instructions The work was verified by repeated observations as we proceeded.

The township is finely watered by the Blanche River and its numerous tributaries. The river enters the township from the west, in the fifth concession, and flows south-easterly crossing the south boundary in lot number two.

The greater portion of the township is admirably adapted for agricultural purposes. The south-west part embracing seventy-five per cent. of the township is comparatively level and is well adapted for cultivation.

The soil is chiefly clay. The north-east part is more broken and rocky. The grand facilties offered must lead to its early settlement. But so far no settlers have invaded the township.

The country has been burned over, I should judge about twenty years ago and all the valuable timber has been destroyed. The undergrowth is of balsams, spruce, pitch pine, tamarac, birch and poplar, and is very dense rendering the work of opening the lines one of great difficulty.

No minerals of any commercial importance were encountered. The general character of the rock is gneiss.

The rivers and streams contain many fish of different varieties.

The variation of the magnetic needle is very regular, being 8° 15′ west.

Herewith are plans, field notes, etc.

Respectfully submitting the above,

I have the honor to be, Sir,
Your obedient servant,

JAMES L. LAIRD,
Provincial Land Surveyor.

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 36*).

DISTRICT OF NIPISSING.

Outlines of Townships.

Haliburton, Ontario,
December 10th, 1889.

Sir, – I have the honour to submit the following report on the survey of outlines of townships at the head of Lake Temiscamingue in the district of Nipissing, surveyed under your instructions of date the 17th day of May, 1889.

I proceeded to the townships shortly after the date of the instructions and went in by the south branch of Blanche River, commenced the survey at the south-east angle of township number twenty-five, and completed the same at the south-east angle of township number twenty-four, returning to Temiscamingue Lake by the main Blanche.

The boundaries were run east and west and north and south astronomically in the following order:

South boundary of township number twenty-five.
Boundary between townships numbers twenty-five and twenty-eight.
Boundary between townships numbers twenty-five and twenty-six.
Boundary between townships numbers twenty-six and twenty-nine.
Boundary between townships numbers twenty-eight and twenty-nine.
West boundary of township number twenty-eight.
South boundary of township number twenty-eight.
West boundary of township number twenty-nine.
Boundary between townships numbers thirty and thirty-one.
Boundary between townships numbers twenty-nine and thirty.

Boundary between townships numbers twenty-seven and thirty.
Boundary between townships numbers twenty-six and twenty-seven.
Boundary between townships numbers twenty-four and twenty-seven.
North boundary of township number twenty-seven.
North boundary of township number thirty.
North boundary of township number thirty-one.
West boundary of township number thirty-one.
South boundary of township number thirty-one.
North boundary of township number twenty-four.
East boundary of township number twenty-four.

The details of the survey will be found in the field notes and on the plan.

As will be seen by the plan, the greater part of the townships outlined has been burnt—most of it about twenty years ago, and in places more recently. The whole area is now growing up with poplar, birch, cherry, pitch pine, etc.

The townships outlined probably contain about sixty-five per cent. of good land. The most clay land is to be found in townships numbers twenty-five and twenty-eight. The soil of the other townships is generally a sandy loam but will be easily worked and if properly farmed grow good crops.

A few white pines are to be found along the northern boundaries of townships numbers twenty-four and twenty-seven and in places north of these townships, whilst to the south-west of township number thirty-one there is a large block of heavily timbered land, a fair proportion of which is white pine.

There is considerable poplar of large growth along the Blanche River, in township number twenty-four.

The townships are very well watered by small lakes and streams.

The largest lake met with in the survey is on north boundary of township number twenty-seven forming with the Blanche River, a long stretch of navigable water.

The lakes abound with fish, Partridge, moose and beaver are quite common. The beaver has hitherto held undisputed sway in the small lakes and streams, of this, so to speak far away country, and although even yet he occasionally asserts his authority by flooding portions of the country, his days are numbered, a few years more and the trapper will have all but exterminated this valuable fur bearing animal.

The geological formations met with are the Huronian and the Laurentian. I saw no trace of minerals.

The Blanche River and its south branch are still good sized streams, where last crossed on the northern boundary of the survey.

I am inclined to think that with the exception of a couple of townships to the west of number seventeen, the good land in the valley of the Blanche has been nearly all outlined. There can be seen however from the northern boundary of township number thirty-one, a level reach of country extending to the north and north-west, a distance of twenty miles or more, which probably contains about the same percentage of good land as that outlined during the present year.

I have included in the present survey all that is worth outlining to the south and west.

The facilities for settlement of this large block of farming land are the same as in 1886, and no settlement is likely to take place until a railway is put through to the head of Lake Temiscamingue.

Accompanying this report are plan and field notes of survey, with account.

I have the honour to be, Sir,
Your obedient servant,

(Signed) A. NIVEN,
Provincial Land Surveyor.

The Honorable A. S. HARDY,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 37.*)

DISTRICT OF ALGOMA.

Township of Craig.

Windsor, Ontario,
October 25th, 1889.

Sir,—I have the honour to report that in compliance with instructions received from your Department, dated the 29th day of May, 1889, I have made a survey of the township of Craig, in the district of Algoma.

Access was gained to said township by rail to Pogamasing station, on the Canadian Pacific Railway, thence by canoes down the Spanish river to the south-east angle of said township.

I commenced by chaining (with a Chesterman Steel band) the west boundary of the township of Moncrieff, planting posts at regular intervals of eighty chains ; then ran my concession lines due west, planting posts as per instructions.

This township is well watered by the Spanish river and numerous small lakes, but it is extremely hilly and rocky.

The soil consists of a coarse sand poorly adapted for growing grass or grain of any kind.

There is a small area of green timber in the sonth concession west of Spanish river, on lots numbers four, five, six, seven and eight, timbered with balsam, spruce, birch, and a few excellent white pine.

There is also some good pine adjoining Spanish river, to the west for about one mile, but fire has recently run through this portion, and it is now being lumbered.

The remaining portion of the township has no timber of any value, fire having run over the whole of it, and over portions of it very recently, leaving no timber of any description. Along the west boundary there is a thick growth of small birch poplar, etc.

The rock is generally granite or gneiss with small veins of quartz.

Outside of patented mining locations E and F, I found no minerals of commercial value The magnetic variation was quite uncertain, the variation shewn on plan being a mean

The survey of river and lakes, were made with a micrometer and compass.

Accompanying this report, you will find field notes, plans, etc.

All of which is respectfully submitted.

I have the honour to be, Sir,
Your obedient servant,

JOSEPH DeGURSE,
Provincial Land Surveyor,

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 38*).

DISTRICT OF THUNDER BAY.

Township of Scoble.

Port Arthur, Ontario,
December 21st, 1889.

Sir,—I have the honour to report that in accordance with your instructions, I commenced the survey of Scoble in the district of Thunder Bay, on the 3rd day of October 1889, taking two simultaneous observations of Polaris, one at the south-east angle of the township of Gillies, and the other a mile further north on the eastern boundary of that

township. I then ran the southern boundary of the township of Scoble, and also the line between the first and second concessions, until I struck the western boundary of the township of Blake, posting the lots on my return, leaving the overplus in lot number twelve. I then ran the side line between lots numbers six and seven, until I struck Oliver Lake, starting the third and fourth concessions east and west from it. This I was obliged to do, as the western boundary of the township of Blake was found to be somewhat irregular and almost obliterated by fire. From the line between concessions numbers two and three I ran the side line between lots numbers ten and eleven, two miles north, starting the fourth and fifth concession east and west from it. The fifth concession line was sighted over mining location R 261, and continued east to the township of Blake. The sixth concession line was started from the side line between lots numbers eight and nine, which was produced north from the line between concessions number four and five to mining location R 221. Observations were taken on each concession line with the exception of the line between concessions numbers five and six where the distance run is comparatively short. Great care has been taken in collecting as much information as could be got of the dimensions of the mining locations contained within the township so as to make the plot as accurate as possible. The lakes were all carefully traversed by triangulation and all the bearings given in the field notes are astronomical. The magnetic variation of the compass was found to be somewhat irregular in the lower parts of the township, but it is more reliable in the northern part of the township. The township is to a very large extent burnt over, there are, however, a few small clumps of pine, mostly Norway, which owing to the close proximity of the mines, and the new railway, will be of value. There are also some clumps of spruce, tamarack, and cedar, which will be useful for tie and pile timber, which is becoming very scarce. The northern part of the township is mostly covered with a thick growth of poplar and birch and some spruce, which is very suitable for cord-wood for the mines or for the manufacture of paper.

The soil is uniformily good and rich, being well suited for agricultural purposes. It is well sheltered from the cold winds that blow from Lake Superior by a high range of hills on the south, which extends from Mount McKay at Fort William westward. Concessions numbers one to four inclusive, appear to be equally as desirable for farming purposes as south Paipoonge and having been well burnt over will require but little clearing and in some cases none at all. As the means of access to this township were somewhat difficult, I had a waggon road cut out from the township of Paipoonge to Pictured Lake, over which I had my supplies hauled. The geological formation, specimens of which accompany this report, is composed of the black silver bearing slates mostly, heavily covered with trap, which renders prospecting for silver somewhat difficult, but such veins as may be found in this township, and particularly in concessions numbers five and six, are likely to amply repay the trouble in searching for them.

I have the honour to be, Sir,
Yeur obedient servant,

HENRY De Q. SEWELL,
Provincial Land Surveyor

The Honourable A. S. Hardy,
Commissioner of Crown Lands,
Toronto.

(*Appendix No. 39.*)

REPORT

OF

THE SUPERINTENDENT

OF

COLONIZATION ROADS.

To the Honourable A. S. Hardy,
Commissioner of Crown Lands,
Ontario.

Sir,—I have the honour to lay before you the annual report of work done under the management of the Colonization Roads' branch of the Crown Lands Department for the year 1889.

There have been one hundred and thirty-eight miles of road constructed and four hundred and four miles repaired. Eighteen bridges were erected and seventeen repaired.

The works are the following:—

NORTH DIVISION.

Batchewaning Road.

About three miles of the worst portions in the Goulais Bay settlement were repaired and made fairly passable.

Cockburn Island Roads.

Repairs made over three and a half miles, being through concessions eight to twelve, and generally between lots 11 and 12, and lots 15 and 16.

Coffin Additional Road.

The road was constructed northward two miles between lots 2 and 3, and through concessions 3 and 4, and with an unexpended balance from this and the Coffin 3rd Con. Road, the bridge at the west end of Ottertail Lake, which was in a dangerous state, was reconstructed at a cost of about one hundred and forty dollars.

Coffin 3rd Con. Road.

A little over one mile built, costing approximately $300, and includes a bridge erected over McLeod's creek on lot number ten. About $100 was spent between lots 10 and 11 from the main road northward to let a number of settlers out, which they could not manage for want of bridges, and the opening of a swamp three-quarters of a mile in length.

Coyne's Road.

Continued from last year's operations north to the fourth and fifth concession line of Galbraith, and thence eastward across lots four and five. The country was so rough and broken that only a mile and a quarter could be built for the grant, but the settlement which the road is designed to serve has been now reached.

Dayton Station Road.

A road from Dayton Station on the Algoma Branch of the Canadian Pacific Railway, and constructed from about the centre of lot 3, concession 4, of Bright additional north half a mile, and thence north-westerly to the corners of lots 3 and 4, concession 5—a mile and a half of new road. Repairs of a mile were made upon the existing road northward to Day township boundary which meets the Thessalon and Bright road, thus giving a fair highway to the railway.

Dean's Lake Station Road.

This road was built from the railway, between sections 20 and 21 of the township of Thompson, northward between these and sections 16 and 17, as also of 8 and 9 to the Mississaga River. and thence north westward along the margin of said river, intersecting with the Thessalon and Bright Road at Bateman's, or Thompson P. O.

Of the length built—two and a half miles—the first mile and a half is very thoroughly made, the balance being only fairly passable.

Galbraith Road.

A mile and a half of new road built from the Coffin Road, north between lots 2 and 3 of Coffin, nearly half a mile, and thence east about one mile to Thessalon River, and boundary of Galbraith.

A new bridge, ninety feet long, was also built over the river, having a span of seventy feet.

Goulais River Bridge.

Eighty-five dollars spent in removing a jam which endangered the structure.

Manitoulin Island Roads.

The expenditure on the island was distributed over ten roads in repairing or construction, the result being seven and a half miles of repairs, and twelve and a quarter miles of new work. The roads were Bidwell Branch Road, upon which the sum of about $220 was expended in ditching a mile and a quarter in the township of Bidwell; the Campbell and Carnarvon Road, or construction of a mile and a quarter on the town line, between the townships indicated, through concessions 7 and 8, involving heavy ditching and crosswaying through a bad swamp, and costing altogether a little less than $500.

The Clover Valley Road was ditched and graded half a mile, opposite lots 31 and 32, of the sixth concession of the township of Assignack, for about $130.

Lake Wolseley Road, the main and only Government road through the townships of Mills, Burpee, Robinson and Dawson, was extended eight miles and a half, beginning at lot 44, between the eleventh and twelfth concessions of Robinson; thence angling through lot 45, and lots one to seven inclusive, of the seventh concession of Dawson,

passing to the south of Hog Lake. and again to the road allowance between concessions 7 and 8; thence westward on the last named road allowance to lot 16; thence north twenty chains; thence west through lots 16 to 20 inclusive, in concession 8; thence north-westerly through concessions 9, 10, 11, and to the west side of Meldrum Bay, between the eleventh and twelfth concessions. The cost of this, with half a mile of repairs of the same road in the township of Burpee, was about $980.

On the Manitowaning and Michael's Bay Road two sections were repaired, one being from Manitowaning Town Plot southward a mile and a half, and the second portion half a mile near the townline between Assignack and Tehkummah, known as Terry's Hill, the outlay being $490.

Manitowaning and Green Bay Road was repaired and graded over a mile and three-quarters of its length at a cost of some $220.

A road called North of Scotland Road was produced half a mile between concessions 14 and 15 of Allan township, across lots 26 and 27 for $115 or thereabout, and on the Sandford and Carnarvon Road a little over $100 was spent in cutting down a very steep hill, reducing its height nine feet, and raising the flat below it with the excavated material. In connection with the last named road $50 were allowed to assist in the renewal of a crossway on the fourth concession line of Sandfield, a condition being that the settlers would do an equal amount of work. This was fulfilled, resulting in one hundred rods of ditching and grading in lieu of the crossway, making a more permanent road.

About a mile of ditching, blasting and other necessary improvements were done on the Sheguiandah and Little Current Road between the points which the name of the road indicates at an outlay of $265, and lastly there was spent the sum of about $320 upon Slash Road, in the construction of two miles, beginning at the intersection of the eighth concession with concession A of Tehkummah, thence east to lot 5, thence north to unite with a road already opened.

Mississaga Road.

Repairs to iron bridge over Mississaga River from the end of last year's operations, that is to say, from the east boundary of Gladstone north to the second concession, thence west to the river, and thence up the stream to the bridge a length of one and three-quarter miles of excellent work.

Nepigon Road.

Of the portion of this road opened last year for winter purposes only, three and three-quarter miles were this year graded and made fairly well, the work dating from Nepigon Station of the Canadian Pacific Railway.

Rabbit Mountain and White Fish Lake Road.

Twelve miles repaired between Beaver and Silver Mountain Mines, one mile of which, having last season been chopped out only, has been properly graded.

Rainy River Road.

The construction was continued from the point of ending last year, section 1, range 22, township 3, through sections 2, 3, 10, 9, and Wild Land Indian Reserve to Rainy River, and about two chains east of Hungry Hall Reserve, a length of seven miles, thus completing a winter road from Fort Francis to the mouth of the river, about seventy-seven miles long.

A branch road was also opened from Rainy River, beginning on line between sections 2 and 3, township 4, range 25, thence north to section 26, thence angling north-westerly through sections 27, 28, 32, 33, to line between ranges 4 and 5, thence north between sections 4 and 5 two miles, thence again north-westerly through sections 16, 15, 23, 24,

25, 26, 34 of range 24, township 3, and into township number 2, a length of over fifteen miles.

The object of this branch which may called and known as Grassy River Road is, as represented by correspondence, to enable the settlers to reach Rat Portage by a shorter route, and avoiding many difficulties encountered in traversing Lake of the Woods in winter, and in addition to these advantages the road passes through a district adapted for settlement, and therefore desirable to open.

Rat Portage and Keewatin Road and Bridges.

In consequence of the erection of a dam by the Dominion Government across the west branch of the Winnipeg River and its subsequent partial destruction, a considerable amount of damage was done to the bridges built by this Department in 1886, and traffic between Rat Portage and Keewatin by this road entirely cut off.

This season the three bridges have been raised and thoroughly overhauled, the work being, the inspector says, in some cases equal in cost to a renewal of the structures. With these repairs and the improvement of road through Tunnel Island, travel is again restored.

Rat Portage and Rainy River Road.

This work was commenced at the east end of Rat Portage, and extends in a south-easterly course towards Rainy River about four miles, and on the line of which a pile bridge two hundred and twenty feet long was erected.

A winter road a mile and a half long was cut out from the main line, and about a mile and a quarter from the village, to Matheson's Bay, with the object of allowing access to the first named road from the lake in winter, for the mail-carriers and other purposes.

Rock Lake Bridge.

A bridge on the Thessalon Road, lot 10, concession 1, Coffin township, which being too low was in danger from spring floods of destruction. It was raised four feet throughout, involving addditional bents and extra covering, its length being now one hundred and eighty-eight feet.

Spanish River Road.

A road begun in the centre of section 27 of the township of Victoria, thence east two and a half miles through Victoria, and a mile and a quarter into Salter, thence south two miles to Spanish River, and thence up the river three miles connecting with a road leading to La Cloche, eight and three-quarter miles, chopped out thirty feet wide as a winter road, and requiring to be graded before it can be used for general travel.

St. Joseph Island Roads.

There has been constructed, first, two miles beginning at U and concession 1 line, from side line between lots 5 and 6 south-westerly five-eighths of a mile to about middle of front of lot 3, thence north-westerly through lot 3, concession U, to the north-west angle of the last named lot, thence continuing and passing through lots 2 and 1 to S and T concession line, and thence south-westerly to the east angle of lot 50, concession 1, to connect with a road before opened. The second work was half a mile opened on the O and P line, across lots 19 and 20, altogether two miles and a half of new and well constructed road.

Thessalon Station Road.

Nearly a mile of road built from the Thessalon Road to the railway station, and between lots 11 and 13. It is the only way by which the station is reached.

Vankoughnet Road.

A new work begun at the termination of a road leading northward from Sault Ste. Marie through the township of Tarentorus, and being the north-east angle of the north-east quarter of section 9 of said township, thence north-easterly through the township to the south boundary of Aweres, and thence northward, passing within half a mile of the west shore of Trout Lake, in the last named township.

Length constructed, two and three-quarter miles.

Ahmic Road.

Repairs of the existing road, and the opening of a portion which was but a rough trail or lumber road, and begun on lot 24, concession 9, township of Croft, and continued from thence, through concessions 8, 7, 6 and 5, to the Ahmic Lake bridge on lot number 15—built in 1887—four and a-half miles, chopped out thirty feet wide and fairly grubbed and leveled.

Alsace Road.

A continuation westward from lot 9, between concessions 10 and 11 of Gurd, to the Commanda Lake road on lot number 2. The length is a mile and three-quarters, which, the land being very heavily timbered, is only as yet, roughly opened.

Bracebridge Road.

This road which is practically on the town line between Macaulay and Draper, is now very well opened.

Two and a-half miles were new work from the end of last year's operations eastward to connect with South Macaulay road : the balance, one and a-half mile, being repairs of a heavy nature, and necessary to make the entire length good and travelable, which the inspector says it now is.

Bridge Repairs, Muskoka and P. S. Districts.

Four bridges repaired at a cost of $390.39, and being, (1) that on the Maganetawan road, on lot 15 between concessions 4 and 5, which fire had destroyed.—Cost, $58.12. 2. Musquosh bridge, at Bala, which on account of its age and general condition requires annual attention, and should be renewed this coming season ; expenditure, $140.64. 3. A floating bridge constructed with timber of Draper bridge, which latter being dangerous to cross was taken down. This floating structure costing, $66.24, is of course a temporary arrangement. The fourth work is the renewal of a bridge at Beggsboro' on the Doe Lake road at a cost of $125.39.

Brunel Branch Road.

The portage road between Lake of Bays and Peninsula Lake, and described in last year's report. This further expenditure for grading and ballasting makes it one of the best roads in the country.

Burk's Falls Road.

A continuation from the work of 1887, eastward through lots 27 to 30 inclusive, thence south-easterly, angling through lots 31 and 32 to town line between Armour and Proudfoot, thence east through lots 1 and 2, between concessions 6 and 7 of the latter town hip, and thence again south-easterly through lots 2 to 6 in the sixth concession, near y three and three-quarter miles of construction, and opens a way to Burk's Falls for a considerable number of settlers.

Cardwell Road.

Two and a-half miles of repairs over two sections, one being between Rosseau, and the work of the previous year, and a second from about four miles east of Rosseau to lot number 20, between concessions 6 and 7 of Cardwell.

Commanda Creek Bridge.

Is over Commanda creek, between concessions 12 and 13 Pringle, and opposite lot 33. It is comprised of a fifty-one and a twenty feet span, on abutments thirteen feet high, and has a total length with the approaches of about two hundred feet.

Eagle Lake Road.

Including some substantial repairs of the long "Narrows" bridge, the road was improved for seven and a-half miles from the Rosseau and Nipissing road eastward. This is a main road to the railway station at South River.

East River Bridge.

The renewal of this structure which is now in progress, is estimated to cost about $1,000, of which amount, $600 are already paid on account. It is on the main and only road between Huntsville and Hoodstown, and in so dangerous a condition that traffic was practically stopped.

Humphrey 4th Concession Road.

A new short road through the peninsula between lakes Joseph and Rosseau, and made as a cheap but useful work through lots 12 to 20, of the 4th concession of Humphrey.

Kearney No. 2 Road.

Two and three quarter miles of repairs between lot 34 Perry, and lot 5 Bethune, and the road extended eastward one and a-quarter mile to lot number 20, between the townships of Bethune and Proudfoot.

Long Point Road.

Repaired from end of last year's work to Walker's Point, on Muskoka Lake, four miles in the township of Wood.

Macaulay Road.

Four and a-half miles improved from within about half a mile of Baysville towards Bracebridge.

Maple Island Bridge.

A structure one hundred and thirty-seven feet long, with a main span of sixty-one feet, built over the north channel of the Maganetawan River, on the Northern road.

McDougall Road.

Five miles fairly well repaired. The road for want of attention was very much overgrown, and bad generally.

McDougall and McKellar T. L. Road.

This road commences about half a mile south of the Northern Road, and runs through lots 1 and 2 concession 12, and through lot number 2 in concessions 9, 10, 11, joining Junction No. 2 Road, on lot 2, concession 9, all in the township of McDougall.

Its length of three and a-quarter miles is sufficiently opened for fair loads, and will be of great advantage to those residing in the southerly portions of McKellar.

Middle River Bridge.

A bridge one hundred and eight feet long on Junction No. 1 Road, over Middle River, on lot 17, concession 14, McKellar, which was very much out of repair, and too low.

The Department repaired the bridge, and the municipality formed the approaches.

Mills Road.

Repaired from its junction with Golden Valley Road, in the tenth concession of Mills, northward about three miles.

The grant was insufficient to repair to Loring, as intended.

Missionary Road.

Five and a-half miles repaired through the township of Spence, from the Rosseau and Nipissing Road eastward, the road being practically on the road allowance between concessions 4 and 5 of this and Ryerson townships.

Monteith and Perry Road.

Repairs through the township of Monteith, from Seguin Falls eastward, altogether about six miles, the expenditure including a new bridge built over a branch creek which empties into the Seguin River, and which has a twenty-five feet clear span. This is the main east and west road between Parry Sound and Emsdale on the railway.

Muskoka Road.

A continuation northward from concession 6 to concession 11, and between lots 20 and 21, of the township of Machar, a little under two and three-quarter miles constructed through a heavily wooded district. A trail was also opened from the end of the work to the allowance for road between concessions 12 and 13, the New Jerusalem road, which, when graded, will make an important highway.

North Cardwell Road.

The portion built this year, the inspector says, is through a very rough section, and the original allowances for roads could not be followed. The work was begun at lot 22, concession 13, of Cardwell, angling from thence through lots 21, 20 and 19 in the same concession, and through lot 18 in the 14th concession—a mile and a-half.

Northern Road.

Repaired between Commanda and the Golden Valley Road two miles, and secondly, between McKellar and Dunchurch, nine and a-half miles.

North-West Road.

Two miles of repairs, from end of last year's operations northward to lot 34, concession 12, McDougall.

Oka Road.

About seven miles constructed this season, the road now reaching from Bala to the mills of the Muskoka Mill and Lumber Company.

The work was commenced at lot 6, concession 6, Gibson, thence northward and westward, about Black Lake to Black River, on lot 21, concession 5, and thence following the margin of the river to the mills.

Orange Valley Road.

Repaired in the township of McKellar, from lot 6, concession 7, westward two and a-quarter miles. A bridge one hundred and twenty feet long was also built over Seguin River on the line of this road.

Otter Lake Road.

The chief work in this instrnce was the construction of two bridges over Boyne Creek and Otter Lake narrows.

One and a-half miles of the road was also repaired from the Parry Souud Road southerly in the township of Foley, as in its then condition, it was well nigh impassable.

Parry Sound Road.

Two bridges have this year been renewed, and a deviation made nearly half a mile long through lots 133, 134, 135, concession B, for the purpose of reaching a better and cheaper river crossing, and the avoidance of a very steep hill.

Three miles of very permanent repairs were also made between Rosseau and Ullswater, which is a very hilly section.

Powassan Road.

A road between the 12th and 13th concessions of Himsworth, and constructed this year across lots 8 to 15 inclusive, over two miles of heavy work. A deviation was made on lot 14 into the 12th concession.

Rainy Lake Road.

The principal work was a bridge, one hundred feet long, built over the outlet of Rainy Lake. In addition, three-quarters of a mile which had previously been roughly opened, between the bridge and Sprucedale, was repaired.

Rosseau Falls Road.

A short road from the Parry Sound road to Rosseau Falls post-office and the mills. The present expenditure was used chiefly in making a deviation through lot 32, concession 2, of Cardwell.

Ryde Road.

This road was chopped out and roughly opened in the year 1887, at a cost of about $160 per mile, but was only travelable in winter. This season three and a-half of the five miles have been properly opened, reaching to the 8th concession of Dalton.

Over Black River on the line of the road a substantial bridge was, at the time of the inspector's last examination, under construction, built by the counties of Victoria and Ontario, as promised when the grant for the road was given.

Another sum of about $500 is required to fully complete the work.

Ryde Centre Road.

Repairs from the 4th concession northward two and a-half miles, the road being on the road allowance between lots 5 and 6 of the township of Ryde.

Ryerson Centre Road.

About one and a-quarter mile of work, one-half of which was new.

The road is between Burk's Falls and the Maganetawan road, and has been described in earlier reports. It is now fully opened and is a valuable work.

South Armour Road.

The raising of a flooded flat of the Maganetawan River across lots 8 and 9, concession 3, Armour.

Twenty-eight rods were raised four feet, and twenty-two rods about fifteen inches.

The Beldon Lumber Company, it is said, will complete the work at their own cost.

South River Road.

A new and important work, connecting Eagle Lake and Distress River roads, in the township of Joly.

It begins between lots 3 and 4, concession 11, and from thence northerly through lot 4 in concessions 11 and 12, and through lot 5 in the 13th concession to the road allowance between lots 5 and 6, near the blind line between concessions 13 and 14, uniting with the Eagle Lake road leading to Sundridge. Two and three-quarter miles fairly well made and already in use for general traffic.

Stephenson Town Line Bridge.

The original structure was built in 1875 at a cost of about $2,200, and is now renewed from the low water line. It is composed of a one hundred feet clear span and two of forty feet each, its total length being two hundred and six feet. It is over the Muskoka River on the town line between Stephenson and Macauly, and is much used.

Stony Creek Bridge.

A bridge over the said creek between concessions 12 and 13, lot 5, township of Armour, with main opening of thirty-eight feet, and eight feet high.

Strong 30 Side Line Road.

In opening this road a quantity of crosswaying was required, the ground being low and swampy.

It is chopped out forty feet wide and opened two and a-half miles, and is an important connecting line in the township, as before its completion the ice of Stony Lake was the only way of exit for teams, and that of course only in winter.

Trout Lake Junction Road.

A road opened from Nipissing Junction of the Canadian Pacific Railway, between lots 22 and 23, concession 14, Ferris, northward towards Trout Lake—one and one-eighth mile. The country is of a very broken and rough description.

Westphalia Road.

A continuation from last year's work to lot number 20 of Gurd, and as before, practically on the road allowance between the 2nd and 3rd concessions. The length made this year is two miles of excessively heavy work.

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EAST DIVISION.

Addington Road.

Repairs commenced at Kaladar Station on the Canadian Pacific Railway and continued north to "Flinton turn," about six miles.

This portion of the road is hilly and difficult to maintain, but is at present in a good general condition.

Alice and Petewawa Road.

A work from lot number 9, westward to lot number 4 on the town line, between Alice and Petewawa, a mile and a-quarter in length.

The land being low about half a mile of crosswaying was required, and of course expensive. This road is a benefit to a number of German settlers.

Alice 3rd Concession Road.

This is repairs between the 2nd and 3rd concessions of Alice, across lots 12 to 20—two and a-half miles. Nearly one mile was over a low beaver meadow, which was cross-wayed.

Alice and Wilberforce Road.

Work begun at lot 28, concession 5, Wilberforce, and between the said township and that of Alice, the improvements extending westward three-quarters of a mile.

It had been chopped out previously by the settlers, but unformed.

Anstruther Road.

About thirteen miles repaired, from the village of Apsley northward.

A bridge eighty feet long was built over Eel Creek to replace one burnt last year.

Antoine Road.

A portion of road one and three-quarters mile long, which settlers had chopped out, but not graded, or in any way made passable before the present expenditure. It is from the bridge at east end of Golden Lake to the Eganville and Killaloe Road, and thence westward on or near the 8th and 9th concession line of South Algona.

Bells Rapid's Road.

A road commenced last year and then described. The $200 expended this season completed the unfinished nearly three-quarters of a mile, and repaired the two miles constructed previously.

Bobcaygeon Road.

Repaired from lot 14, Minden, to lot 31, Stanhope, and between Kinmount and Union Creek, altogether eleven and a-half miles.

Over Union Creek, which is about seven miles south of Kinmount, the bridge was thoroughly overhauled and repaired. The structure is about ninety feet long and nine feet high.

Blairhampton Road.

The repairs made this season of four miles is over the south end of the same road mentioned in last year's report, and is from lot 12, concession 4, of Minden, northeasterly to lot 18, concession 9.

Buckhorn Road.

One and a-half mile of repairs on the north side of Scott's mills.

Burleigh Road.

Upon the south end of this road, that is to say, from Burleigh bridge southward, about three miles were repaired at a cost of $350, of which sum the county of Peterborough gave $175. Through the township of Burleigh about twenty miles were gone over, and more or less repaired at a cost of $300. Two stages run daily over this route.

Calabogie Bridge.

The payment this year of $1,000 represents a balance on account of the above work which is more fully referred to in last year's report.

Callender Road.

This might as properly be called Mattawa and Callender Road, as it lies between these two points.

For the appropriation, nine miles of the portion before constructed from Callendar station, C. P. Railway, were repaired, and half a mile opened eastward toward Mattawa.

Callender and North Bay Road.

Construction continued on the road allowance between lots 5 and 6, to that between the eleventh and twelfth concessions of Bonfield, thence westerly on the last named allowance to the line between lots 2 and 3, one and a half mile.

Calvin Road.

Beginning at the south end of the fifth concession, and between lots 10 and 11 of Calvin the road is improved, northward between the lots mentioned to the seventh concession and south limit of the railway, thence westward following the said limit to McKay's Mill on lot 13, concession 8, a length of two and a half miles.

Cameron Road.

About eleven miles of the portion between Moore's Falls and the Bobcaygeon road, and five miles from the Village of Norland, southward, were repaired. Repairs to the bridge at Moore's Falls were also made, the latter costing about $200.

Chandos Road.

A road running east from Apsley and repaired from lot 31, concession 1 Anstruther, to lot 10, concession 3, Chandos, about three miles.

Combermere Bridge.

The bridge over Madawaska River at Combermere Village, and now in a dangerous condition requiring a new superstructure.

The work is delayed for want of ice, but will be finished, it is expected, before spring

Copper Cliff Road.

A road into mines, roughly opened by the inhabitants, and now improved over three miles of its length, from lot 7, concession 3, McKim, westerly.

Dalton 25 and 26 Side Line Road.

Cut out for about one mile through concession 9 and part of concession 10. The bridge over Black River which is one hundred and sixty-five feet long was well repaired and raised two feet.

Douglas and Scotch Bush Road.

The chief work in this instance is a bridge built over Ritchie's Creek near Douglas. It is fifty feet long with main span of twenty four feet, and constructed almost entirely of cedar. About a quarter of a mile was graded as approaches on each side of the bridge.

Eganville and Cobden Road.

About three miles of repairs, beginning about two miles east of Eganville, and extending eastward towards Cobden.

Eight large culverts were built and a considerable amount of blasting was done.

EGANVILLE AND FOY ROAD.

Eight miles of repairs from the Opeongo road towards Eganville. It is the main road and stage route through that district.

EGANVILLE AND KILLALOE ROAD.

A very steep hill on this road was reduced, and the road improved from lot 28 to lot 32, both inclusive. It is the road allowance between concessions 8 and 9 of South Algona.

FRASER AND ALICE ROAD.

One mile of heavy work from lot 16, concession 9 Alice westward.

FRONTENAC ROAD.

This work consisted in raising half a mile of the road through concessions 10 and 11 of the township of Portland, which was flooded anually through the damming of the river by the Napanee River Company. The cost, with tne repairing of three miles in addition, was, according to the cash abstract statement of the aforesaid township, $1,053.35 so that the government grant of $500 is about one-half the total expenditure, and is in accordance with the agreement made with the Municipality.

GELERT STATION ROAD.

Four and three-quarter miles of repairs between Minden Village and Gelert or Minden station on the railway.

GILMOUR STATION ROAD.

From Gilmour station, Canada Central Railway (lot 12, con. 8, Tudor), this road extends eastward along and near the north margin of Wadsworth's Lake, intersecting Tudor road. The entire length is four and a half miles, which was more or less repaired throughout and made fairly passsable.

GOLDEN AND ROUND LAKE ROAD.

About one mile of road repair from the bridge at the west end of Golden Lake westward.

GULL LAKE ROAD.

Repairs of two miles in the township of Harvey, from lot 29 concession 5 to lot 31 concession 4.

HAGARTY 4 AND 5 CONCESSION ROAD.

This may be called new work as four deviations were made, and the balance was almost entirely overgrown with underbrush. The length was two miles from lot 22 to lot 30 on the concession line indicated.

HASTINGS ROAD.

Repairs over eleven miles between Rathbun station and L'Amable.

The approaches to McKenzie's Lake bridge were properly repaired with two other bridges on the same road.

HARVEY ROAD.

About five miles of substantial repairs between Buckhorn and Sandy Lake.

The county of Peterborough and township of Harvey gave each $200 on account of this work.

Again the township of Harvey granted $100 which with an equal amount from the Government was expended, about one half upon the sixteenth concession line of Harvey, from lot A. north, to lot 5, and balance upon the south portion of Harvey road near Sandy Lake.

Herschel Road.

This road is on or about the line between concessions 10 and 11 of Herschel, and is opened this season two miles westward to a point about four miles west of Hastings. It leads into lands reported as suitable for settlement and into which several have already made their way.

Herschel and Faraday T. L. Road.

From the town line between the townships suggested by this road, two and a half miles were well repaired in a westerly direction to Deer Lake.

Hinchinbrooke Road.

Two miles of repairs over work done within the past two years, this season's operations dating from lot 11, concession 9 of Hinchinbrooke northward.

The road-bed was in many places low and in others very rough.

Hyde's Chute Bridge.

For want of ice the construction of this bridge has been delayed, but it will in all probability be completed during the present winter. It is over the Madawaska River, in the township of Griffith, and will replace one built about seventeen years ago.

Indian River Bridge.

Repairs consisting of a new truss over main opening, and partial renewal of other portions. It is over Indian River between lots 21 and 22, in the eighth concession of the township of Alice.

Lake Township Road.

Four miles constructed this season, and now reaching to lots number thirteen of the township of Lake, on the line of the location known as Gibson's survey. The county of Hastings contributed $250 of the expenditure.

L'Amable Du Fond Bridge.

An expenditure of $63.75 for glancing booms found to be required for the protection of this bridge, which was built by the Department last year on the Mattawa and L'Amble Du Fond Road.

Lavant Road.

New work begun on the road allowance between concessions 3 and 4, and between lots 10 and 11, of the township of Darling and continued on the last mentioned line two miles to the end of the second concession. The first mile is fully completed, the second is yet to be graded in order to make it of full value as a road.

Laxton Road.

Is between the fourth and fifth concessions of Laxton and across lots one to seven, two miles of repairs.

Lonsdale and Bridgewater Road.

Three miles are this year added to the length of this highway. The work was between lots 24 and 25 of Hungerford, through concessions 3, 4 and 5, mostly uncleared land. The County of Hastings gave $300 of the expenditure.

MacKay's Station and Petewawa Road.

Two miles of road in the township of Head, made southerly from the bridge over MacKay's creek, built last season by this Department. Two miles of the same road were opened last year.

Mattawa Road.

Repairs of this road were commenced at the boundary between the townships of Clare and Cameron, and continued from thence westward in the latter township about ten miles, including the re-building of eight small bridges which, through age, were unfit to travel over.

Mattawa Bridge.

This bridge was renewed throughout, excepting portions of some of the cribs where the timber being perfectly sound was allowed to remain.

The original structure built in the year 1877 and raised and repaired in 1884, was 696 feet long and its width sixteen feet.

Its length has now been reduced to about 600 feet by filling in permanently one hundred feet with stone, but it was found necessary to increase its width to twenty feet so that teams and pedestrians might pass over without serious danger which before was experienced. The grant of $3,000 made by the Legislature towards rebuilding, was estimated to be about one-half the amount required for its completion, the expectation then being that any unfinished portion might, with safety, remain for another year.

It was discovered, however, as the work progressed, that with the new portions raised and widened it would cost a considerable sum to make the balance available for even temporary use, and the money thus spent would be largely wasted.

Upon these representations your consent was given for its completion which has been effected for less than the estimated cost by nearly one thousand dollars.

Mattawa and Callender Road.

A continuation of repairs made from last year's operations. The road is in the townships of Papineau and Calvin, the improvements being over three miles in the former and two miles in the latter township, and which was chopped out in the year 1886.

Mattawa and Temiscamingue Road.

This road was roughly opened from the foot of Lake Temiscamingue, towards the Village of Mattawa by settlers and others interested in its construction.

This season about seventeen miles were gone over and further improved as a winter road. Work was commenced at the easterly end of lot number 35, concession 6 township of Mattawa and continued northward towards the lake. Jock's creek was also bridged.

Mississippi Road

Twenty-nine miles of repairs, twelve of which were made from the town line between Mayo and Ashby eastward, and seventeen from Playfairs corners westward.

Monck Road.

The repairs were over three different sections, amounting to seventeen and a half miles altogether. One portion was in the township of Galway, seven miles; a second was eight miles, beginning at the town line between Faraday and Cardiff, and from thence eastward almost to the Hastings Road; and a third portion from half a mile west of Norland, westward two and a half miles.

A bridge over Crego's Creek on the above road, about two miles west from Kinmount, was renewed at a cost of $316.

The municipality made a grant of $230 to complete the approaches, which, it is understood, was spent by the overseer employed by the Department for the bridge.

Monmouth Road.

Fourteen miles repaired eastward from a point about five miles east of Haliburton. Thirty-three culverts were renewed.

Mountain Grove Station Road.

This road is described as follows:—Commencing at Mountain Grove Station of the Canadian Pacific Railway, on lot 14, concession 2, of Olden; thence south-easterly crossing lots 13, 12, 11, concession 3, and connecting with the Parham and Arden road. It is a low, expensive piece of work, and required a quantity of crosswaying timber, which was supplied by the municipality at a cost understood to be nearly as much as the Departmental expenditure, $403.37.

Mud Lake Narrows Bridge.

Built to replace that erected in 1886, and is on the line of the Hyde's Chute and Sanson road, in the township of Matawatchan, the main and only road from east to west in that section of country.

The structure is comprised of three main spans of fifty feet in the clear each, and with the approaches is two hundred and forty feet long. The county of Victoria gave one-half the cost,

Muskrat Lake Road.

The road allowance between the first and second concessions of the township of Westmeath, and improved between lots 23 and 27, two miles, which had been roughly chopped out before.

North Bay and Temiscamingue Road.

Repairs of a necessarily light character were made over sixteen miles, and are of great advantage to settlers who are filling the country rapidly. Several are occupying land twenty miles from North Bay.

North Shore Road.

This work was the reduction in length of a bridge 108 feet long over a creek near Grass Lake, in the vicinity of Haliburton. The approaches were filled in permanently, leaving an opening of fifty feet, over which a bridge was constructed.

Nosbonsing Road.

A road between South-East Bay, Lake Nipissing and Lake Nosbonsing.

One mile was opened this season from the east side of lot 24, concession 4 Ferris easterly through lot 23 and ending on lot 22. There is yet a length of three or four miles to be constructed before the settlement which it will serve is fully reached.

Opeongo Road.

From Vanbrugh eastward two and a half miles were repaired.

Osceola and District Line Road.

A mile and a quarter of road made passable for vehicles between the fourth and fifth concessions of the township of Bromley from Eganville and Osceola road northward.

Pembroke and Mattawa Road.

A bridge one hundred feet long was built over Aumond creek, the former one having been destroyed by fire. A new site was chosen and a diversion of the road made as a general improvement.

Perrault Settlement Road.

Completion of repairs to the Opeonga road from the termination of last year's operations, two and a half miles. A bridge one hundred and ten feet long was built over Constant creek on lot 9, concession 6 of Grattan.

Peterson Road.

Two and a half miles were well repaired between Bobcaygeon road and Bushkong bridge and four miles east and west of Papineau creek. The bridge which is three hundred feet long was rebuilt and an excellent job reported. It is at Papineau creek "Forks."

Petewawa 15 and 16 Side Line Road.

One and a quarter miles constructed through the fifth and sixth concessions of Petewawa on the side line indicated, and which, being low and marshy, required brushing and ditching.

Powassan and Callender Road.

The portion built this year is practically on the line between lots ten and eleven from that between the seventh and eighth concessions of Bonfield, southward to the second concession three and a half miles, the first mile of which had before been chopped out as a winter road.

Raglan Road.

A continuation from the work of last year and now reaching the Carlow road on lot number four in the fourth concession of Raglan. Length made this season one and a half mile.

Reid Road.

The sum of $200 was given to supplement grants of $100 from the County of Peterborough and $50 from the township of Galway, and was spent in opening and improving the road from lot 3 to lot 8 in the 16th concession of Galway, a mile and a half.

Scott Road.

Seven and a half miles of repairs, four of which were between Apsley and Coe Hill and three and a half in the township of Wollaston, namely, from lot 23, concession 10 to lot 32 concession 12.

Silver Lake Road.

A new work in the township of South Algona, between lots 29 and 30 in the sixth and seventh concessions, one mile in length.

In the eighth concession a steep hill was reduced and made available for public use.

Snake River Bridge.

A bridge on the Stafford and Willberforce road, which was entirely reconstructed. The structure with the heavy earth approaches is three hundred feet long and required more than the grant to complete the work.

South Harvey Road.

Upon a memorial from the township of Harvey, two grnnts of $50 each were allowed to supplement equal sums voted by the council and spent on 1. South Harvey road between Sandy Lake bridge and Buckhorn; and 2. on the sixteenth line of Harvey between lot A. and lot 5, some five miles altogether.

Sturgeon Falls Road.

This road is between the first and second concessions of Springer township, extending this season west from lot number eight two miles.

The work was excessively heavy, the ground being low and wet.

Sudbury Road.

A new road six and a half miles long and reaching settlers in the township of Rayside.

It was commenced near the village of Sudbury and constructed through a rough section on the west side of the Canadian Pacific Railway, where at the distance of three and a half miles it crosses the track, leaving the township of McKim, passing through an angle of the township of Snider and into Rayside.

The route is reported to be well selected and a very good and useful road for settlers and miners.

Sydenham and Bedford Road.

Repaired from three miles north of Sydenham northward five and one half miles.

An additional sum ($160) was allowed in order to complete repairs to Dessert lake, a further length of one and a half mile, and for repairing the bridge at the outlet of Otter Lake, all of which was accomplished.

Westmeath 9 Con. Road.

The completion of grading three miles referred to in last year's report. The road is now properly open for traffic.

Widdifield Road.

Two miles of heavy work through the second and third concessions and between lots twenty and twenty-one of Widdifield.

A destructive fire last year so injured the part opened that a considerable portion of the money was required and spent in restoring it to usefulness.

Widdifield and Phelps Road.

Two and a quarter miles constructed between concessions A. and B., from lot sixteen eastward, all in the township of Widdifield.

Wilberforce Road.

The raising and grading three quarters of a mile on the town line between Wilberforce and Stafford from concession 23 of the first named township northward.

Whitefish Lake Road.

One portion of work was begun at lot 21 and continued to lot 3 in Cavendish. A second portion is new work from lot 16 to lot 19 in the fourteenth concession with some useful repairs on the same concession line from lot 22 to the boundary. Repairs were also made from lot 23 of Galway to the boundary line of Cavendish, altogether about three miles of improvements and nearly a mile of road opened.

Wylie Station Road.

This last work is on the town line between Buchanan and Rolph, from the Pembroke and Mattawa Road northward. Three quarters of a mile of a new road cut out forty feet wide and graded about twenty feet wide. It was low land requiring heavy brushing and ditching and therefore very expensive work.

SUMMARY OF EXPENDITURE ON COLONIZATION ROADS AND BRIDGES IN THE YEAR 1889.

NAME OF WORK.		Cash.	Supplies from Department.	Total.
North Division.		$ c.	$ c.	$ c.
Batchewaning	Road	200 86	.....	200 86
Cockburn Island	do	510 00	17 94	527 94
Coffin, additional	do	490 00	.....	490 00
Coffin, 3rd Concession	do	490 00	.....	490 00
Coyne's	do	496 63	.....	496 63
Dayton Station	do	499 95	.....	499 95
Dean's Lake	do	640 97	157 51	798 48
Galbraith	do	521 69	41 50	563 19
Goulais River	Bridge	85 05	.....	85 05
Inspection		1,290 30	.....	1,290 30
Manitoulin Island	Roads	2,937 70	386 41	3,324 11
Mississaga	Road	307 30	.....	307 30
Nepigon	do	1,108 65	.....	1,108 65
Rabbit Mountain and Whitefish Lake	do	1,099 38	.....	1,099 38
Rainy River	do	3,463 10	524 37	3,987 47
Rat Portage	Bridge and do	3,876 35	.....	3,876 35
Rat Portage and Rainy River	do	2,200 00	.....	2,200 00
Rock Lake	do	200 00	.....	200 00
Spanish River	do	799 03	201 37	1,000 40
St. Joseph Island	do	850 19	230 91	1,081 10
Thessalon Station	do	380 00	.....	380 00
Vankoughnet	do	755 03	244 63	999 66
		23,202 18	1,804 64	25,006 82
West Division.				
Ah-mic	Road	401 87	.....	401 87
Alsace	do	404 04	.....	404 04
Bracebridge	do	800 57	.....	800 57
Bridge repairs, M. and P. S. District		390 39	.....	390 39
Brunel branch	Road	602 71	.....	602 71
Burk's Falls	do	832 72	167 28	1,000 00
Cardwell	do	500 00	.....	500 00
Commanda Creek	Bridge	440 00	.....	440 00
Eagle Lake	Road	620 00	159 96	779 96
East River	Bridge	600 00	.....	600 00
Hood's and Port Vernon (1876-9)	Road	14 00	.....	14 00
Humphry, 4th Concession	do	356 24	.....	356 24
Inspection		1,250 00	.....	1,250 00
Kearney No. 2	Road	1,009 09	162 51	1,171 60
Long Point	do	453 32	.....	453 32
Macaulay	do	816 34	185 53	1,001 87
Maple Island	Bridge	600 00	.....	600 00
McDougall	Road	500 00	.....	500 00
McDougall & McKellar	do	375 78	.....	375 78
Middle River	Bridge	100 51	.....	100 51
Mills	Road	474 19	41 50	515 69
Missionary	do	500 11	.....	500 11
Monteith & Perry	do	665 75	154 13	819 88
Muskoka	do	593 71	218 06	811 77
Musquosh	Bridge	6 00	.....	6 00
North Cardwell	Road	500 49	.....	500 49
Northern	do	1,155 54	148 37	1,303 91
North-west	do	493 95	136 14	630 09
Oka	do	829 21	202 63	1,031 84
Orange Valley	do	500 85	.....	500 85
Otter Lake	do	450 00	.....	450 00
Parry Sound	do	1,877 83	165 32	2,043 15
Powassan	do	615 93	183 25	799 18

SUMMARY OF EXPENDITURE, ETC.—*Continued.*

NAME OF WORK.		Cash.	Supplies from Department.	Total.
WEST DIVISION.—*Continued.*		$ c.	$ c.	$ c.
Rainy Lake	Road	303 05		303 05
Rosseau Falls	do	115 00		115 00
Ryde	do	803 23		803 23
Ryde Centre	do	154 79		154 79
Ryerson Centre	do	499 23		499 23
South Armour	do	400 82		400 82
South River	do	500 03		500 03
Stephenson town line	Bridge	1,200 00	150 29	1,350 29
Stony Creek	do	101 40		101 40
Storage and freight		5 00		5 00
Strong 30 side line	Road	499 15		499 15
Trout Lake Junction	do	500 50		500 50
Westphalia	do	1,200 00	293 93	1,493 93
		26,013 34	2,368 90	28,382 24
EAST DIVISION.				
Addington	Road	624 29		624 29
Alice and Petewawa	do	499 80		499 80
Alice, 3rd Concession	do	516 30		516 30
Alice and Wilberforce	do	251 10		251 10
Anstruther	do	514 74		514 74
Antoine	do	534 82		534 82
Bedford (1886)	Bridges	150 00		150 00
Bell's Rapids	Road	200 00		200 00
Bobcaygeon	do	869 76	130 69	1,000 45
Blairhampton	do	251 30		251 30
Buckhorn	do	200 00		200 00
Burleigh	do	671 31		671 31
Calabogie	Bridge	1,000 00		1,000 00
Callender	Road	500 00		500 00
Callender and North Bay	do	500 75		500 75
Calvin	do	302 23		302 23
Cameron	do	952 92	182 61	1,135 53
Chandos	do	278 62		278 62
Combermere	Bridge	547 00		547 00
Copper Cliff	Road	153 00		153 00
Cross Lake (balance)	Bridge	212 50		212 50
Dalton, 25 and 26, S. L.	Road	206 29		206 29
Douglas and Scotch bush	do	257 00		257 00
Eganville and Cobden	do	464 04		464 04
Eganville and Foy	do	290 00		290 00
Eganville and Killaloe	do	508 67		508 67
Fraser and Alice	do	496 94		496 94
Frontenac	do	500 00		500 00
Gelert Station	do	209 77	49 25	259 02
Gilmour Station	do	411 05		411 05
Golden and Round Lake	do	199 75		199 75
Gull Lake	do	200 00		200 00
Hagarty, 4th and 4th Concession	do	522 43		522 43
Hastings	do	762 38	122 82	885 20
Harvey	do	834 55		834 55
Herschel	do	309 39		309 39
Herschel and Faraday T. L.	do	200 57		200 57
Hinchinbrooke	do	200 00		200 00
Hyde's Chute	Bridge	1,000 00		1,000 00
Indian River	do	158 55		158 55
Inspection { Balance of 1889		559 27		3,096 34
Inspection {		2,537 07		
Lake Township	Road	516 42		516 42

SUMMARY OF EXPENDITURE, ETC.—*Continued.*

NAME OF WORK.		Cash.	Supplies from Department.	Total.
EAST DIVISION.—*Continued.*		$ c.	$ c.	$ c.
L'Amable Du Fond	Bridge	63 75		63 75
Lavant	Road	506 31		506 31
Laxton	do	100 00		100 00
Lonsdale and Bridgewater	do	600 25		600 25
Mackay's Station and Petewawa	do	501 18		501 18
Mattawa	do	600 14		600 14
Mattawa	Bridge	4,846 72	234 11	5,080 83
Mattawa and Callender	Road	1,007 26		1,007 26
Mattawa and Temiscamingue	do	998 64		998 64
Mississippi	do	1,338 70	251 37	1,590 07
Monck	do	1,205 88	54 80	1,260 68
Monmouth	do	983 07		983 07
Mountain Grove Station	do	403 37		403 37
Mud Lake Narrows	Bridge	851 73		851 73
Muskrat Lake	Road	249 84		249 84
North Bay and Temiscamingue	do	996 99		996 99
North Shore	do	163 34		163 34
Nosbonsing	do	377 15	107 74	484 89
Opeongo	do	508 78		508 78
Osceola and District Line	do	499 30		499 30
Pembroke and Mattawa (Aumond Creek Bridge)		449 93		449 93
Perreault Settlement and Sanson's	Road	401 55		401 55
Peterson	do	726 60		726 60
Petewawa, 15 and 16 Side Line	do	201 07		201 97
Powassan and Callender	do	757 83	246 32	1,004 15
Raglan	do	401 00		401 00
Reid	do	350 00		350 00
Ross and Bromley, T. L. (balance)	do	25 00		25 00
Scott	do	604 83		604 83
Sharbot Lake (balance)	Bridge	40 00		40 00
Silver Lake	Road	302 12		302 12
Snake River	Bridge	749 00		749 00
South Harvey	Road	200 00		200 00
Sturgeon Falls	do	836 69	161 66	998 35
Sudbury	do	1,624 45	493 00	2,117 45
Sydenham and Bedford	do	746 42		746 42
Victoria Road (balance)	Bridge	19 56		19 56
Westmeath, 9th Concession	Road	510 00		510 00
Widdifield	do	796 38		796 38
Widdifield and Phelps	do	613 19		613 19
Wilberforce	do	253 75		253 75
Whitefish Lake	do	635 95		635 95
Wylie Station	do	501 79		501 79
		49,624 09	2,034 37	51,658 46
MUNICIPAL GRANTS, REFUNDS, ETC.—				
Municipality of Harvey, for South Harvey Road	$100 00			
County of Peterborough, for Harvey Road	200 00			
" " " Reid "	100 00			
" " " Burleigh "	175 00			
" Hastings—Lonsdale and Bridgewater Road	300 00			
" " Lake Township "	250 00			
Municipality of Harvey—Harvey "	200 00			
" Galway—Reid "	50 00			
W. T. Pateman, Refund—Cockburn Island....Roads	5 89			1,380 89
Departmental Expenditure				

SUMMARY OF EXPENDITURE, ETC.—*Continued.*

RECAPITULATION.

	$ c.	$ c.	$ c.
I. North Division	25,006 82		
II. West Division	28,382 24		
III, East Division	51,658 46		
		105,047 52	
Less Municipal grants and refunds		1,380 89	
Total Departmental Expenditure			103,666 63

HENRY SMITH,
Superintendent Colonization Roads.

DEPARTMENT OF CROWN LANDS,
TORONTO, 31st December, 1889.

REPORT

OF THE

DEPARTMENT OF IMMIGRATION

FOR THE

PROVINCE OF ONTARIO,

FOR THE YEAR

1889.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

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1890.

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REPORT OF THE

COMMISSIONER OF IMMIGRATION

FOR THE YEAR ENDING 31ST DECEMBER,

1889.

To the Honourable SIR ALEXANDER CAMPBELL, K.C.M.G.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned has the honour to submit the following Report on the operations of the Immigration Department, for the twelve months ending the 31st December, 1889.

In 1889, as compared with 1888, there was a decrease of 5,145 in the number of immigrants who remained in the Province of Ontario. This decrease is owing to various causes, viz.: the improvement in trade in the British Isles, which causes farm labourers out of employment in the rural districts to drift into the cities to find employment; the rise in ocean fares consequent on the discontinuance of the assisted passage rates and the inducements offered by the Australasian colonies. The decrease in the number of immigrants carried by the three leading steamship lines to Canadian ports was still greater than that in the number settled in this Province.

The immigrants, with few exceptions, were able to pay their way to their respective destinations where their labour was in demand. A large proportion of the mechanics and general labourers remained in Toronto, where, owing to the activity in the building trade, they succeeded in finding employment. The wages of stonecutters and bricklayers ranged higher than in the previous year, while labourers closely connected with the building trade also improved their condition. But although mechanics and skilled workmen receive higher wages here than in the British Isles there is no demand for their services in excess of the supply that would justify any special effort to induce them to emigrate. The organized trades and labour societies and the contractors and employers of labour so far control the rate of wages and the chances of employment at any given point, as to render it inadvisable to assume responsibility in giving advice to these classes further than to caution them against the representations of irresponsible parties who are ready to give advice with no accurate knowledge of the condition of the labour market in this country. The variations, incident to local causes, in the demand for mechanics and other skilled workmen, render it undesirable that this department should undertake to direct or influence their movements. It is also unnecessary under existing circumstances

from the fact that these classes have ample opportunity to inform themselves of the actual condition of their special industry at any given point, and can therefore regulate their movements in accordance with their individual interests.

Farm Labourers.

As in the previous year, there was a great demand for this class from the first of April till the end of October, and the falling off in the supply caused no small inconvenience to the farmers, who, in some districts, could not procure an adequate number of labourers. This led to an increase in wages which ranged during the harvest months from $25 to $40 per month with maintenance.

The system of yearly engagements, though slowly making its way among the better class of farmers, might still, it is believed, be extended with great advantage both to the employer and employed. There are instances of young men who, having spent the summer and harvest months on the farm, come into the cities in the fall in search of employment for the winter. This not only abstracts from the farm the labour which even in winter might be profitably employed upon it, but also unduly swells the number of the unemployed in the centres of population. It is to be hoped that the system of annual engagements, and the employment, where practicable, of married men to whom homes and garden plots may be allowed, will come more and more into favour amongst our farmers, thereby ensuring a fixed population of farm labourers and rendering farmers less dependent on the chance of hiring temporary help.

Female Domestic Servants.

The immigration of this class has been falling off gradually since the year 1883 when two thousand five hundred settled in the Province of Ontario. The demand during the past year could not be supplied although wages were largely increased.

The following is a statement of the number of immigrants settled in the Province of Ontario, through the Ottawa, Kingston, Toronto, Hamilton, and London Agencies, with their nationalities, during the years 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, and 1889, respectively :—

Year.	English.	Scotch.	Irish.	German.	Other Countries.	Total.
1878	6,124	1,785	1,551	620	2,975	13,055
1879	12,169	2,894	3,993	1,450	3,901	24,407
1880	7,980	3,027	4,518	1,197	2,569	19,291
1881	7,704	3,070	4,521	1,274	1,664	18,233
1882	10,873	3,173	6,322	1,033	1,290	22,691
1883	11,954	2,658	8,993	1,384	2,130	27,119
1884	11,020	2,623	3,783	1,716	3,136	22,277
1885	7,261	2,131	2,105	1,098	1,378	13,973
1886	8,344	2,268	2,497	936	1,243	15,288
1887	10,758	3,277	3,330	1,032	1,326	19,723
1888	11,984	3,598	2,801	993	1,156	20,532
1889	9,028	2,347	2,268	779	965	15,387

The above table shews a decrease of 5,145 in 1889 as compared with 1888.

The total arrivals in and departures from Ontario in 1888 and 1889 respectively were as follows :—

Via St. Lawrence.	United States.	Total Arrivals.	Passed through the Province.	Remained in Ontario.
1888—22,691	70,546	93 237	70,257	20,532
1889—14,802	52,343	67,145	51,758	15,387
Decrease in 1889				5,145

The immigrants settled in this Province during the years 1878, 1879, 1880, 1881 1882, 1883, 1884, 1885, 1886, 1887, 1888, and 1889, were distributed through its respective Agencies as follows :—

Year.	Ottawa.	Kingston.	Toronto.	Hamilton.	London.	Total.
1878	416	746	4,602	6,348	943	13,055
1879	608	1,134	9,509	10,639	2,517	24,407
1880	767	1,363	7,094	8,241	1,826	19,291
1881	977	2,187	7,779	6,227	1,063	18,233
1882	2,248	5,473	8,404	5,363	1,201	22,691
1883	2,670	3,984	11,233	7,535	1,697	27,119
1884	3,033	3,196	7,229	7,176	1,643	22,277
1885	1,398	1,877	5,166	4,698	834	13,873
1886	1,072	2,173	6,045	4,705	1,293	15,288
1887	1,660	1,983	8,606	6,419	1,055	19,723
1888	1,238	1,972	9,430	6,358	1,534	20,532
1889	940	1,633	6,950	4,660	1,204	15,387

In addition to the above immigrants, the following numbers were reported through the customs as having arrived and settled in Ontario :—

	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Ottawa and Ports within its Ageney	1,133	1,123 1,395*	1,131 968*	1,020	1,150	944	1,168	932
Kingston do	958	1,001	939	855	673	629	725	832
Toronto do	1,546	1,622	426	1,593	1,709	1,736	2,057	2,757
Hamilton do	1,138	1,366	1,179	987	912	1,218	1,131	1,565
London do	6,740	6,868	6,674	2.642	2,735	1,493	1,609	1,723
Total	11,515	13,378	11,217	7,097	7,179	6,020	6,690	7,809

*Sent from Quebec to other places within the Ottawa Agency.

STATEMENT shewing the number of persons who arrived at the undermentioned Ports of Entry, with the value of their effects, from the United States, for settlement in the Province of Ontario, from the 1st January to 31st December, 1889.

PORT OF ENTRY.	Total reported.	NATIONALITIES.					SEXES.			Value of Effects.
		Canadians.	English.	Irish.	Scotch.	Other Countries.	Males.	Females.	Children.	
Amherstburg	297	184	24	11	6	72	79	83	135	$8499 00
Belleville	101	84	8	4		5	26	39	36	6203 00
Brantford	148	92	25	2	8	21	39	50	59	6389 00
Brighton	81	70				11	23	31	27	2836 00
*Brockville										
Chatham	501	384	21	9	4	83	126	147	228	16071 00
Clifton	210	69	28		2	111	62	75	73	18350 00
Cobourg	41	31		1		9	11	12	18	2785 00
Colborne	25	21				4	5	8	12	1230 00
Collingwood	42	32	4	1	5		13	14	15	653 00
Cornwall	179	121	9		7	42	46	46	87	5036 00
Cramahe	20	17				3	6	6	8	1016 00
Darlington	6	6					2	1	3	180 00
Deseronto	33	33					17	12	4	2768 00
Dover	140	96	27	4		13	37	43	60	8106 00
Dunnville	50	50					16	20	14	2030 00
Erie	342	130	30	4	4	174	94	114	134	23095 00
Galt	60	53	2		1	4	18	22	20	7445 00
Gananoque	104	55	1	1		47	38	33	33	2667 00
Goderich	108	75		12	9	12	23	26	59	5700 00
Hamilton	555	244	80	21	28	182	155	166	234	42613 00

Kingston	261	202	20			39	65	94	102	20888 00
Lindsay	38	20	18				14	9	15	1770 00
London	129	69	38	4	4	14	34	43	52	6953 00
Morrisburg	81	46		3	1	31	21	26	34	2776 00
Napanee	51	44	2			5	16	25	10	1611 00
Niagara	21					21	4	7	10	570 00
Oakville	50	21	15	14			18	15	17	2635 00
Oshawa	23	14	2			7	5	9	9	4030 00
Ottawa	507	345	17	39	13	93	126	142	239	25934 00
Owen Sound	123	26	5		4	88	28	36	59	4493 00
Paris	39	13	23		3		16	17	6	1520 00
Penetanguishene	4					4	1	1	2	75 00
Picton	62	53				9	15	20	27	2550 00
Port Arthur	120	45	15		3	57	75	40	5	2496 00
Prescott	165	91	9			65	45	52	68	7422 00
Saugeen	6		2		4		2	3	1	270 00
Sault St. Marie	326	175	2	12	51	86	94	98	134	11975 00
Stratford	308	134	41	19	27	87	87	89	132	18477 00
St. Thomas	176	120	20	3	8	25	65	56	55	3334 00
Toronto	2011	631	485	129	114	652	535	616	860	159318 00
Trenton	53	37	2	9		5	15	15	23	3357 00
Whitby	14	13				1	5	4	5	495 00
Woodstock	198	161	14		8	15	53	68	77	11273 00
	7809	4107	989	302	314	2097	2175	2433	3201	457894 00

*Return not received.

Total number of Immigrants and value of effects reported through the Customs, at the various Ports of Entry within the several agencies, for 1889.

PORTS OF ENTRY.	Total Reported.	Value of Effects.
		$ c.
Ottawa Agency	932	41,168 00
Kingston do	832	47,911 00
Toronto do	2,757	188,120 00
Hamilton do	1,565	110,118 00
London do	1,723	70,577 00
Total	7,809	457,894 00

The value of the effects of the Immigrants reported through Customs in the following year was :—

	1884.	1885.	1886.	1887.	1888.	1889.
Ottawa	$37,408	35,667	42,680	37,275 00	53,909 00	41,168
Kingston and ports within its Agency.	51,130	37,266	37,244	28,662 00	32,035 00	47,911
Toronto and ports within its Agency.	25,563	128,179	151,241	158,678 00	175,570 00	188,120
Hamilton and ports within its Agency.	60,214	56,961	58,709	79,312 00	80,520 00	110,118
London and ports within its Agency.	236,109	131,065	145,492	74,337 45	79,889 00	70,577
Total value	$410,424	$389,138	$435,366	$378,264 45	$421,923 00	$457,894
Total value in '83, '84, '85, '86, '87, '88, '89.	533,295	410,424	389,138	435,366 00	378,264 45	421,923
Increase			$46,226		$43,658 55	$35,971
Decrease	$122,871	$11,286		$57,101 55		

IE FOLLOWING ARE THE NUMBERS SETTLED IN ONTARIO THROUGH AGENCIES, AND REPORTED THROUGH CUSTOMS DURING THE TWELVE MONTHS ENDING 31st DECEMBER, 1889.

AGENCY.	Settled through Agencies.	Reported through Customs.	Total settled in Ontario.
TAWA	940	932	1872
NGSTON	1633	832	2465
RONTO	6950	2757	9707
AMILTON	4660	1565	6225
NDON	1204	1723	2927
Grand Total for 1889	15387	7809	23196
Grand Total for 1888	20532	6690	27222

DAVID SPENCE, *Secretary.*

STATEMENT A.—Shewing the number of Immigrants arrived in Ontario and the number remained, with their Nationalities, for the twelve months ending 31st December, 1889.

DAVID SPENCE, Secretary.

The following statement shews the number of Immigrants who left the British Island for places out of Europe, and the percentage settled in Ontario, through Agencies, during the years 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, and 1889 respectively :—

Year.	Numbers Left.	Settlers in Ontario.	Per centage.
1874.	241,014	25,254	10.55
1875.	173,809	17,655	10.16
1876.	138,222	11,432	8.27
1877.	119,971	11,654	9.77
1878.	147,663	13,055	8.84
1879.	217,163	24,407	11.23
1880.	332,294	19,291	5.80
1881.	392,514	18,233	4.64
1882.	413,288	22,691	5.49
1883.	397,157	27,119	6.83
1884.	304,074	22,277	7.32
1885.	264,986	13,973	5.27
1886.	330,881	15,288	4.62
1887.	396,494	19,723	4.97
1888.	398,494	20,532	5.16
1889.	.....	15,387	..

The following statement shews the aggregate number of children settled in this Province since 1868 by the undermentioned parties.

Year.	Miss Rye.	Miss Macpherson.	Mrs. E. Bilbrough Wallace.	Mr. Middlemore.	Rev. Dr. Stephenson.	Dr. Barnardo.	Shaftesbury's Boys' Home, London, Eng.	Cardinal Manning and others.	Total.
1868	5								5
1869	187								187
1870	253	194							447
1871	277	498							775
1872	185	321							506
1873	134	358		102					594
1874	193	279		50	81				603
1875		184		78	43				305
1876		163		71					234
1877	91	115		83	28				317
1878	42	68	79	86	32				307
1879	96	95	126	57	24				398
1880	68	114	129	41	22		11	22	407
1881	117	90	158	60	43		49	45	562
1882	118	183	153	70	41	51	24	139	779
1883	170	193	194	125	53	172	43	183	1133
1884	165	165	254	145	75	252	39	283	1378
1885	125	183	351	115	87	395	32	323	1611
1886	110	215	274	129	91	615	33	301	1768
1887	120	212	316	202	75	406		77	1408
1888	300	270	271	279	101	484	104	30	1839
1889	160	249	295	85	86	481	92		1448
Total	2916	4149	2600	1778	882	2856	427	1403	17011

EXPENDITURE.

The total expenditure on account of Immigration during the years 1884, 1885, 1886, 1887, 1888, and 1889, respectively, was as follows:

——	1884.	1885.	1886.	1887.	1888.	1889.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Agencies in Europe	7690 27	5150 00	5150 00	5150 00	5150 00	3889 00
Agencies in Canada	6690 52	4964 63	4224 35	2485 22	550 00	648 00
Carriage of Immigrants in Ontario	12175 90	2852 74	780 58	809 34	328 55	236 63
Provisions for Immigrants, including medical attendance	7148 94	2959 16	2527 64	2948 31	638 78	423 97
Incidentals	2033 94	623 48	872 98	403 07	485 06	474 82
Immigration Pamphlet and Maps	1394 38	2538 10	3281 85	.....	800 00	1177 48
Carriage of female domestics from Quebec	6235 97	.....	.....	.....	.....	.....
Total	43369 92	19088 11	16837 40	11795 94	7952 39	6849 90
Cost per head, including Immigrants settled through Agencies only.	1.94	1.36	1.10	.59	.38	.44

The following statement, condensed from the Reports of the Commissioners of Crown Lands, shews the progress of the settlement of the Free Grant Districts since 1868:—

YEAR.	Number of Townships set apart.	Number of persons located.	Number of acres located.	Number of purchasers.	Number of acres sold.	Number of lots, the location of which have been cancelled.	Number of patents issued.
1868	15	511	46336	82	2120	.....	.....
1869	24	566	56011	52	956	.....	.....
1870	14	1200	155427½	148	4585½	.....	.....
1871	1	1113	153105½	139	3452½	.....	.....
1872	18	875	115065	97	2268½	148	.....
1873	6	757	100603½	79	5038	381	.....
1874	10	919	119070	57	2144	453	755
1875	1	1387	186807	89	3896	381	570

STATEMENT of settlements in Free Grant Districts, etc.—*Continued.*

YEAR.	Number of Townships set apart.	Number of persons located,	Number of acres located.	Number of purchasers.	Number of acres sold.	Number of lots, the locations of, which have been cancelled.	Number of patents issued.
1876	.....	463	192858	110	2261	462	546
1877	4	1914	260801	149	5534	691	542
1878	1	2115	274238	188	6637	1118	472
1879	.....	1506	199500	123	4911	1018	513
1880	23	1292	181745	110	3621	870	487
1881	5	1077	153764	155	8870	781	487
1882	1	932	129535	150	5562	624	502
1883	1	985	134594	143	8927	587	790
1884	3	1157	161964	125	5809	635	609
1885	2	1236	175351	149	5998	563	581
1886	.....	1149	162734	133	5474	607	706
1887	4	902	122772	109	5694	612	559
1888	.....	842	109002	74	2797	556	523
1889	.....	858	114050	84	3708	657	386
Total	133	24756	3305333½	2545	100263½	10844	9018

STATEMENT shewing the number of Immigrants settled in Ontario, through Agencies, and reported through Customs, from 1868 to 1889.

YEAR.	Number settled through Agencies.	Number reported through Customs.	Total number settled.	Value of the effects of Immigrants reported through Customs.
1868	.....	.....	10873	No returns reported.
1869	.....	.....	15893	"
1870	.....	.....	25590	"
1871	.....	.....	25842	"
1872	.....	.....	38129	"
1873	.....	.....	39184	"
1874	25444	6276	31720	Returns not complete
1875	17655	4096	21751	$328236 000
1876	11432	7691	19123	279138 00
1877	11654	6225	17879	305662 00
1878	13055	4885	17940	311117 00
1879	24407	4420	28827	244618 00
1880	19291	5435	24726	258919 00
1881	18233	6967	25200	313075 00
1882	22691	11515	34206	503032 00
1883	27119	13375	40494	533295 00
1884	22277	11217	33494	405770 00
1885	13973	7079	21052	389138 00
1886	15288	7179	22467	435364 00
1887	19723	6021	25744	378264 45
1888	20532	6690	27222	421923 00
1889	15387	7809	23196	457894 00
Total	298161	116880	560552	$5566455 45

Further details will be found in the various appendices to this Report.

All of which is respectfully submitted.

CHARLES DRURY,
Commissioner.

TORONTO, January, 1890.

APPENDICES.

No. 1.

ANNUAL REPORT OF PETER BYRNE, ESQ., IMMIGRATION AGENT, LIVERPOOL, ENGLAND.

ONTARIO GOVERNMENT AGENCY,
NOTTINGHAM BUILDINGS, 19 BRUNSWICK STREET,
LIVERPOOL, 31st December, 1889.

The Hon. CHAS. DRURY, M.P.P.,
Minister of Agriculture and Immigration,
Toronto.

SIR,—I have the honor to report that my efforts during the past year have, as usual, been directed to the spread of information regarding the resources and attractions of Ontario, mainly among the populations of the rural districts of the United Kingdom.

The methods employed to this end have not varied materially from those adopted heretofore. Public attention has been drawn to the Province chiefly by advertising the pamphlet, entitled "Ontario as a Home for the British Tenant Farmer," with colored map. This has been done to a limited extent in all the leading agricultural journals published in Great Britain and Ireland, besides many other general newspapers which have a large and influential circulation in the agricultural districts. The result has been an extensive demand for the pamphlet which is sent free to every applicant.

I have personally visited during the year a great many passenger agents actively engaged in different parts of the country in promoting emigration to Canada—instructing them as to the kind of people we are anxious to attract to Ontario, as settlers, and supplying them with printed matter for distribution, and, when occasion serves, giving special information and advice to their clients.

I have also attended and taken part in a number of emigration meetings held in the country towns and villages, where, besides giving short addresses, I have answered many enquiries both public and private regarding Ontario. Of course, I studiously avoid on every occasion advocating indiscriminate emigration; but on the contrary, carefully specify the classes who are wanted and would be likely to do well, and distinctly discourage all others.

Besides distributing among the agricultural population large numbers of pamphlets and leaflets relating to the Province, I have also furnished supplies of printed matter to the office of the High Commissioner in London, to the several Dominion agents throughout the country and to the different Canadian shipping companies, for distribution at their respective offices.

The correspondence of the office continues to be considerable and also the number of personal applications for information. All enquiries whether by letter or otherwise are carefully answered. They proceed from all classes of people and in some cases from distant places outside the United Kingdom. They are often long and important and relate to a great variety of subjects, such as questions of law, manufactures, the tariff, land transfers, rate of interest obtainable on investment, nature of security for loans, amount of capital required in some particular industrial enterprise or the purchase and stocking of improved farms, etc., etc.

But the great bulk of the more important enquiries received have reference to land, showing that the desire to possess a farm is the principal motive inspiring the generality of intending emigrants whether they be possessed of capital or have little or nothing but their own industry wherewith to commence a fresh career in a new country.

Applications from ordinary laborers and mechanics have not been so numerous of late, owing no doubt to the great improvement in every kind of trade and the consequent increase of employment that has taken place during the year. I, however, uniformly discourage these classes from emigrating in the absence of any special demand for their labor in Ontario.

I continue to receive a good many enquiries from young men who have been well brought up and well educated, and who are desirous of finding situations with farmers in Ontario for the purpose of learning practical agriculture. Such persons I usually refer to the many respectable societies which now exist for the purpose of affording practical assistance to such persons. In cases where the applicants or their friends have means, I strongly recommend them to apply for admission to the Government Agricultural College at Guelph where, I assure them, they are certain to obtain a valuable training for an agricultural career.

As to that most important class of all emigrants—namely, persons with capital, I have received during the year a fair proportion of enquiries from them and with many I have had personal interviews. Some of them required information with a view to engaging in trade or manufacturing industries, but the majority were anxious to learn all about the prospects of success in Ontario for a practical farmer with more or less money at his command. In all such cases I take every pains to give the fullest information and assistance in my power, and I have reason to believe that a goodly number of this class of emigrants have found their way to the Province this past season.

Farm laborers as a class are less able than they were years ago to emigrate, owing to the decrease in their wages and in the case of Canada to the discontinuance of assisted passages. But those of them who, after years of steady thrift and self-denial, have managed to accumulate out of their scant earnings enough to defray their passages, ought to be welcomed as the very pick of working men who will be pretty certain to become valuable settlers, proving a benefit to the Province as well as reaping benefit for themselves. I therefore think it right to give all the encouragement I can to such emigrants.

There are fewer enquiries than ever from good female domestics who continue to be in strong demand everywhere. Even when, as in the case of Queensland and some other colonies, free passages are granted, it is found no easy matter to induce them to emigrate.

Owing to the tithe agitation and other causes of depression and discontent among the agricultural classes of Wales, I have recently thought it well to prepare a four page leaflet for distribution in that part of the country, in which I have given a brief description of Ontario and set forth the great advantages it offers to tenant farmers and others with some capital and practical experience ; also pointing out that in Ontario there is perfect religious equality, no tithes to pay and no vexatious game laws or other restrictions to hamper and burden their industry. As very many of the Welsh people, especially in the rural sections of the country, are not able to read English, I have had the leaflet translated and am now having 20,000 printed which I will take immediate steps to have circulated. Should this experiment succeed in awakening an interest regarding Ontario in Wales, I shall, subject to your approval and sanction, repeat it on a larger scale.

As you are doubtless already aware there has been a very marked falling off in the volume of general emigration this year as compared with 1888. The following returns show the total number of passengers carried to Canada by the Allan, Dominion and Beaver Line steamers during both years :—

	1889.	1888.
Allan line	35,428	48,026
Dominion line	8,914	11,396
Beaver line	6,491	7,501

I have the honor to remain
Your obedient servant,

P. BYRNE,
Agent for Ontario.

No. 2.

ANNUAL REPORT OF EDWIN M. CLAY, ESQ., DOMINION IMMIGRATION AGENT, HALIFAX.

Dominion Immigration Office,
Intercolonial Railway Station,
Halifax, Nova Scotia, January 22nd, 1890.

Sir,—I have the honour to submit for your information a report of the immigration at this port for the year ending December 31st, 1889.

The arrivals at this port for the year were as follows:—

Cabin.

Males	3,517	
Females	2,817	
Children	293	
		6,627

Steerage.

Males	7,430	
Females	3,054	
Children	1,844	
		12,328
Grand total		18,955

The above shows an increase over last year in cabin of 2,856, and a decrease in steerage of 2,725, or an increase over the grand total of last year of 131.

The class of people landing here during the year has been far above the average of previous years, very few poor people, and none receiving Government assistance. In fact a better class could hardly be desired.

Six parties of children landed here as per statement enclosed.

Our farmers have again experienced a very prosperous year, crops all over the Province having yielded excellent returns.

Trusting the above will prove satisfactory.

I have the honour to be, Sir,
Your obedient servant,

EDWIN M. CLAY,
Dominion Immigration Agent.

D. Spence, Esq.,
Secretary Ontario Immigration Department,
Toronto, Ontario.

STATEMENT showing number of Children Immigrants landed at this port during the year 1889.

STEAMERS.	Date of Arrival.	By whom sent.	No. of Children.		Remarks: Where bound, etc.
			M.	F.	
Parisian.....	March 24..	Miss Macpherson.....	75	.....	Stratford, Ontario.
Siberian.....	" 26..	Mr. Quarrier	129	.. ..	Brockville, "
Vancouver.....	" 30..	R. Wallace.....	91	.....	Belleville, "
"	" 30..	Mr. Fegan	94	.....	Toronto, "
"	" 30..	Dr. Stephenson	47	.....	Hamilton, "
Manitoban.....	Sept. 24..	Mrs. Cameron.....	.....	20	St. John, N.B.

EDWIN M. CLAY,
Dominion Immigration Agent.

YEARLY RETURN of Immigrant Arrivals and Departures at Halifax, Nova Scotia, Immigration Agency for the year of 1889.

—	ADULTS, 12 YEARS AND OVER.		UNDER 12 YEARS.		TOTAL SOULS.	TOTAL AMOUNT BROUGHT IN.	
	Male.	Female.	Male.	Female.			
Via Ocean Travel	7430	3054	1073	771	12328	Effects...$	227,185 00
Via United States						Cash...$	321,375 00
Total	7430	3054	1073	771	12328	$	548,560 00

NATIONALITIES.											TRADES OR OCCUPATIONS.								DECLARED DESTINATIONS.										
																			LOWER PROVINCES.										
English.	Irish.	Scotch.	Germans.	Scandinavians.	French and Belgians.	U. S. Citizens.	Canadians.	Chinese.	Other Countries.	Total.	Farmers.	Farm Labourers.	General Labourers.	Mechanics.	Clerks, Traders, &c.	Female Servants.	Not Classified.	Total.	N. S.	N. B.	P.E.I.	Quebec.	Ontario.	Manitoba.	North-West Territories.	British Columbia.	United States.	Total.
5782	349	1012	278	247	380	2538	....	....	180	10766	804	804	3195	985	605	1201	3172	10766	4461	631	89	784	2346	1313	743	399	1562	12328
521	21	15	338	278	135	....	....	.. .	254	1562	44	81	853	58	1	176	349	1562	The figures in this line show those going to the U. S.										

ARRIVALS.	
Not reported elsewhere :	
For Canada	10766
For United States	1562
Reported elsewhere :	
For Canada	
For United States	
Total	12328

REMARKS.

EDWIN M. CLAY, *Agent.*

NOTE.—The five totals must agree.

Ocean Travel means immigrants arriving at a *Canadian* seaport. Those landing at Boston, New York, Portland, or crossing the United States frontier are *via* United States.

Nationality is to be decided by place of birth, except in case of children, who are to be classed with their fathers.

Declared Destinations. No person travelling across the continent, and not intending to settle, is to be counted.

Trades or Occupations. Women and children are to be classed as "not classified," except in the case of female domestic servants.

Yearly Return of Cabin Arrivals and Departures at Halifax, Nova Scotia, Immigration Agency for the year 1889.

—	Adults, 12 Years and Over.		Under 12 Years.		Total Souls.	Total Amount Brought in.
	Male.	Female.	Male.	Female.		
Via Ocean Travel	3,517	2,817	163	130	6,627	Effects...$
Via United States						Cash...$
Total	3,517	2,817	163	130	6,627	$

Nationalities.										
English.	Irish.	Scotch	Germans.	Scandinavians.	French and Belgians.	U. S. Citizens.	Canadians.	Chinese.	Other Countries.	Total.
1180	14	18	....	3	25	5368	....	....	5	6613
13	....	....	....	.....	.....	....	....	....	1	14

Trades or Occupations.							
Farmers.	Farm Labourers.	General Labourers.	Mechanics.	Clerks, Traders, &c.	Female Servants.	Not Classified.	Total.
....	.....	....	....	.....	....	6613	6613
....	.....	....	....	.....	....	14	14

Declared Destinations.									
Lower Provinces			Quebec.	Ontario.	Manitoba.	North-West Territories	British Columbia.	United States.	Total.
N. S.	N. B.	P.E.I.							
5840	194	17	140	245	73	21	83	14	6627
The figures in this line shew those going to the U. S.									

Arrivals.	
Not reported elsewhere:	
For Canada	6613
For United States	14
Reported elsewhere:	
For Canada	....
For United States	.....
Total	6627

Remarks.

EDWIN M. CLAY, *Agent.*

Note.—The five totals must agree.

Ocean Travel means immigrants arriving at *Canadian* seaports. Those landing at Boston, New York, Portland, or crossing the United States frontier are *via* United States.

Nationality is to be decided by place of birth, except in case of children, who are to be classed with their fathers.

Declared Destinations. No person travelling across the continent, and not intending to settle, is to be counted.

Trades or Occupations. Women and children are to be classed as "not classified," except in the case of female domestic servants.

No. 3.

ANNUAL REPORT OF R. MACPHERSON, ESQ., DOMINION IMMIGRATION AGENT, KINGSTON, ONTARIO.

GOVERNMENT IMMIGRATION OFFICE,
KINGSTON, 31st December, 1889.

SIR,—I have the honour to submit my annual Report shewing the arrivals and departures of immigrants at this Agency for the twelve months ending 31st December, 1889, and their nationalities.

The demand for farm labourers and female domestic servants during the past year as usual far exceeded the supply, more particularly in the summer season, and I trust a larger number of both may come under my care the coming year. There will also be a demand for ordinary labourers in this district next season to complete the laying of double track for the Grand Trunk Railway Company between Montreal and Toronto.

The immigrants generally, during the past season, were of a good class, healthy, and required but little medical assistance, were placed very soon after arrival, and but few returned to me for further advice after having been once placed.

In reference to child immigeation, from my personal knowledge after having inspected a very considerable number of them placed chiefly with farmers in my district, seeing their healthy condition, the general satisfaction they are giving and the care exercised in looking after them, I am satisfied this class of immigration is beneficial.

I have to report that stock raising continues to increase in my district and more attention is being paid by farmers than formerly to the improvement of this important branch of husbandry, also to the making of cheese and to the export of eggs and poultry.

All of which is respectfully submitted.

Your obedient servant,

R. MACPHERSON,
Government Immigration Agent.

The Honourable
THE COMMISSIONER OF IMMIGRATION
Toronto.

KINGSTON AGENCY.

STATEMENT showing the number of immigrant arrivals and departures at this Agency for the twelve months ending 31st December, 1889, and their nationalities, the number of free meals and free passes by railways, or other conveyances, from this Agency to their respective places of destination.

MONTHS.	Number of arrivals *via* the St. Lawrence and Halifax.	Number of Arrivals *via* the United States.	Total Number of Souls.	Went to the United States.	Went to Province of Quebec.	Went to Manitoba.	Remained in the Province of Ontario.	NATIONALITIES OF IMMIGRANTS SETTLED IN ONTARIO.									Number of Free Meals.	Number of Free Passes.
								English.	Irish.	Scotch.	German.	Scandinavian.	Swiss.	Icelandic.	American.	Other Countries.		
January	4	7	11	....	....	....	11	7	2	....	....	.....	....	....	2	.....	....	...
February	11	.....	11	....	....	....	11	9	2	.....	....	.....	....	....	....	.....	...	....
March	260	4	264	...	....	...	264	124	10	130	....	.....	....	....	....	.....	....	....
April	197	.....	197	....	....	....	197	175	7	12	....	3	....	....	....	.....	....	....
May	278	12	290	....	....	....	290	228	16	34	1	1	....	....	....	10	....	....
June	434	1	435	....	....	....	435	279	21	135	....	.....	....	....	....	....	....	....
July	102	.....	102	....	....	....	102	82	10	10	....	.....	....	....	....	.....	....	....
August	158	.....	158	....	....	....	158	148	5	5	....	.....	....	....	....	....	....	....
September	81	.....	81	....	....	....	81	62	11	8	...	.....	....	....	....	.....	....	....
October	55	.....	55	....	....	....	55	45	6	4	....	....	....	....	....	....	....	....
November	21	.....	21	....	....	....	21	13	4	4	....	.....	....	....	....	.....	....	....
December	8	.....	8	....	....	...	8	7	1	.....	....	....	....	....	....	.....	....	....
	1609	24	1633	....	....	....	1633	1179	95	342	1	4	....	....	2	10	....	....

(Signed) R. MACPHERSON,
Agent.

KINGSTON, 31st December, 1889.

No. 4.

ANNUAL REPORT OF JOHN A. DONALDSON, ESQ., DOMINION IMMIGRATION AGENT, TORONTO, ONTARIO.

Immigration Office,
Toronto, 31st December, 1889.

Sir,—I have the honour to submit this my twenty-ninth annual report, showing the working of this agency for the twelve months ending December 31st, 1889.

The arrivals here during that period, in number, fall below those of 1888, and are as follows: Total number of souls arriving and passing through here, 10,749. Of these 9,055 came by way of the Canadian ports, of Quebec and Montreal in summer, and Halifax in winter, and the remainder, amounting to 1,694, came here by way of the various ports of the United States.

The total number remaining in Ontario and dealt with at this office were 6,950.

Number passed through on their way to Manitoba and points in the North-West, 170.

Number passed through on their way to the Western States, 3,629.

As stated in my last year's report, the immigrants from Quebec on their way to Manitoba and the North-West, do not now pass through this agency, but take the all rail route, which accounts for the comparatively small number here reported.

The demand for agricultural laborers during the season has been greatly in excess of the supply, in fact it has been some years since we have had so many applications on our books for this class; farmers writing and coming from all sections of the country to obtain the necessary help, and in many cases being disappointed. Wages ranged from $15 to $22 per month for the summer season, and from $120 to $160 for the year. A larger number were hired by the year than has been the custom heretofore, and especially was this the case with married men with families.

The demand for domestic help, both in the city and country, has, as usual, far exceeded the supply, and we have found it utterly impossible to supply even a small proportion of those applying. Comparatively few girls of the domestic class now find their way as far as Toronto, and the majority of those who do have friends to go to, so that we have been worse off for domestic help this year than ever before, and especially is this the case in the agricultural districts.

The greater proportion of those arriving at the agency this season have obtained employment in the country parts, those remaining in the city being principally parties sent for by friends.

Very few general laborers have arrived this year, in comparison with former years, and there was a total absence of the pauper element, not a single person, as far as I am aware, having arrived who could be placed under this class. Almost all the societies in England who are now engaged in helping immigrants out, are very careful in their selection, and have a small fund of money here for the purpose of helping those they send out until they obtain employment, so that the burden of supporting them, in case they do not soon fall into work, does not fall upon the charitable institutions of the city.

The trade and business of the city has been very good, and what few mechanics arrived obtained employment without much difficulty, though, as a rule, there is but little demand for this class. The value of property in Toronto still increases, and for miles in every direction land is boing sold at very high figures for suburban residences, etc. As an instance of this I may state that a short time ago a farm of less than a hundred acres, a little outside of the city, was sold for $180,000, to be cut up into building lots. West Toronto Junction, where, a few years ago, scarcely a house was to be seen, is growing into a large and enterprising town, and many extensive manufactures are now running there, giving employment to a large number of hands.

Though the numbers this year are below those of 1888, the quality of the immigrants continues to improve, and we have had as good a class this season as could be wished for. All appear to be well and comfortably clothed, and from the value and appearance of their baggage, have sufficient clothing to face the winter. A few have invested in improved farms, but the majority deposited their money in the banks until they had a little experience in the ways of the country.

The general health of the new comers has been very good, the principal cases of sickness being among young children from the effects of sea sickness, or the weariness of the journey. Not a single death has occurred during the season.

The religious requirements of the new arrivals have been well looked after by the various ministers of the city, and services have been held on the premises whenever a sufficient number have been staying at the depot over Sunday.

Very few immigrants have availed themselves this season of the free grants in the Muskoka and Parry Sound Districts, though there has been considerable enquiry through this office by parties who have been resident in the country a few years, and who are contemplating moving there. The country opened up by the Canadian Pacific Railway, north of Lake Nipissing, appears to be attracting more attention now than the older district of Muskoka, both on account of the better quality of the land and from the fact that there is more choice. The mineral district also, round Sudbury, is causing considerable enquiry here, and we feel the need of maps and descriptive pamphlets of the whole of this northern country.

The various railway companies have been very attentive to the wants of the immigrants while on their way to their destination, and every possible kindness has been shown by the various officials on the trains and at the stations.

All of which is most respectsully submitted.

I have the honour to be, Sir,
Your obedient servant,
J. A. DONALDSON.

To the Honourable,
THE COMMISSIONER OF IMMIGRATION,
Toronto.

STATEMENT showing the number of Immigrant arrivals and departures at this Agency for the twelve months ending December 31st, 1889, and their nationalities, the number of free meals and free passes by railways, or other conveyances, from this Agency to their respective places of destination.

MONTHS.	Number of arrivals *via* the St. Lawrence and Halifax.	Number of arrivals *via* the United States.	Total number of souls.	Went to the United States.	Went to Province of Quebec.	Went to Manitoba.	Remained in the Province of Ontario.	NATIONALITY OF IMMIGRANTS SETTLED IN ONTARIO.								Number of free meals.	Number of free passes.
								English.	Irish.	Scotch.	German.	Scandinavian.	Swiss.	Icelandic.	American.	Other Countries.	
January	158	92	250	130	.....	.....	120	69	35	16	.....	.....	.....	.....	.....	.....	5	6
February	144	150	294	98	.....	.....	196	127	47	18	4	.....	.....	.....	.....	.....	7	5
March	414	362	776	269	.....	.....	507	325	109	73	.....	.....	.....	....	.....	.....	76	11
April	1515	212	1727	477	.....	55	1195	876	165	154	.....	.....	.....	.....	.....	.....	293	25
May	1859	206	2065	704	.....	.....	1361	924	190	213	29	5	.....	.....	.....	.....	567	26½
June	1524	90	1614	546	....	.....	1068	689	206	163	10	.....	.....	.....	.....	.....	203	9
July	799	142	941	381	.....	34	526	336	125	65	.....	.....	.....	.....	.....	.....	112	12½
August	768	119	887	260	.....	.....	627	448	94	85	.....	.....	.....	.....	.....	.....	76	13
September	591	85	676	235	.....	29	412	269	86	57	.....	.....	.....	.....	.....	.....	48	12
October	719	71	790	237	.....	48	505	270	123	81	25	6	.....	.....	.....	.....	116	11
November	327	111	438	169	....	4	265	160	57	26	22	.....	.....	.....	.....	.....	71	9½
December	237	54	291	123	.....	.....	168	97	45	17	9	.....	.....	.....	.....	.....	13	4½
Total	9055	1694	10749	3629	.....	170	6950	4590	1282	968	99	11	.....	...	.....	.....	1587	145

(Signed) J. A. DONALDSON,
Agent.

REPORT showing the number and destination of Immigrants forwarded from this Agency by Free Passes for the twelve months ending December 31st, 1889.

STATIONS.	Adult passes.	STATIONS.	Adult passes.
Acton	1	Harriston	1
Ailsa Craig	1	Holland Landing	1
Allandale	1	Hornby	2
Appin	2	Inglewood	1
Ayr	2	Islington	4
Berlin	2½	Jordan	2
Bolton	1	Kenilworth	2
Bothwell	3	London	3
Bowmanville	1	Malton	1
Bradford	4	Markdale	1
Brampton	1	Merritton	1
Brantford	1	Mimico	1
Bronte	1	Mount Forest	3
Burketon	1	Mono Road	1
Burk's Falls	3	Newmarket	1
Chatham	5	Niagara	8
Clarkson's	1	Orillia	2
Clinton	2	Owen Sound	1
Craigvale	1	Paris	7½
Durham	3½	Peterborough	2
Emsdale	2	Pickering	1
Erie and Huron Crossing	1	Port Carling	2
Fletcher	2	Port Dover	1
Foxmead	2½	Port Union	1
Galt	2	Reaboro	1
Garnet	1	Ridgetown	2
Gravenhurst	3	Shelburne	1
Grimsby	1	Simcoe	3
Hagersville	2	Springfield	1
Hamilton	6	Stratford	2

REPORT showing the number and destination of Immigrants forwarded from this Agency by Free Passes for the twelve months ending December 31st, 1889—*Continued..*

STATIONS.	Adult passes.	STATIONS.	Adult passes.
St. Catharines	3	Whitby	2
Thorold	3	Wingham	5
Thornhill	2	Winona	1
Tilsonburg	1	Woodville	1
Utterton	1	Woodstock	3
Watford	1		
Weston	1	Total	145

No. 5.

ANNUAL REPORT OF JOHN SMITH, ESQ., DOMINION IMMIGRATION AGENT, HAMILTON, ONTARIO.

HAMILTON, ONTARIO, December 31st, 1889.

SIR,—I have the honour to submit the following annual report with tabular statements showing the arrivals and departures of immigrants at this agency for the year ending the 31st day of December, 1889.

The past year shows a decrease of 1,575 immigrants settled in Ontario as compared with the corresponding period of the previous year.

There is a decrease of 617 immigrants passing through to Manitoba and the North-West Territories from the Ports of New York, Boston and Philadelphia, the New England States and the States of New York and Pennsylvania.

There is a large decrease of immigrants passing through Canada from the United States Alantic ports to the Western States amounting to 17,418.

Statement A shows the arrivals and departures of immigrants, their declared destinations, nationalities and occupations.

Statement B shows the arrivals and departures of immigrants and their general destinations.

Statement E shows the monthly arrivals of immigrants *via* the St. Lawrence and settling in Ontario.

Statemement F shows the monthly arrivals of immigrants *via* the United States settling in the Dominion and those passing through to the Western States.

Statement H shows the number of children brought and settled in the Hamilton district by the philanthropic societies.

Statement J shows the amount of capital reported as brought into Canada.

Statement L shows the number of immigrants settled in Canada and their destinations.

Statements M, N, O and P show the number of immigrants, the value of effects as reported at the Custom House ports of entry.

Statement Q shows the total number of immigrants and the value of their effects as reported by the respective customs ports of entry.

Statement S shows the rate of wages paid in the district of the Hamilton agency.

Statement T shows the prices of the different articles of food and wearing apparel.

The immigrants arriving at this agency during the past year compared favorably with those received in previous years. the whole of them being healthy and self-reliant and free from the pauper element.

The number of mechanics arriving here and reporting themselves at this agency amounted to sixty-eight, including those connected with the various trades, all of whom met with ready employment on arrival, the number arriving being inadequate to meet the demand, especially in the building trades, some of the contractors cabling to Europe for a supply of men.

The majority of immigrants arriving at this agency was from the rural districts of Europe being composed principally of agricultural and common labourers with their wives and families who readily found employment, the boys and girls being eagerly sought after for farm work and domestic duties; the immigrants this year being a very desirable class of settlers and well adapted to the wants of the Province.

During the year there has been a good enquiry for situations for young men to learn farming previous to purchasing farms in this Province or taking up homesteads in Manitoba or the North West Territories.

The past year having been pretty free from strikes, work has been steady with wages at full scale prices, and with the open fall and winter months building operations have been continued up to the close of the year.

During the past year there has been a good demand at this agency for all classes of immigrants and at no time has the supply equaled the demand, this being so particularly with the farm labourers, causing great inconvenience to the farmers who were unable to obtain the required help.

The immigrants arriving at the close of the year; the greater portion of them have been assisted out by their friends who arrived early in the season.

Agricultural Labourers.

The demand during the past year has been largely in excess of the supply both for married men with families and also for single young men. At present there is a good demand for all classes of farm labourers including stock men. Wages have ruled about the same as last year, engagements by the year were from one hundred and twenty dollars to one hundred and fifty and for first-class hands two hundred dollars has been paid, the rate per month for good hands running from twelve to fifteen dollars per month and for extra hands as high as twenty has been paid commencing from the 1st of April to the end of October, the rate for harvest hands being twenty-five dollars per month, including board and lodging.

Female Domestics.

During the past year it has been utterly impossible to meet the demand for this class of immigrants at the increased wages offered; the rate for ordinary servants ranging from eight to ten dollars and for first-class general servants the wages rate from twelve to fifteen dollars, whilst good cooks command from fifteen to twenty dollars per month.

The demand for this class of labour will continue owing to the increasing industries established in the Dominion giving employment to females; another cause for the scarcity of domestic servants is caused by the early marriages incident to colonial life.

Mechanics.

There has been a fair demand during the past year, those arriving having met with ready employment. The number reported at this agency as having arrived by the St. Lawrence and *via* the United States being sixty-eight.

Mill Operatives.

There has been a good demand for this class of labour, some of the mills being hard pressed to obtain the necessary number of hands.

Manufacturers' Operatives.

During the past year there has been a fair demand for all classes of operatives, especially in the ready-made clothing department.

Common and Skilled Labourers.

There has been a fair demand during the past year for all able-bodied labourers, able to work in the rolling mills, foundries, railways, public works and the building trades.

Juvenile Immigration.

The societies engaged in juvenile immigration, whose homes are located in the Hamilton district and referred to in statement H shows a decrease of two hundred and three as compared with the previous year.

The children which arrived this year compare very favourably with any brought out in previous years.

The superintendents and matrons have been careful in the selection of the homes provided for the children.

The children's home situated in Hamilton and connected with the homes of the Rev. Mr. Stevenson, England, of which the Hon. W. E. Sandford is President has met with a sad and heavy loss by the death of Mrs. Evans, the late matron ; the home is now managed by her son Mr. Sandford Evans, who has been engaged in the work for some time past, and during the winter and fall months he has made a thorough inspection of the children sent out from the home.

Most of the societies engaged in sending out adult emigrants are well organized, care being taken in the selection of the emigrants before being assisted out to Canada.

The Self-help Emigration Society, the Charity Organization Society, and the Northumberland Village Homes make ample provision for the care of their emigrants on their arrival in Canada until such time as they can obtain employment.

During the past year there has been a large correspondence asking for maps, pamphlets and general information in reference to free grant lands, Manitoba, British Columbia and the North-West Territories. The number of communications received and despatched for the year numbered 6,179.

The demand for agricultural labourers and female domestics has already commenced for the coming season and from present prospects it will be impossible to supply the demand.

I have the honour to be, Sir,
Your obedient servant,

JOHN SMITH,
Dominion Government Emigration Agent.

A.

STATEMENT of Immigrant Arrivals and Departures from Hamilton

MONTHS.	ARRIVALS.			SEXES.				DECLARED DESTINATIONS.						
	Via ocean travel.	*Via* United States.	From other ports of Canada.	Male adults.	Female adults.	Children under 12 years.	Total number of souls.	Lower Provinces.	Quebec.	Ontario.	Manitoba.	North West Territory.	British Columbia.	United States.
January	71	3605	....	1749	638	1289	3676	..	..	279	88	..	..	3309
February	75	3248	....	1573	579	1171	3323	..	..	281	83	.	..	2959
March	57	6790	....	4335	1166	1346	6847	..	..	318	157	..	..	6372
April	297	7649	....	4884	1349	1713	7946	..	..	549	186	..	..	7211
May	397	10030	....	6105	1755	2567	10427	..	..	699	129	..	..	9599
June	234	6695	....	4357	1172	1400	6929	..	..	492	118	..	..	6319
July	195	2842	....	1519	504	1014	3037	..	..	444	88	..	..	2505
August	242	1534	....	888	293	595	1776	..	..	421	58	..	..	1297
September	141	2021	....	1081	357	724	2162	..	..	384	60	..	..	1718
October	222	2003	....	1113	367	745	2225	..	..	253	44	..	..	1928
November	107	1881	....	995	328	665	1988	..	..	293	84	..	..	1611
December	103	1550	....	828	272	553	1653	..	..	247	103	..	..	1303
	2141	49848	....	29427	8780	13782	51989	..	.	4660	1198	..	..	46131
Philanthropic Societies	494	.....	....	.....	.....	494	494	..	..	494	....	..	..	.....
Customs Returns	....	1128	....	305	372	451	1128	..	..	1128	....	..	..	.....
Total	2635	50976	....	29732	9152	14727	53611	..	..	6282	1198	..	..	46131

HAMILTON, 31st December, 1889.

Immigration Agency for the twelve months ending December 31st, 1889.

Nationalities Remaining in Canada.									Occupations Remaining in Canada.							Not Reported Elsewhere.		Report'd Elsewhere			
English.	Irish.	Scotch.	German.	Scandinavian.	French and Belgian.	United States.	Canadians.	Chinese and Japanese.	Other countries.	Farmers.	Farm laborers.	General laborers.	Mechanics.	Clerks, Traders, etc.	Female domestics.	Not classified.	For Canada.	For United States.	For Canada.	For United States.	Effects.	Cash.
117	35	57	32	..	..	100	..	..	26	5	62	55	7	2	15	221	296	3309	71	..	.....	27095
122	19	59	66	..	..	82	..	..	16	5	66	65	21	1	24	182	289	2959	75	..	.....	26515
165	35	78	59	..	..	110	..	..	28	14	85	61	5	5	45	260	418	6372	57	..	.....	48660
345	79	97	90	..	..	95	..	..	29	19	103	92	16	3	85	417	438	7211	297	..	.....	54130
394	92	131	81	..	..	109	..	..	21	10	121	102	7	6	93	489	431	9599	397	..	.....	45875
294	55	84	56	..	..	97	..	..	24	5	122	85	....	....	73	325	376	6319	234	..	.....	40295
223	59	98	58	..	..	73	..	..	21	4	101	54	1	1	59	312	337	2505	195	..	.....	34310
218	58	99	41	..	..	52	..	..	11	3	87	62	....	....	62	265	237	1297	242	..	.....	26815
194	63	62	49	..	..	64	..	..	12	1	54	52	1	....	41	295	303	1718	141	..	.....	29200
112	58	61	30	..	.	27	..	..	9	....	41	45	....	....	26	185	75	1928	222	..	.....	30960
136	42	68	48	..	..	69	.	..	14	6	54	37	4	3	35	238	270	1611	107	..	.....	27875
118	37	66	47	.	..	65	.	..	17	2	27	22	6	4	21	268	247	1303	103	..	.....	38550
2438	632	960	657	..	..	943	..	..	228	74	923	732	68	25	579	3457	3717	46131	2141	..	.....	430280
462	30	2	....	..	..	....	..	..	....	....	....	....	....	....	....	494	....	.....	494	..	.....	.....
138	25	34	59	..	..	355	..	..	517	....	....	....	....	...	...	1128	1128	.....	....	..	84628	.....
3038	687	996	716	..	..	1298	..	.	745	74	923	732	68	25	579	5079	4845	46131	2635	..	84628	430280

JOHN SMITH,
Dominion Government Immigration Agent.

STATEMENT B.—Return of Immigrant arrivals and departures in the district of the Hamilton Agency, including those reported by the Customs Ports of Entry and the Philanthropic Societies for the year ending December 31st, 1889.

NATIONALITIES.	Number of arrivals *via* the St. Lawrence and Halifax.	Number of arrivals *via* the United States.	SEXES.			Total number of Souls.	NATIONALITIES.						GENERAL DESTINATIONS.		
			Males.	Females.	Children.		English.	Irish.	Scotch.	German.	United States Citizen.	Other Countries.	Ontario.	Manitoba.	Western States.
English	1467	4637	.....	.....	.....	6104	6104	.....	.....	.....	.....	.....	2229	237	3666
Irish	310	3671	.....	.....	.....	3981	.....	3981	.....	.....	.....	.....	547	85	3349
Scotch	354	2100	.....	.....	.....	2454	.....	.....	2454	.....	.....	.....	810	150	1494
German	10	20444	.....	.....	.....	20454	.....	.....	.....	20454	.....	.....	400	257	19797
United States citizen	.....	943	.....	.....	.....	943	.....	.....	.....	.....	943	.....	674	269	.....
Other Countries	.....	18053	.....	.....	.....	18053	.....	.....	.....	.....	.....	18053	.....	228	17825
	2141	49848	29427	8780	13782	51989	6104	3981	2454	20454	943	18053	4660	1198	46131
Philanthropic Societies	494	.....	.....	.....	494	494	462	30	2	.....	.....	.....	494	.....	.....
Customs Returns	.....	1128	305	372	451	1128	138	25	34	59	355	517	1128	.....	.....
Total, 1889	2635	50976	29732	9152	14727	53611	6704	4036	2490	20513	1298	18570	6282	1198	46131
Total, 1888	3590	69631	30922	14820	27479	73221	8724	5889	3930	27813	1342	25523	7857	1815	63549
Increase	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decrease	955	18655	1190	5668	12752	19610	2020	1853	1440	7300	44	6953	1575	617	17418

STATEMENT E.—Yearly return of Immigrant arrivals *via* the St. Lawrence at the Hamilton Agency and the Departures for the year ending December, 1889.

1889.	Total.	Nationalities.						Destinations.		
		English.	Irish.	Scotch.	German.	United States Citizen.	Other countries.	Ontario.	Manitoba.	Western States.
January	71	48	12	11				71		
February	75	50	12	13				75		
March	57	50		7				57		
April	297	239	28	30				297		
May	397	309	36	52				397		
June	234	178	28	28				234		
July	195	124	32	39				195		
August	242	149	45	48				242		
September	141	103	15	23				141		
October	222	103	52	57	10			222		
November	107	60	25	22				107		
December	103	54	25	24				103		
	2141	1467	310	354	10			2141		
Children's homes	494	462	30	2				494		
Total	2635	1929	340	356	10			2635		

HAMILTON, 31st December, 1889.

JOHN SMITH,
Dominion Government Immigration Agent.

STATEMENT F.—Yearly returns of Immigrant arrivals *via* the United States at the Hamilton Agency for the year ending December 31, 1889.

1889.	Total.	Nationalities.						Destinations.		
		English.	Irish.	Scotch.	German.	United States Citizen.	Other countries.	Ontario.	Manitoba.	Western States.
January	3605	373	307	189	1393	100	1243	208	88	3309
February	3248	368	278	139	1218	82	1163	206	83	2959
March	6790	577	475	248	2874	110	2506	261	157	6372
April	7649	571	559	281	2929	95	3214	252	186	7211
May	10030	639	586	345	4362	109	3989	302	129	9599
June	6695	666	517	255	3005	97	2155	258	118	6319
July	2842	429	310	175	1030	73	825	249	88	2505
August	1534	207	111	94	520	52	550	179	58	1297
September	2021	288	195	109	789	64	576	243	60	1718
October	2003	47	40	27	991	27	871	31	44	1928
November	1881	284	176	136	709	69	507	186	84	1611
December	1550	188	117	102	624	65	454	144	103	1303
	49848	4637	3671	2100	20444	943	18053	2519	1198	46131
Customs returns	1128	138	25	34	59	355	517	1128	....	.....
	50976	4775	3696	2134	20503	1298	18570	3647	1198	46131

HAMILTON, 31st December, 1889.

JOHN SMITH,
Dominion Government Immigration Agent.

STATEMENT H.—Shewing the number of children arrived in the District of the Hamilton Agency from the Societies engaged in Immigration for the year ending December 31, 1889.

NAME OF SOCIETY.	Boys.	Girls.	Total.	Remained in the Home December 31st, 1888.	Remained in the Home December 31st, 1889.
Rev. Mr. Stephenson's Home	47	33	80	10	7
Miss Rye's Home	.....	150	150	9	13
Miss McPherson's Home	162	87	249	25	42
Earl of Shaftesbury's Home	15	.....	15	.....	.....
Total, 1889	224	270	494	44	62
Total, 1888	367	330	697	.....	.....
Increase	.....	.....	.....	.....	.....
Decrease	143	60	203	.....	.....

JOHN SMITH,
HAMILTON, 31st December, 1889. Dominion Government Immigration Agent.

STATEMENT J.—Shewing the amount of capital brought to Canada by Immigrants and Settlers in the District of the Hamilton Agency for the year ending December 31, 1889.

MONTHS.	1889.	1888.	Increase.	Decrease.
	$ c.	$ c.	$ c.	$ c.
January	27,095 00	28,100 00	.....	.....
February	26,515 00	32,550 00	.....	.....
March	48,660 00	45,075 00	.....	.....
April	54,130 00	53,700 00	.....	.....
May	45,875 00	45,190 00	.....	.....
June	40,295 00	53,535 00	.....	.....
July	34,310 00	45,875 00	.....	.....
August	26,815 00	38,575 00	.....	.....
September	29,200 00	38,095 00	.....	.....
October	30,960 00	33,850 00	.....	.....
November	27,875 00	34,550 00	.....	.....
December	38,550 00	36,350 00	.....	.....
Total	430,280 00	485,445 00	.....	55,165 00

JOHN SMITH,
HAMILTON, 31st December, 1889. Dominion Government Immigration Agent.

STATEMENT L.—Shewing the location of Immigrants reportad in the district of the Hamilton Agency, including those sent out by the Philanthropic Societies and those reported by the Customs Port of Entry in the Hamilton district for the year ending December 31st, 1889.

County.	No.	County.	No.
Algoma	22	Middlesex	386
Bruce	182	Muskoka	61
Brant	214	Monck	7
Durham	7	Nipissing	46
Dufferin	23	Northumberland	7
Essex	177	Norfolk	231
Elgin	175	Ontario	89
Frontenac	9	Oxford	296
Grey	91	Peterboro'	6
Grenville	3	Peel	91
Halton	230	Perth	177
Haldimand	101	Renfrew	8
Huron	188	Stormont	5
Hastings	5	Simcoe	186
Kent	257	Wentworth	1025
Lincoln	212	Wellington	221
Leeds	4	Waterloo	267
Lambton	174	Welland	607
Lanark	2	York	490
Manitoba	1193	Total	7480

STATEMENT M.—Shewing the number of Immigrants reported at the Port of Hamilton and the value of their effects for the year ending December 31st, 1889.

NATIONALITY.	Male.	Females.	Children.	Total.	Value of Effects.
					$ c.
English	24	19	37	80	3814 00
Irish	3	4	14	21	145 00
Scotch	10	11	7	28	1430 00
German	4	4	7	15	700 00
United States Citizens	37	40	37	114	15110 00
Other Countries	67	98	132	297	21414 00
	145	176	234	555	42613 00

STATEMENT N.—Shewing the number of Immigrants reported at the Port of Niagara Falls and the value of their effects for the year ending December 31st, 1889.

NATIONALITY.	Male.	Females.	Children.	Total.	Value of Effects.
					$ c.
English	10	8	10	28	4170 00
Irish					
Scotch		1	1	2	100 00
German	11	12	13	36	2750 00
United States Citizens	20	29	15	64	6715 00
Other Countries	21	25	34	80	4615 00
	62	75	73	210	18350 00

STATEMENT O.—Shewing the number of Immigrants reported at the Port of Fort Erie and the value of their effects for the year ending 31st December, 1889.

NATIONALITY.	Males.	Females.	Children.	Total.	Value of Effects.
					$ c.
English	9	9	12	30	2300 00
Irish	1	1	2	4	300 00
Scotch	1	1	2	4	300 00
German	1	1	2	4	100 00
United States Citizens	43	60	66	169	12760 00
Other Countries	39	42	50	131	7335 00
	94	114	134	342	23095 00

STATEMENT P.—Shewing the number of Immigrants reported at the Port of Niagara, and the value of their effects for the year ending December 31, 1889.

NATIONALITIES.	Males.	Females.	Children.	Total.	Value of effects.
					$ c.
English					
Irish					
Scotch					
German	1	1	2	4	100 00
United States Citizens	1	2	5	8	150 00
Other Countries	2	4	3	9	320 00
	4	7	10	21	570 00

STATEMENT Q.—Shewing the number of Immigrants and the value of their effects at the respective Ports of Entry in the district of the Hamilton Agency for the year ending December 31, 1889.

NATIONALITY.	Hamilton.	Niagara Falls.	Fort Erie.	Niagara.	Total.	Value of Effects.
						$ c.
English	80	28	30		138	10284 00
Irish	21		4		25	445 00
Scotch	28	2	4		34	1830 00
German	15	36	4	4	59	3650 00
United States Citizens	114	64	169	8	355	34735 00
Other Countries	297	80	131	9	517	33684 00
	555	210	342	21	1128	84628 00

STATEMENT S.—Rate of Wages paid in the district of Hamilton Agency for the year 1889.

EMPLOYMENT.	WAGES.	
	From	To
	$ c.	$ c.
Bookbinders and Printers	1 50	2 00
Blacksmiths	1 50	2 25
Bakers	1 50	1 75
Brewers	1 50	3 00
Butchers	1 50	1 75
Brickmakers	1 75	2 50
Bricklayers and masons	3 00	3 25
Boilermakers	1 50	2 25
Carpenters	2 00	2 25
Cabinetmakers	1 50	2 50
Coopers	1 50	2 00
Fitters	1 75	2 25
Firemen, Locomotive	1 50	1 75
Laborers, Common	1 25	1 50
do Farm	1 25	1 25
do Railway	1 25	1 37
Lath Hands	1 50	2 00
Moulders	2 00	3 00
Millwrights	2 00	2 50
Millers	1 25	2 25
Painters	1 50	2 00
Patternmakers	1 75	2 50
Plasterers	1 75	2 50
Plumbers	1 50	2 25
Rivetters	1 50	1 75
Shoemakers	1 50	2 00
Shipwrights	1 75	2 50
Stonecutters	3 00	3 25
Saddlers	1 50	1 75
Tanners	1 25	2 50
Tailors	1 25	1 75
Tinsmiths	1 25	1 75
Woollen Mills.		
Card-room	50	1 25
Spinners	1 00	1 50
Weavers	75	1 25
Dyers	1 00	1 50
Wool Assorters	1 25	1 75
Cotton Mills.		
Card-room	50	1 00
Spinners	1 25	1 50
Weavers	80	1 25
Overlookers	2 25	3 00
Females per month with board and lodging.		
Cooks	12 00	20 00
Dairy Maids	7 00	10 00
Dressmakers and Milliners	10 00	15 00
General Servants	8 00	12 00
Laundry Maids	10 00	12 00
Housemaids	10 00	12 00
Monthly hands with board and lodgings.		
Farm laborers	12 00	15 00
Harvest hands	20 00	25 00
Lumbermen	15 00	25 00

JOHN SMITH,
Dominion Immigration Agent.

HAMILTON, December 31st, 1889.

STATEMENT T.—List of Retail Prices of the ordinary articles of food and raiment required by the working class.

ARTICLES.	PRICES. From	PRICES. To	ARTICLES.	PRICES. From	PRICES. To
	$ c.	$ c.		$ c.	$ c.
Bacon, per lb	10	15	Eggs, per doz	12	25
do Ham, per lb	12	17	Potatoes, per 60 lbs	30	40
do Shoulders, per lb	9	12	Salt do	45	50
Pork do	8	10	Firewood, per cord	4 00	6 00
Beef do	7	12	Coal, per 2000 lbs	4 00	5 75
Mutton do	10	12	Coat, over	5 00	10 00
Veal do	10	12	do under	4 00	6 00
Butter, fresh do	20	25	Pants	2 00	4 00
do salt do	15	20	Vests	1 00	2 00
Candles do	12	.....	Shirts, flannel	1 25	2 00
Cheese do	10	15	do cotton	50	1 00
Coffee do	25	40	do underware	37	1 00
Codfish do	6	10	Drawers, wollen, woven	50	75
Mustard do	35	40	Hats, felt	1 00	1 50
Pepper do	25	35	Socks, worsted	25	50
Rice do	4	5	do cotton	10	25
Soap do	5	6	Blankets, per pair	2 00	5 00
Sugar do	5	8	Rugs	1 00	1 50
Tea, green do	30	50	Flannel, per yard	20	40
do black do	30	50	Cotton do	5	10
Tobacco do	50	60	do double sheeting	20	30
Cornmeal per 100 lbs	2 00	2 50	Canadian tweed cloth	40	1 00
Flour do	2 00	2 75	Shoes, men's per pair	1 50	2 00
Buckwheat flour, per 100 lbs	2 00	2 50	do women's do	1 00	1 50
Oatmeal do	.....	2 75	Boots, men's do	1 75	2 50
Bread, by 4 lbs. loaf	9	10	do women's do	1 25	2 00
Milk, per quart	5	6	Rubber, men's do	75	1 25
Herring, per barrel	7 00	8 00	do women's do	50	75

JOHN SMITH,
Dominion Government Immigration Agent.

HAMILTON, December 31st, 1889.

No. 6.

ANNUAL REPORT OF A. G. SMYTH, ESQ., DOMINION IMMIGRATION AGENT, LONDON, ONT.

Immigration Office, December 31st, 1889.

Sir,—I have the honour to enclose statement shewing the arrivals and departures of immigrants at this agency for the year ending 31st December, 1889 :

The total number, 1,615 ; *via* St. Lawrence and Halifax, 1,069 ; *via* the United States, 546 ; distributed as follows to Manitoba, British Columbia, and the North-West Territories, 236 ; remained in the Province of Ontario, 1,204 ; went to the Western States, 175. The nationalities of those remaining in Ontario are : English, 658 ; Irish, 243 ; Scotch, 175 ; Germans, 91, and other countries, 37.

One hundred and twenty-nine have also settled in Ontario as per statement from our Custom House, who brought in goods and effects, value $6,953.00, more than half of whom are Canadians returning from the United States.

The class of immigrants that arrived at this agency was very good all the season, many with cash and capital outfits.

The demand as usual for agricultural and farm servants has been much in excess of the supply, especially in the early part of the season.

The prospects for the coming season are as good as usual, and no doubt, but that all farm and general labourers who will choose this district to settle in will get employment at good fair wages.

I have the honour to be, Sir,
Your obedient servant,

A. G. SMYTH,
Government Immigration Agent.

David Spence, Esq.,
Secretary, Department of Immigration,
Toronto, Ont.

LONDON AGENCY.

STATEMENT shewing the number of Immigrant arrivals and departures at this Agency for the twelve months ending 31st December, 1889, and their nationalities, the number of free meals and free passes by railways, or other conveyances from this Agency to their respective places of destination.

MONTHS.	Number of arrivals *via* the St. Lawrence and Halifax.	Number of arrivals *via* the United States.	Total number of Souls.	Went to the United States.	Went to Province of Quebec.	Went to Manitaba, North West Territories, and British Columbia.	Remained in the Province of Ontario.	Nationalities of Immigrants Settled in Ontario.									Number of Free Meals.	Number of Immigrants fed.	Number of Free Lodgings.	Number of Free Passes.
								English.	Irish.	Scotch.	German.	Scandinavian.	Swiss.	Icelandic.	American.	Other Countries.				
January	63	51	114	20	.....	7	87	48	19	15	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
February	61	25	86	25	.....	9	52	38	11	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
March	69	56	125	20	.....	19	86	38	26	7	7	.....	.....	.....	.....	8	.....	.....	.....	.....
April	170	46	216	19	.....	30	167	106	28	22	11	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	149	42	191	5	.....	19	176	110	29	25	12	.....	.....	.....	.....	.....	.....	.....	.....	.....
June	105	66	171	18	.....	42	111	53	16	19	11	.....	.....	.....	.....	12	.....	.....	.....	.....
July	65	63	128	10	.....	25	93	39	25	19	6	.....	.....	.....	.....	4	.....	.....	.....	.....
August	71	37	108	7	....	21	80	34	21	19	6	.....	.....	.....	.....	.....	.....	.....	.....	.....
September	64	49	113	7	.....	23	83	34	22	18	9	.....	.....	.....	.....	.....	.....	.....	.....	.....
October	72	49	121	18	.....	20	83	29	12	20	9	.....	.....	.....	.....	13	.....	.....	.....	.....
November	45	33	78	11	.....	15	52	31	12	2	7	.....	.....	.....	.....	.....	.....	.....	.....	.....
December	135	29	164	15	.....	15	134	98	22	9	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	1069	546	1615	175	.....	236	1204	658	243	175	91	.....	.....	.....	.....	37	.....	.....	.....	.....

LONDON, ONT., 31st December, 1889.

(Signed), A. G. SMYTH,
Government Immigration Agent.

FIFTEENTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM,

1889.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

TORONTO:
PRINTED BY WARWICK & SONS, 68 AND 70 FRONT STREET WEST.
1890.

CONTENTS.

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ONTARIO AGRICULTURAL COLLEGE GUELPH.

FIFTEENTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND EXPERIMENTAL FARM.

GUELPH, January 2nd, 1890.

To the Honorable CHARLES DRURY,
Minister of Agriculture :

DEAR SIR,—I have the honor to submit herewith the Fifteenth Annual Report of the Ontario Agricultural College and Experimental Farm.

In this Report we have reviewed briefly the work of the year 1889 under the following heads :—

I have the honor to be, sir,
Your obedient Servant,

JAMES MILLS,
President.

PART I.

REPORT OF THE PRESIDENT.

A year ago on the 26th of last November our farm buildings, with their contents, were destroyed by fire. This calamity caused us much trouble and inconvenience. We had to sell most of our cattle at such prices as we could get under very unfavorable circumstances, and were obliged to provide temporary stabling for our horses during the winter. It was not only the loss and inconvenience that were to be regretted, but the serious interference with the educational work of the institution. The students who were in attendance last winter had little or no opportunity for practical instruction in cattle feeding; no experiments were conducted in the live-stock department; and we had not the usual number and variety of animals for practical illustration in the live-stock class-room. Notwithstanding these disadvantages, we kept the students together and did what we could in various ways to make up for the lack of practical instruction in one or two departments.

During the latter half of the year things have been in much better shape for efficient and satisfactory work in all the outside departments.

The Experimental Department.

Our new experimental barn, with the necessary conveniences for experimental work, was completed early in the summer. A large number of varieties of wheat, oats, and barley, imported from Europe, were sown on our experimental plots; and under the management of Professor Shaw, with the efficient assistance of Mr. C. A. Zavitz, our Assistant Superintendent of Experiments, it is hoped that valuable results will be obtained from these tests—that some good varieties of cereals which are adapted to our changed conditions of soil and climate will be found and gradually distributed among the farmers of this Province. A number of experiments in cattle feeding have also been undertaken —breed against breed, food against food, and method against method. Careful tests are being made, and bulletins giving the results will be issued from time to time during the winter and spring.

The Farm Proper.

A special and determined effort has been made during the year to clean the farm of noxious weeds, which have given some trouble and have not added much to our reputation in the past; nearly a mile of substantial wire fence has been constructed; and a good deal of time has been spent in making a first-class (I might almost say a model) road between our farm proper and an additional fifty acres in the township of Puslinch. This road will be a convenience to ourselves and the public, and will add considerably to the value of the land on both sides. Our new farm buildings have been completed; and I think we may say that the barn, silo, horse stable, sheep house and bull shed which we now have are in many respects a marked improvement upon those which were destroyed a year ago. They look better and are much more convenient.

Live Stock.

We have not imported either sheep or cattle to take the place of those which were sold after the fire, but have endeavored to buy suitable animals at reasonable prices from Canadian breeders. Professor Shaw and John I. Hobson, Esq., were commissioned to purchase cattle of the beef breeds—Shorthorns, Herefords, Aberdeen-Angus Polls, Galloways, and Devons. They completed their work some time since, and the animals selected are now in our stables for experimental and educational work. In addition to these, Professor Shaw bought four Jerseys and two Ayrshires some months ago; and J. W. Robertson, our Professor of Dairy Husbandry, has recently selected two or three more Ayrshires and suitable samples of the Holstein breed.

The Dairy Department.

In the Dairy Department also, valuable work has been done during the past year. By direction of the Professor of Dairying, 70 samples of Indian corn were sown under different conditions. The intention was to make a number of experiments simultaneously; and the plot of ground chosen for the purpose was a large, low-lying field which was rather dirty, but otherwise in fair condition. Part of this field was ploughed in the fall, part in the spring, and the remainder in both fall and spring. Artificial fertilizers were applied to one part of the field, a good coat of farmyard manure to another, and a third part was left unmanured. Some of the seed was sown broadcast, some in drills, and some in hills. Some was sown early, some late and some at the ordinary time. Drills were made at different distances apart, and different quantities of seed were put in different drills. Thus, it will be seen, many practical points were involved, and Professor Robertson's report giving the results in Part VIII. of this volume will be an unusually interesting and valuable addition to dairy literature in this Province.

For the preservation of the corn spoken of above, a large silo has been constructed in one corner of the old barn, near the creamery; and the remainder of the same barn has been changed into a cow stable for winter-dairying.

The Horticultural Department.

There has been the usual amount of work in this department, but nothing specially noteworthy, except the grading and gravelling of some roads on the lawn. Owing to the size of the lawn and the number of other things to be looked after—the vegetable garden, the orchard, the raspberry grounds, the vinery, and the forest tree-clumps—the work in this department has become very heavy; and this year it has been work without much return, because the frost which came early in June was so severe that it left neither blossoms, fruit, nor fruit buds. Consequently we have grown no fruit this year. We are now buying all we use, and shall have to do so till next autumn.

Chemical and Botanical Laboratories.

The work in these two laboratories has been carried on with energy and earnestness throughout the year. It is however fully described by the Professors of Chemistry and Natural History in Parts III. and IV. of this report, and all I need say is that our students generally are taking greater interest than formerly in scientific and literary work. They are not neglecting the practical or bread-and-butter branches; but they seem more anxious to learn the scientific principles which underlie the best practice, and to acquire such a knowledge of their mother tongue as will enable them to express their thoughts correctly, clearly, and forcibly on such subjects as it may be their duty or privilege to discuss in the different spheres in which they may move when college days are past.

A College Paper Started.

For several years past our students have thought and talked about starting a college paper, but the shortness of our course of study has always been a serious obstacle in the way. During the first fourteen years of our history, our course was limited to two years; and as a consequence we had regularly a complete change of students every *biennium*. Under such a system it would of course be very difficult to conduct a college paper with any degree of efficiency. With editors and business managers constantly changing, there would not be much chance of success. In the session 1887-88, however, a third year was added to our course, and since that time the prospects for a college journal have been somewhat brighter. At length, in October last, the matter was taken up by our Literary Society, and in the month of November the first number of the "O. A. C. Review" appeared. The second number has since come to hand, and, all considered, I think it is a creditable production—one which exhibits good taste and a very fair share of journalistic ability.

A Very Sad Event.

In this report it is our painful duty to record the first death in our list of graduates —that of R. M. Soule, B. S. A., South End, Welland, Ontario. Having spent three years with us, Mr. Soule passed his final examinations in May last, and on the 8th of June received the degree of B. S. A from the University of Toronto. Twenty-four years of age, full of hope, and anxious to make some return for the advantages of a college education, he went back to his father's farm and had got nicely to work, when his life came suddenly to an end, and his parents were left to mourn the death of a dutiful and promising son. Mr. Soule was a general favorite at college, a good student, and a hard worker. His conduct and record were very satisfactory to the college staff, and his sorrowing parents have our sincere sympathy.

Students in Attendance.

The attendance during the past year has been quite satisfactory—a little larger than the year before. The total number on the roll is 134, more than 70 per cent. of whom are from this Province. Thirty-one counties of Ontario are represented, and the largest representation is from the counties of Grey, Leeds, Prince Edward, York, and Middlesex.

COLLEGE ROLL FOR 1889.

Third Year Students.

Name.	P. O. Address.	County, Etc.
Brodie, G. A.	Bethesda	York, Ont.
Dean, H. H.	Harley	Brant, Ont.
Gelling, J. A.	Bridgewater	Nova Scotia.
*Harcourt, G.	St. Ann's	Lincoln, Ont.
*Hutton, J. R.	Welland	Welland, Ont.
*Lehmann, A.	Orillia	Simcoe, Ont.
McCallum, W.	Ailsa Craig	Middlesex, Ont.
McEvoy, T. A.	London South	Middlesex, Ont.
Monteith, S. N.	Fairview	Perth, Ont.
*Morgan, J. H. A.	Kerwood	Middlesex, Ont.
Orsman, C. P.	Bathurst	Lanark, Ont.
*Raynor, T.	Rose Hall	Prince Edward, Ont.
Shantz, A.	Waterloo	Waterloo, Ont.
Stover, W. J.	Norwich	Oxford, Ont.
*Soule, R. M.	South End	Welland, Ont.
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*Obtained the degree of B.S.A. in June.

Associates Doing Special Work.

Name.	P. O. Address.	County, Etc.
Horrocks, T. J.	Toronto	York, Ont.
Willans, N.	Leeds	England.
Willans, T. B.	Leeds	England.
—3		

Second Year Students.

Name.	P. O. Address.	County, Etc.
Asbury, E.	Delaware	Middlesex, Ont.
Bayne, P. R. C.	Calcutta	India.
Brown, H. H.	Chatham	Kent, Ont,
Buchanan, D.	Hensall	Huron, Ont.
Campbell, C. S.	Brantford	Brant, Ont.
Cowan, J. H.	Galt	Waterloo, Ont.
Cowan, R. E.	Galt	Waterloo, Ont.
*Derbyshire, J. A.	Brockville	Leeds, Ont.
Dolsen, W. H.	Chatham	Kent, Ont.
Elliott, R.	Seaforth	Huron, Ont.
Fairbairn, O. G.	Brockville	Leeds, Ont.
Field, H.	Cobourg	Northumberland, Ont.
Hadwen, G. H.	Mons en Bareul, near Lille	France.
Harcourt, J.	St. Ann's	Lincoln, Ont.
Hewgill, E. A.	Heathcote	Grey, Ont.
Holliday, W. B.	North Shields	England.
Hutt, H. L.	South End	Welland, Ont.
*Linfield, F. B.	Dunlop	Huron, Ont.
Macfarlane, T. W. R.	Ottawa	Carleton, Ont.
Makinson, T. C.	Harbor Grace	Newfoundland.
*Marsack, F.	Turnbridge Wells	England.
*Marsack, H.	Turnbridge Wells	England.

COLLEGE ROLL.—SECOND YEAR STUDENTS.—*Continued.*

Name.	P. O. Address.	County, Etc.
Mattice, W. A	Cornwall	Stormont, Ont.
McDonald, H. M	Lower South River	Nova Scotia.
McKergow, J. G	Montreal	Quebec.
*McClaren, P	McGarry	Lanark, Ont.
Monk, W. D	South March	Carleton, Ont.
Mulholland, F	Yorkville	York, Ont.
Noxon, H. S	Ingersoll	Oxford, Ont.
*Rendall, W	Camperdown	Grey, Ont.
*Rennie, E. A	Hamilton	Hamilton, Ont.
Shaw, P. G	Thornton Heath, Surrey	England.
Sleightholm, J. A. B	Humber	Peel, Ont.
Thomson, H. C	Hamilton	Hamilton, Ont.
*Tinney, T. H	Oakwood	Victoria, Ont.
Watson, G. C	Varney	Grey, Ont.
Webster, F. E	Creemore	Simcoe, Ont.
Wells, E	Chilliwhack	British Columbia.
Whitley, C. F	Enfield, Middlesex	England.
Wilson, F. G	Green River	Ontario.
Wood, W. D	Cornwall	Stormont, Ont.

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*Received an Associate Diploma in June

FIRST YEAR STUDENTS.

Name.	P. O. Address.	County, Etc.
Alloway, E. L. U	Toronto	York, Ont.
Bate, E. H	Brighton	Northumberland, Ont.
Bealey, H. B	Ratcliffe Close	England.
Benyon, E. A. G	Bracknell, Surrey	England.
Bertram, H	Toronto	York, Ont.
Buscarlet, F. W	Lausanne	Switzerland
Burns, J. A. S	Halifax	Nova Scotia.
Cathcart, W	Liverpool	England.
Carlyle, W. L	Chesterville	Dundas, Ont.
Cochrane, J	Kilsyth	Grey, Ont.
Conn, W	Heathcote	Grey, Ont.
Cox, H	Rose Hall	Prince Edward, Ont.
Duke, E. W	Chelsea, London	England.
Dunne, H. R	Ottawa	Carleton, Ont.
Esterbrook, F	Bridgehampton, L. I	New York, U. S.
Faithfull, L. E	Marseilles	France.
Farlinger, F. E	Morrisburg	Dundas, Ont.
Gibson, D. Z	Willow Grove	Haldimand, Ont.
Golden, J. H	Amherstburg	Essex, Ont.
Graham, M. H	London, S. W	England.
Grange, G. J	Guelph	Wellington, Ont.
Grant, R. S	Byng	Haldimand, Ont.
Hall, E	Darlington, Durham	England.
Hall, W. P. B. H	Kingston	Frontenac, Ont.
Harris, J. C	Calne, Wilts	England.
Harrison, F. C	London	England.
Hunter, G. N	St. George	Brant, Ont.
Haight, W. L	Wellington	Prince Edward, Ont.
Jacob, N. F	Norwich	Oxford, Ont.
Johnston, P. B	Somenos	British Columbia.
Kitchen, B. E	Waterford	Norfolk, Ont.
Landsdowne, F. R. B	Clifton, Bristol	England.
Lewis, W. W	Brockville	Leeds, Ont.
McCrea, H. E	Brockville	Leeds, Ont.
McFaul, D	Wellington	Prince Edward, Ont.

College Roll.—First Year Students.—*Continued.*

Name.	P. O. Address.	County, Etc.
McGarry, W. R	McGarry	Lanark, Ont.
McGoey, J. P	Ottawa	Carleton, Ont.
McMichael, J. H	Waterford	Norfolk, Ont.
Moody, A. A	Weston	York, Ont.
Murphy, A	Sidney	Cape Breton, N. S.
Milne, H. S	Brown's Corners	York, Ont.
Musgrave, R	Cowichan	British Columbia.
Newcomen, W. F	Epping, Essex	England.
Perry, E	Smithville	Lincoln, Ont.
Pownall, E. F	S. Kensington, London	England.
Preston, J. G	Forfar	Leeds, Ont.
Ransom, S	Sydenham	England.
Rorke, J. R	Heathcote	Grey, Ont.
Roper-Curzon, A. C	Norbiton Place, Surrey	England.
Roper-Curzon, S. D	Norbiton Place, Surrey	England.
Rowen, E	Holt	York, Ont.
Seymour, F. B	Toronto	York, Ont.
Scully, D	Downeyville	Victoria, Ont.
Smith, D	Montreal	Quebec.
Sparrow, J. C. H	Antrim	Carleton, Ont.
Spencer, W. A	Salmon Point	Prince Edward, Ont.
Stagg, J. C	Brockville	Leeds, Ont.
Start, F. E	Currie's Crossing	Oxford, Ont.
Thomas, E. F	Clifton, Bristol	England.
Thompson, A	Thornton	Simcoe, Ont.
Thompson, J. P	Uptergrove	Ontario.
Urquhart, W. H	Newbury	Middlesex, Ont.
Warner, W. A	Napanee	Lennox, Ont.
Weber, E	Hamburg	Germany.
White, E. F	Clarksburg	Grey, Ont.
White, J	Heathcote	Grey, Ont.
Wheaton, J. H	Thorndale	Middlesex, Ont.
Whitworth, E. J	Fenwick	Welland, Ont.
Wiancko, A. T	Sparrow Lake	Muskoka, Ont.
Wills, H. G	Toronto	York, Ont.
Wilkin, F. A	Calgary	Northwest Territories.
Wilkinson, J. J	Winterbourne	Waterloo, Ont,
Worthington, F. H	Brockville	Leeds, Ont.
Woolverton, E. L	Grimsby	Lincoln, Ont.
Young, J. L	Murray	Prince Edward, Ont.
—75		

Total.....134.

Analysis of Roll.

Counties, etc.	No. of Students.	Counties, etc.	No. of Student
Brant	3	India	1
British Columbia	3	Kent	2
Carleton	4	Lanark	3
Cape Breton	1	Lincoln	4
Dundas	2	Leeds	7
England	22	Lennox	1
Essex	1	Middlesex	6
France	2	Muskoka	1
Frontenac	1	Newfoundland	2
Germany	1	New York, U. S. A	1
Grey	8	Norfolk	2
Haldimand	2	Northumberland	1
Hamilton	2	Northwest Territories	1
Huron	3	Nova Scotia	3

ANALYSIS OF ROLL—*Continued.*

Counties, etc.	No. of Students.	Counties, etc.	No. of Students.
Ontario (County)	2	Switzerland	1
Ottawa	1	Toronto	4
Oxford	4	Victoria	2
Peel	1	Waterloo	4
Perth	1	Welland	4
Prince Edward county	6	Wellington	1
Quebec	2	York	6
Simcoe	3		
Stormont	2	Total	134

RELIGIOUS DENOMINATIONS.

Episcopalians	38	Christians	1
Presbyterians	33	Evangelical Reform	1
Methodists	30	Mennonites	1
Baptists	9	Plymouth Brethren	1
Congregationalists	9		
Roman Catholics	6	Total	134
Friends	5		

AGE OF STUDENTS.

3	16 years.	5	23 years.
19	17 "	7	24 "
30	18 "	5	25 "
22	19 "	7	26 "
13	20 "	1	27 "
8	21 "	3	28 "
11	22 "		

Average age.....20 years.

COUNTY STUDENTS.

Of those in attendance during the year, thirty were nominated by county councils and as a consequence were exempted from the payment of tuition fees. The counties represented were the following :—

Addington, Brant, Carleton, Cornwall, Dundas, Elgin, Essex, Grenville, Grey, Haldimand, Huron, Kent, Lambton, Lanark, Leeds, Lennox, Lincoln, Middlesex, Muskoka, Norfolk, Northumberland, Ontario, Peel, Prince Edward, Simcoe, Stormont, Victoria, Waterloo, Welland, York.

CLASS-ROOM WORK.

Our class-room work has gone on as usual during the past year. The candidates for degrees were all successful in passing their examinations, and a fair proportion of first and second year students gained a respectable standing; but the number of failures is still much larger than it should be. The syllabus of lectures given in Appendix 1 conveys some idea of the class-room work done during the year, and the class lists in Appendix 4 indicate the standing of each student more clearly than anything I could say.

Examiners.

The third year examinations were conducted by the University of Toronto, and those of the first and second years by the professors of the College and three other gentlemen, to whom we are much indebted, viz., S. C. Smoke, B.A., and E. C. Jeffrey, B.A., of Toronto, Examiners in English Literature, and W. A. Douglas, B.A., of the same place, Examiner in Political Economy.

Bachelors of the Science of Agriculture.

Six candidates for the degree of B.S.A. were examined in the month of May. These candidates were all successful, and received their degrees at the regular Convocation of the University of Toronto on the 8th of June. The list is as follows :—

Harcourt, G.	County of Lincoln, Ont.
Hutton, J. R.	County of Welland, Ont.
Lehmann, A.	County of Simcoe, Ont.
Morgan, J. H. A.	County of Middlesex, Ont.
Raynor, T.	County of Prince Edward, Ont.
Soule, R. M.	County of Welland, Ont.

Recipients of Associate Diplomas.

Thirteen young men, having completed the course of two years, received diplomas admitting them to the status of Associates of the College. The diplomas were presented by the Hon. Charles Drury, Minister of Agriculture, at our closing exercises on the 28th of June, and the names of the recipients are as follows :—

Brodie, G. A	Bethesda, York, Ont.
*Derbyshire, J. A.	Brockville, Ont.
Gelling, J. A	Bridgewater, N. S.
Linfield, F. B.	Dunlop, Huron, Ont.
Marsack, F.	Tunbridge Wells, England.
Marsack, H.	" " "
McCallum, W	Ailsa Craig, Middlesex, Ont.
†McEvoy, T. A.	London, Middlesex, Ont.
McLaren, P. S.	McGarry, Lanark, Ont.
*Monteith, S. N	Fairview, Perth, Ont.
Rendall, W	Camperdown, Grey, Ont.
‡Rennie, E. A.	Hamilton, Wentworth, Ont.
Tinney, T. H.	Oakwood, Victoria, Ont.

First-class Men.

The work in the college is divided into five departments, and all candidates who get an aggregate of 75 per cent. of the marks allotted to the subjects in any department are ranked as first-class men in that department. We would like to have a larger number of such men, but we are determined that none shall be so ranked unless they really deserve it. The following list contains the names of those who gained a first-class rank in the different departments at the examinations in 1889 :—

First Year.

1. Bayne, S. R., Calcutta, India.—In one department : Natural Science.
2. Buchanan, D., Hensall (Huron), Ont.—In one department : Veterinary Science.

* Required to take Veterinary Obstetrics again.
† Has to pass another examination in Organic Chemistry.
‡ Has to pass another examination in Systematic Botany.

3. Cowan, R. E., Galt (Waterloo), Ont.—In two departments: Agriculture, and Mathematics and Book-keeping.

4. Dolsen, W. J., Chatham (Kent), Ont.—In one department: Mathematics and Book-keeping.

5. Hadwen, G. H., Lille, France.—In one department: Agriculture.

6. Harcourt, J.. St. Ann's (Lincoln), Ont.—In four departments; Agriculture, Natural Science, Veterinary Science, and Mathematics, and Book-keeping

7. Hutt, H. L., South End (Welland), Ont.—In three departments: Agriculture, Natural Science, and Veterinary Science.

8. Sleightholm, J. A. B., Humber (Peel), Ont.—In three departments: Agriculture, Natural Science and Mathematics, and Book-keeping.

9. Thompson, J. P., Uptergrove (Ontario county), Ont.—In one department: Mathematics and Book-keeping.

10. Whitley, C. F., Middlesex, England.—In one department: English Literature and Composition.

Second Year.

1. Brodie, G. A., Bethesda (York), Ont.—In four departments: Agriculture, Natural Science, Veterinary Science, English Literature and Political Economy.

2. Linfield, F. B., Dunlop (Huron), Ont.—In five departments: Agriculture, Natural Science, Veterinary Science, English Literature and Political Economy, and Mathematics.

3. Monteith, S. N., Fairview (Perth), Ont.—In one department: Agriculture.

4. Rendall, W., Camperdown (Grey), Ont.—In one department: Agriculture.

5. Tinney, T. H., Oakwood (Victoria), Ont.—In four departments: Agriculture, Natural Science, Veterinary Science, and English Literature, and Political Economy.

MEDALLISTS.

Medals were given to the three students who ranked highest in general proficiency in the theory and practice of the second year taken together. The competition was close and keen, as usual, with the following results:—

Gold Medallist.—G. A. Brodie, Bethesda, York, Ont.

First Silver Medallist.—F. B. Linfield, Dunlop, Huron, Ont.

Second Silver Medallist.—T. H. Tinney, Oakwood, Victoria, Ont.

PRIZE MEN OF FIRST YEAR.

Agriculture and Dairying.—1st, J. A. B. Sleightholm, Humber, Peel, Ont.; 2nd, H. L. Hutt, South End, Welland, Ont.

Natural Science.—1st, J. Harcourt, St. Ann's, Lincoln, Ont.; 2nd, H. L. Hutt.

Veterinary Science.—1st, J. Harcourt; 2nd, D. Buchanan, Hensall, Huron, Ont.

English Literature and Composition.—1st, C. F. Whitley, Enfield, Middlesex, England; 2nd, H. L. Hutt.

Mathematics and Book-Keeping.—1st, J. Harcourt; 2nd, R. E. Cowan, Galt, Waterloo, Ont.

General Proficiency.—1st, J. Harcourt; 2nd, Hutt; 3rd, Sleightholm.

PRIZE MEN OF SECOND YEAR

Agriculture, Live Stock, Dairying.—1st, G. A. Brodie; 2nd, F. B. Linfield.

Natural Science.—1st, T. H. Tinney; 2nd, G. A. Brodie.

Veterinary Science.—1st, G. A. Brodie; 2nd, T. H. Tinney.

English Literature.—1st, F. B. Linfield; 2nd, G. A. Brodie.

Mathematics.—1st, F. B. Linfield; 2nd, T. H. Tinney.

General Proficiency.—1st, Brodie; 2nd, Linfield; 3rd, Tinney; 4th, W. Rendall, Camperdown, Grey, Ont.

Valedictory Addresses.

The second year men chosen by their fellow students to deliver the valedictory addresses at the closing exercises on the 28th June were S. N. Monteith and F. B. Linfield.

Farmers' Institutes.

The work of the Farmers' Institutes is still increasing in magnitude and importance. The professors of our college took part in about sixty institute meetings in January, 1889, and J. W. Robertson, our professor of dairy husbandry, was helping at institute and dairying meetings during the greater part of the year.

The gentlemen who composed the deputations in January, 1889, were: Professors Panton, James, Robertson, Grenside, Shaw, Mills; Messrs. John I. Hobson, John McMillan, M.P., Edward Jeffs, John Dryden, M.P.P., Simpson Rennie, A. H. Pettit, John Kernighan, and D. Nicol.

In addition to these, there were several representatives of the Fruit Growers' Association.

Professor Shaw, representative of the Central Farmers' Institute, and L. Woolverton, M.A., Secretary of the Fruit Growers' Asssociation, have consulted with me this year in regard to the programme and speakers for the meetings to be held in January, 1890. The list is as follows:—

I.—North-Western Division.

Drayton (West Wellington)	3rd & 4th	Prof. James, R. Gibson, Esq., and G. C. Caston, Esq.
Tara (North Bruce)	7th	
Chesley (Centre Bruce)	8th & 9th	
Teeswater (South Bruce)	10th	
Formosa (South Bruce)	11th	
Wroxeter (East Huron)	13th & 14th	Prof. James, W. Cowan, V.S., and G. C. Caston, Esq.
Mount Forest and Kenilworth (East Wellington)	15th & 16th	
Goderich (West Huron)	17th & 18th	
Hensall (South Huron)	20th	
Elora (Centre Wellington)	22nd	

II.—Western Division.

Lucan (North Middlesex)	7th	Prof. Shaw, John Hannah, Esq., and A. M. Smith, Esq.
Park Hill "	8th	
Dorchester Station (East Middlesex)	9th	
Alvinston (East Lambton)	10th & 11th	
Glencoe (West Middlesex)	13th & 14th	Prof. Shaw, F. Green, Esq., and M. Pettit, Esq.
Botany (East Kent)	15th	
Zone "	16th	
Windsor (North Essex)	17th & 18th	
Amhurstburg (South Essex)	20th	
Tilbury Centre (West Kent)	21st	
Chatham (West Kent)	22nd	

III.—South-Western Division.

Freelton (North Wentworth)	2nd	Prof. Grenside, A. Lehmann, B.S.A., and A. H. Pettit, Esq.
Drumbo (North Oxford)	3rd	
Innerkip "	4th	
Mount Elgin (South Oxford)	7th & 8th	
Shedden (West Elgin)	9th	
Waterford (North Norfolk)	10th & 11th	
Aylmer (East Elgin)	13th & 14th	
Simcoe (South Norfolk)	16th	
Selkirk (Haldimand)	17th & 18th	
Marshville (Monck)	20th & 21st	

IV.—South Central Division.

St. George (North Brant)	3rd & 4th	Prof. Robertson, Edward Jeffs, Esq., and P. C. Dempsey, Esq.
Brantford (South Brant)	7th	
Welland (Welland)	8th	John Dryden, M.P.P., Edward Jeffs, Esq., and P. C. Dempsey, Esq.
Thorold "	9th	
St. Davids (Lincoln)	10th & 11th	Prof. Robertson, Edward Jeffs, Esq., and T. C. Dempsey, Esq.
Hamilton (South Wentworth)	13th	
Oakville (Halton)	14th & 15th	John Dryden, M.P.P., Edward Jeffs, Esq., and E. Morden, Esq.
Georgetown (Halton)	16th	
Brampton (Peel)	17th & 18th	
Weston (West York)	20th	Prof. Robertson, Edward Jeffs, Esq., and E. Morden, Esq.
Preston (South Waterloo)	22nd	

V.—North Central Division.

Shelburne (Dufferin)	3rd	Professor Mills, John McMillan, M. P., and T. H. Race, Esq.
Dundalk (South Grey)	4th	
Flesherton (East Grey)	7th	
Meaford (North Grey)	8th & 9th	
Creemore (West Simcoe)	10th & 11th	
Tottenham (South Simcoe)	13th	Professor Mills, Thomas McMillan, Esq., and T. H. Race, Esq.
Elmvale (Centre Simcoe)	15th & 16th	
Aurora (North York)	17th & 18th	Professor Mills, Thomas McMillan, Esq., and A. M. Smith, Esq.
Markham (East York)	20th	

VI.—East Central Division.

Uxbridge (North Ontario)	3rd	John I. Hobson, Esq., Chairman of the College Board, T. Raynor, B. S. A., and L. W. Croil, Esq.
Brechin (North Ontario)	4th	
Lindsay (South Victoria)	7th	
Bobcaygeon (North Victoria)	8th & 9th	
Peterborough (West Peterborough)	10th & 11th	
Norwood (East Peterborough)	13th	
Keene (East Peterborough)	14th	
Warkworth (East Northumberland)	15th & 16th	John I. Hobson, Esq., T. Raynor, B.S.A., and L. Woolverton, M.A.
Baltimore and Cobourg (West Northumberland)	17th & 18th	
Bowmanville (West Durham)	20th	
Blackstock (West Durham)	21st	
Oshawa (South Ontario)	22nd	

VII.—Eastern Division.

Picton (Prince Edward)	3rd	Prof. Panton, D. Nicol, Esq., and Thomas Beall, Esq.
Centreville (Addington)	7th	
Inverary (Frontenac)	8th & 9th	
Lansdowne (Leeds)	10th & 11th	
Algonquin (South Grenville)	13th & 14th	
Iroquois (Dundas)	15th	Prof. Panton, D. Nicol, Esq., and P. E. Bucke, Esq.
Lancaster (Glengarry)	16th	
South Finch (Stormont)	17th & 18th	
Lanark (South Lanark)	20th	
Carleton Place (South Lanark)	21st	
Renfrew (Renfrew)	22nd & 23rd	
Galetta (Carleton)	24th & 25th	

In the lists given above the speakers are so arranged that each deputation consists of a professor, a practical farmer and a representative of the Fruit Growers' Association. The only exceptions are in the case of Mr. Hobson and Mr. Dryden, who take the place of professors at the meetings for which they are announced. By this arrangement it was thought that the meetings might be made both interesting and profitable to all classes and sections of the farming community.

FINANCIAL STATEMENT.

I.—College Expenditure.

Maintenance.

1. *Salaries and wages*		$14,177 18
2. *Food*—		
Meat, fish, and fowl		3,062 52
Bread and biscuits		582 64
Groceries, butter, and fruit		3,184 29
3. *Household Expenses*—		
Laundry, soap, and cleaning		163 25
Women servants' wages		1,416 16
4. *Business Department*—		
Advertising, printing, postage, and stationery		596 17
5. *Miscellaneous*—		
Chemicles, apparatus, etc		226 46
Medals		71 15
Library and reading room (books, papers, and periodicals)		243 25
Unenumerated		445 48
		$24,168 55

Maintenance and Repairs of Government Buildings.

Furniture and furnishings	$700 54	
Repairs and alterations	787 58	
Fuel	2,849 59	
Light	796 70	
Water	650 00	
		$5,784 41
		$29,952 96

College Revenue.

1. Tuition fees	$2,767 40	
2. Balances paid for board, after deducting allowances for work	3,612 42	
3. Gas and chemicals used by third year students	66 00	
4. Fines, breakage, etc	63 13	
5. Supplemental examinations	47 50	
6. Old iron, bones, etc	7 15	
7. Sheets and pillows	6 85	
		$6,570 45
Net cash expenditure of college		$23,382 51

The net sum voted by the Legislature for the maintenance of the College was $26,935. Consequently, the unexpended balance for the year is $3,552.49.

II.—Farm.

(a) *Farm Proper.*

1. *Permanent Improvements*—Fencing, etc			$545 19
2. *Farm Maintenance*—			
Salaries and wages	$2,794 20		
Live stock to replace stock sold after fire	6,763 00		
Seeds	501 22		
Store stock for feeding	684 70		
Maintenance of stock	2,599 88		
Manure	240 90		
Binding twine	45 60		
Furnishings and repairs	848 96		
Fuel, light, etc	50 00		
Printing, postage, and stationery	77 13		
Contingencies	190 48		
		$14,796 07	
		$15,341 26	
Less revenue		1,659 62	
		$13,681 64	

(b) *Experiments.*

1. Experimental Plots and Feeding:			
Salaries and wages—			
Assistant Superintendent	$600 00		
Instructor (part wages)	100 00		
Labor	240 33		
		$940 33	
Seeds		796 30	
Manures		17 13	
Live stock for experimental feeding		85 30	
Furniture, furnishings, repairs, etc		227 29	
Printing, postage, and stationery		171 83	
		$2,238 18	

2. Experimental Dairy :

Salaries and wages—			
Assistant	$247 50		
Labor	508 35		
	755 85		
Live stock for experimental work	401 03		
Feed	235 98		
Furniture, furnishings, repairs, etc.	529 80		
Printing, postage, and stationery	76 68		
Contingencies	84 11		
		2,083 45	
			4,321 63

(c) Garden, Lawn, Etc.

Salaries and wages—			
Foreman (part salary)	$500 00		
Assistant	447 00		
Second Assistant	199 70		
Teamster	264 00		
Labor	930 12		
		2,340 82	
Manures		66 15	
Seeds, bulbs, plants, trees, etc		188 69	
Furniture, furnishings, repairs, etc.		444 71	
Fuel, light, etc		22 17	
Contingencies		8 50	
		3,071 04	
Cash Revenue		79 20	
			2,991 84

(d) Instruction.

Salaries and wages—			
Farm Foreman (part salary)	$291 65		
Gardener (part salary)	199 96		
Carpenter (part salary)	500 00		
Instructor (part salary)	99 00		
Cattleman (part wages)	33 33		
		1,123 94	
Repairs and alterations—lumber, nails, oil, etc., for practice		24 59	
Furniture and furnishings—tools, etc., for use in shop		43 15	
Fuel, light, etc.		23 05	
			1,214 73
			$22,209 84

Total net Expenditure for Maintenance in all Departments in 1889.

College	$23,382 51
Farm proper	13,681 64
Experiments	4,321 63
Garden, lawn, etc	2,991 84
Instruction	1,214 73
	$45,592 35

By comparing these figures with the estimates for 1889, it will be seen that there are over-expenditures as follows: Farm Proper, $373.64; Experimental Plots, $518 18; Experimental Dairy, $583.45; Garden, Lawn, etc., $391.84;—amounting in all to $1,867.11; but there are unexpended balances—in the College, $3,552.49, and under Instruction, $259.27. Hence, when all is added together, the total maintenance expenditure for the year is less than the sum voted by the Legislature for that purpose.

Expenditure on Capital Account

In addition to the direct expenditure of the Department of Public Works for farm buildings, disposal of sewage, etc., the following sums were expended on capital account:

(*a*) *Farm Proper.*

Implements	$511 00	
Piggery	289 23	
		$800 23

(*b*) *Experiments.*

Constructing silo and fitting up stables in connection with the Dairy Department	$938 88	
Implements	149 09	
		1,087 97

(*c*) *Garden, Lawn, etc.*

Completing and grading roads	348 73
	$2,236 93

The total sum voted under these heads was $2,580. Consequently, there is here an unexpended balance of $343.07.

Buildings Needed.

In conclusion, I may say that we still require four or five additional buildings to put us in a position to do satisfactorily and efficiently the work which we have undertaken. Those which are most urgently needed are:—

(1) A building to be used as a Convocation Hall and Gymnasium.

(2) New green and propagating houses.

(3) A house for the Professor of Chemistry.

(4) A house for the Professor of Natural History.

Hoping that you may find it possible to erect some of these buildings before the close of the year 1890,

I have the honor to be, sir,

Your obedient servant,

JAMES MILLS,
President.

APPENDIX I.

GRADUATES AND ASSOCIATES.

1. Bachelors of Science in Agriculture, Degree of B. S. A.

University of Toronto.

Date **C.**

1888—Craig, J. A.
1888—Creelman, G. C.

F.

1888—Fee, J. J.

H.

1889—Harcourt, G.
1889—Hutton, J. R.

L.

1889—Lehmann, A.

Date. **M.**

1889—Morgan, J. H. A.

P.

1888—Paterson, B. E.

R.

1889—Raynor.
1889—Soule, R. (ob.)

Z.

1888—Zavitz, C. A.

2. Associates.

The total number of Associates up to the present time is 177 and the list is as follows :

Date. **A.**

1888—Austin, A. M.
1880—Anderson, J.
1880—Ash, W. E.

B.

1881—Ballantyne, W. W.
1879—Bannard, E. L.
1888—Bayne, S. R. S,
1888—Birdsall, W. G.
1888—Bishop, W. R.
1889—*Brodie, G. A.
1888—Budd, W.
1885—‡Butler, G. C.
1884—Black, P. C.
1882—Blanchard, E. L.
1886—Broome, A. H.
1886—‡Brown, C. R.
1888—Brown, S. P.

Date. **C.**

1886—Calvert, S.
1877—Campbell, J. A.
1880—Campbell, D. P. L.
1884—*Carpenter, P. A.
1888—Carpenter, W. S.
1886—Cobb, C.
1880—Chapman, R. K.
1882—Charlton, G. H.
1882—Chase, O.
1879—Clark, J.
1879—Clinton, N. J.
1880—Clutton, A. H.
1887—Craig, J. A.
1887—Creelman, G. C.
1878—Crompton, E.

D.

1878—Davis, C. J.
1880—Dawes, M. A.

* Gold Medallist. ‡ Second Silver Medallist.

Date. **D.**

1882—Dawson, J. J.
1888—†Dean, H. H.
1882—Dennis, J.
1889—Derbyshire, J. A.
1881—Dickenson, C. S.
1887—Donald, G. C.
1887—Donaldson, F. N.
1877—Douglas, J. D.
1877—Dunlop, S.

E.

1888—Elton, C. W.
1888—Elton, R. F.
1882—Elworthy, R. H.
1887—Ewing, W.

F.

1878—Farlinger, W. K.
1886—Fee, J. J.
1881—File J.
1882—Fotheringham, J.
1883—‡Fotheringham, W.
1879—Fyfe, A.

G.

1883—Garland, C. S,
1889—Gelling, J. A.
1887—Gilbert, W. J.
1879—Gillespie, G. H.
1878—Graham, D.
1879—Greig, G. H.
1881—Grindley, A. W.

H.

1882—Hallesy, F.
1888—*Harcourt, G.
1887—Harkness, A. D.
1888—Harrison, R. E.
1887—Hart, J. A.
1887—Hart, J. W.
1888—Heacock, F. W.
1886—Holtby, R. M.
1880—Holterman, R. F.
1882—Horne, W. H.
1888—Horrocks, T. J.
1887—Howes, J. S.
1882—Howitt, W.
1888—Hutton, J. R.

I.

1886—Idington, P. S.

Date. **J.**

1886—Jeffrey, J. S.
1883—Jeffs, H. B.
1879—Jopling, W.

K.

1888—Knowlton, S. M.

L.

1882—Lansborough, J.
1887—Leavens, D. H.
1884—‡Lehmann, A.
1887—‡Lick, E.
1877—Lindsay, A. J.
1889—†Linfield, F. B.
1887—Livesey, E. M.
1880—Lomas, J. W.
1878—Logan, T.

M.

1880—Macaulay, H.
1885—Macpherson, A.
1886—*Madge, R. W.
1882—Mahoney, E. C.
1884—Major, C. H.
1889—Marsack, F.
1889—Marsack, H. A.
1877—Mason, T. H.
1877—Meyer, G. W.
1887—Morgan, J. H. A.
1881—Motherwell, W. R.
1885—†Muir, J. B.
1887—McCallum, E. G.
1889—McCallum, W.
1889—McEvoy, T. A.
1885—McIntyre, D. N.
1885—McKay, J. B.
1886—McKay, J. G.
1889—McLaren, P. S.
1883—McPherson, D.
1889—Monteith, S. N.

N.

1878—Naismith, D. M.
1879—Nicol, A. (ob.)
1882—Nicol, G.
1886—Notman, C. R.

O.

1877—O'Beirne, A. C.
1887—Orsman, C. P.
1886—Owen, W. H.

* Gold Medallist. † First Silver Medallist. ‡ Second Silver Medallist.

Date. **P.**

1888—Palmer, W. J.
1887—Paterson, B. E.
1883—Perry, D. E.
1881—§Phin, R. J.
1881—Phin, W. E.
1881—Pope, H.
1886—Power, R. M.
1884—Powys, P. C.

R.

1882—‡Ramsay, R. A.
1879—Randall, J. R.
1885—*Raynor, T.
1885—Reid P.
1889—Rendall, W.
1889—Rennie, E. A.
1883—*Robertson, W.
1879—Robertson, J.
1881—Robins, W. P.
1879—Robinson, C. B.
1881—Ross, J. G.

S.

1884—Saxton, E. A.
1888—Serson, W. E.
1888—Sinclair, J. J.
1882—Silverthorne, N.
1888—Soule, R. M.
1877—Sykes, W. J.
1883—Schwartz, J. A.
1887—†Scrugham, J. G.
1888—Shantz, A.
1887—Sharman, H. B.
1877—Shaw, G. H.
1882—†Shuttleworth, A.
1884—†Slater, H. (ob.)
1887—*Sleightholm, F. J.
1885—Smith, E. P.

Date. **S.**

1884—Steers, O.
1888—Stevenson, C. R.
1878—Stewart, W.
1882—Stover, W. J.
1886—†Sturge, E
1888—Sweet, H. R.

T.

1889—‡Tinney, T. H.
1879—Toole, L.
1883—Torrance, W. J.
1884—Tucker, H. V.
1885—Thompson, W. D.

V.

1888—Valance, R.

W.

1879—Warnica, A. W.
1884—Wark, A. E.
1878—Warren, J. B.
1880—§Webster, J. L.
1879—Wells, C.
1882—Wettlaufer, F.
1879—Wilkinson, J. P.
1888—Willans, T. B.
1888—Willans, N.
1879—Willis, J.
1883—Willis, W. B., (ob.)
1888—Wilmot, A. B.
1882—White, C. D.
1879—White, G. P.
1884—Wroughton, T. A.

Z.

1886—Zavitz, C. A.

*Gold Medallist. † First Silver Medallist. ‡Second Silver Medallist.
§ Winner of the Governor-General's Medal—the only medal given that year.

APPENDIX 2.

SYLLABUS OF LECTURES.

Lectures began as usual on the 1st October, 1888, and continued till the 28th June, 1889, which latter date was the end of the scholastic year 1888-9.

The following syllabus of lectures will convey some idea of the class-room work done by the several Professors in the nine months just mentioned :

FIRST YEAR.—FALL TERM—1st OCTOBER to 22nd DECEMBER.

Department 1.—Agriculture.

Introductory.—Ancient and modern agriculture ; agricultural literature ; different kinds of farming.

Soils.—Natural conditions of soil and plant ; examination and classification of soils ; physical properties of each kind.

Rotations in Cropping.—Importance and necessity of rotation ; principles underlying it ; rotations suitable to different kinds of soil ; examination and criticism of different systems of rotation.

Buildings.—Location of house, barn, and stables ; stables for horses, sheep, and cattle ; arrangement of farm buildings.

Miscellaneous.—Roads, lanes, fences.

Department 2.—Natural Science.

Chemical Physics.—Matter ; accessory and essential properties of matter ; attraction ; various kinds of attraction—cohesion, adhesion, capillary, electrical and chemical ; specific gravity ; weights and measures ; heat, measurement of heat, thermometers, specific and latent heat ; sources, nature, and laws of light.

Inorganic Chemistry.—Scope of subject ; elementary and compound substances ; chemical affinity ; symbols ; nomenclature ; combining proportions by weight and by volume ; atomic theory ; atomicity and basicity ; oxygen and hydrogen ; water—its nature, functions, decomposition, and impurities ; nitrogen ; the atmosphere—its composition, uses and impurities ; ammonia—its sources and uses ; nitric acid and its connection with plants.

Human Physiology and Hygiene.—Description of the different tissues of the body alimentary system ; circulatory system ; nervous system ; importance of ventilation and the influence of food on the body ; remarks on the proper care of the body and attention to its surroundings in order to keep it in a continual state of health.

Zoology.—Distinctions between animate and inanimate objects ; distinction between plants and animals : basis and classification among animals ; leading character of each sub-kingdom, with special reference to classes or animals connected with agriculture.

Department 3.—Veterinary Science.

Anatomy and Physiology of the horse, ox, sheep, and pig ; osseous system, muscular system, syndesmology, plantar system, and odontology.

Department 4.—English.

Composition.—The sentence, paragraph, and period; capitals and punctuation. Exercises in composition.

English Classics.—Critical study of Scott's "Lady of the Lake."

Department 5.—Mathematics.

Arithmetic.—Review of subject, with special reference to farm accounts. Interest, discount, stocks, and partnership.

Mental Arithmetic.—Calculations in simple rules.

Book-keeping.—Subject commenced.

First Year.—Winter Term—22nd January to 16th April.

Department 1.—Agriculture.

Breeding, rearing, and feeding of animals. Points to be considered in deciding what kind of animal to keep.

Cattle.—History and characteristics of Shorthorns, Herefords, Aberdeen-Angus Polls, Ayrshires, Jerseys, Guernseys, Holsteins, Devons, Galloways, etc.; grade cattle; milch cows—points of a good milch cow; breeding generally; pedigree.

Sheep.—Breeds of sheep generally considered; crosses between different breeds compared; quality, quantity, and uses of different kinds of wool.

Department 2.—Natural Science.

Inorganic Chemistry (Continued).—Carbon; combustion; carbonic acid and its relation to the animal and vegetable kingdom; sulphur and its compounds; manufacture and uses of sulphuric acid; phosphorus; phosphoric acid and its importance in agriculture; chlorine—its bleaching properties; bromine; iodine; silicon; potassium; calcium; magnesium; iron, etc.

Organic Chemistry.—Constitution of organic compounds; alcohols, aldehydes, acids and their derivatives; formic, acetic, oxalic, tartaric, citric, lactic, malic, uric, and tannic acids. Constitution of oils and fats—saponification; sugars, starch, cellulose; albuminoids, or flesh formers, and their allies; essential oils; alkaloids—morphine and quinine; classification of organic compounds.

Zoology (Continued).—Sub-kingdoms further described; detailed account of some injurious parasites, such as "liver fluke," "tape-worm," "trichina," etc.; insects—their influence on plant life; corals and mollusks as agents in the formation of soil; vertebrates, with special reference to those of importance in the economy of the farm.

Lectures illustrated by specimens and diagrams.

Department 3.—Veterinary Science.

Veterinary Anatomy.—Anatomy and physiology of the horse, ox, sheep, and pig—digestive system, circulatory system, respiratory system, urinary system, nervous system, sensitive system, generative system, tegumental system.

Department 4.—English.

Composition.—Exercises continued; abstracts of speeches and essays; letter writing.

English Classics.—Critical study of "Cowper's Task," Books 3 and 4.

Department 5.—Mathematics and Book-keeping.

Arithmetic.—Equation of payments; percentage; profit and loss; stocks; partnership; exchange.

Book-keeping.—Business forms and correspondence; general farm accounts; dairy, field, and garden accounts.

First Year.—Spring Term—17th April to 30th June.

Department 1.—Agriculture.

Preparation of Soil.—Modes of preparation for different crops, and various kinds of soil.

Seeds and Sowing.—Testing the quality of seed; changing seed; quantity per acre; methods of sowing.

Improvement of Lands.—Drainage; ordinary cultivation; sub-soiling; fallowing; manuring. Farm-yard manure and management of the same; the properties, application and uses of special fertilizers—lime, plaster, salt, bone dust, superphosphates, etc.

Roots.—Cultivation of roots and tubers—effects of each kind on soil.

Green Fodders.—The cultivation and management most appropriate for each.

Management of pastures; harvesting and preparing crops for market or one's own use; crops for current year examined.

Department 2.—Natural Science.

Geology.—Connection between geology and agriculture; classification of rocks—their origin and mode of formation, changes which they have undergone after decomposition; fossils—their origin and importance; geological periods and characteristics of each.

Geology of Canada, with special reference to the nature and economic value of the rock deposits; glacial period and its influence on the formation of soil.

Lectures illustrated by numerous specimens and designs.

Botany.—Full description of seed, roots, stem, leaves, and flower. Plants brought into the lecture-room and analyzed before the class, so as to render students familiar with the different organs and their use in the plant economy.

Lectures illustrated by excellent diagrams.

Department 3.—Veterinary Science.

Materia Medica.—The preparation, doses, action and use of about one hundred of the principal medicines used in veterinary practice.

Department 4.—English.

English Grammar and Composition.—Authorized Grammar and Williams' Practical English.

Department 5.—Mathematics.

Mensuration.—Mensuration of surfaces—the square, rectangle, triangle, trapezoid, regular polygon, circle. Special application to the measurement of lumber. Mensuration of solids; special application to the measurement of timber, earth, etc.

SECOND YEAR.—FALL TERM—1st OCTOBER to 22nd DECEMBER.

Department 1.—*Agriculture.*

Experimental Plots.—The results of last season's experiments with crops and animals; liability to disease; effects of various manures on different crops, etc.

Farm Management.—Detailed account of the treatment of each field; results from different kinds of seed and soil; effects of manure; harvesting, storing, and threshing of crops; fall ploughing, sub-soiling, etc.

Stock Feeding.—Value of feeding materials; estimate for winter keep of live stock; housing, feeding, and fattening; points to be observed in selecting animals for fattening; feeding experiments; common diseases of animals; management of animals on pasture; value of green fodder. Dairy management and cheese making.

Department 2.—*Natural Science.*

Agricultural Chemistry.—Connection between chemistry and agriculture; the various compounds which enter into the composition of the bodies of animals: the chemical changes which food undergoes during digestion; chemical changes which occur during the decomposition of the bodies of animals at death; the functions of animals and plants contrasted; food of plants, and whence derived; origin and nature of soils; classification of soils; causes of unproductiveness in soil and how detected; preservation, development, and renovation of soils; manures classified; the chemical action of manures on different soils; commercial valuation of fertilizers.

Horticulture.—Ontario as a fruit-growing country; the natural divisions into which it may be divided for growing fruit; detailed account of the operations, layering, grafting, budding, pruning, etc.; laying out and cultivation of an orchard; list of fruits best suited for general purposes, with best methods for their cultivation; remarks on gardening as a source of profit; plants best adapted to bedding and potting.

Lectures illustrated by practical work in the garden, and specimens in the class-room.

Department 3.—*Veterinary Science.*

Pathology.—Osseous System.—Nature, causes, symptoms, and treatment of diseases of bone, as splint, spavin, ringbone, etc.

Muscular System.—Nature, causes, and treatment of flesh wounds, etc.

Syndesmology.—Nature, causes, symptoms, and treatment of curb, bog-spavin, and other diseases of the joints.

Plantar System.—Nature, causes, symptoms, and treatment of corns, sand-crack founder, and other diseases of the feet.

Odontology.—Diseases of the teeth and treatment of the same.

Department 4.—*English.*

English Classics.—Critical study of prose selections from DeQuincey, Lamb, and Ruskin.

Department 5.—*Mathematics.*

Dynamics.—Motion, forces producing motion, momentum; work; the simple machines, etc.

Drainage.—General principles; how to lay out a system of drains; how, where, and when to commence draining; depth of drains and distances apart; grades; cost of draining.

SECOND YEAR.—WINTER TERM—22nd JANUARY to 16th APRIL.

Department 1.—Agriculture.

Capital required in farming; laying out of farms; general management and economy; cost of production; buying, selling, and marketing.

Management of cattle, sheep and other animals in winter; breeding generally considered; special management of ewes before, during, and after the season of lambing; treatment of other animals in parturition; rearing of lambs, calves, and pigs; washing and dipping of sheep, etc., etc.

Aboriculture.—Importance of the subject and its special application to North America; what is being done in the conservation and replanting of forests in other countries; the objects of conserving and replanting—shelter for crops, animals and dwellings, regulation of temperature and rain-fall, ornament and profit; requisite proportion of tree surface to that under agricultural crops; existing condition of forests in North America; adaptability of soils and climate to rapid results; what parts of the country should be conserved and what parts replanted; conservation of indigenous forests generally considered; special attention to the care of young natural forest trees.

Department 2.—Natural Science.

Agricultural Chemistry.—Continuation of the subject from preceding term, as follows: Composition of plants in relation to the soils upon which they grow; rotation of crops; the classification of fodders according to their chemical composition and a general treatment of the science of cattle feeding; relation of feeding to manure; chemistry of the dairy.

Entomology.—Importance of the subject to agriculturists; beneficial and injurious insects—their habits and the best means of checking the ravages of the latter.

Lectures illustrated by specimens.

Meteorology.—Relation of meteorology to agriculture; composition and movements of the atmosphere; description of the barometer, different kinds of thermometers, pluviameter, anemometer and how to read them; temperature, its influence on agriculture; the elements which are to be considered in the discussion of climate; the principles considered in forecasting the weather.

Lectures illustrated by instruments referred to.

Department 3.—Veterinary Science.

Digestive System.—Nature, causes, symptoms, and treatment of spasmodic and flatulent colic, inflammation of the bowels, acute indigestion, tympanitis in cattle, impaction of the rumen, and many other common diseases.

Circulatory System.—Description of the diseases of the heart and blood.

Respiratory System.—Nature, causes, symptoms, and treatment of catarrh, nasal-gleet, roaring, bronchitis, pleurisy, and inflammation of the lungs, etc.

Urinary System.—Nature, causes, symptoms, and treatment of inflammation of the kidneys, etc.

Nervous System.—Nature, causes, symptoms, and treatment of lock-jaw, string halt, etc.

Sensitive System.—Nature, causes, symptons, and treatment of the diseases of the eye and ear.

Generative System.—Nature, causes, symptoms, and treatment of abortion, milk fever, etc.

Tegumental System.—Nature, causes, symptoms, and treatment of scratches, sallenders, mallenders, parasites, and other diseases of the skin.

Department 4.—English Literature and Political Economy.

English Classics.—The critical study of Shakespeare's "Julius Cæsar."

Political Economy.—Utility; production of wealth—land, labour, capital; division of labour; distribution of wealth; wages; trades unions; co operation; money; credit, credit cycles; functions of government; taxation, etc.

Department 5.—Mathematics.

Statics.—Theory of equilibrium; composition and resolution of forces; parallelogram of forces; moments; centre of gravity, etc.

Hydrostatics.—Transmission of pressure; the hydraulic press; specific gravity density; pumps, siphons, etc.

Book-keeping.—Review of previous work.

Second Year.—Spring Term—17th April to 30th June.

Department 1.—Agriculture.

Review of past lectures, with special drill on outside work. Reasons for management, etc.

Department 2.—Natural Science.

Determination of soils and fertilizers by physical properties.

Analytical Chemistry.—Chemical manipulation, preparation of common gases and reagents; operations and analysis—solution, filtration, precipitation, evaporation, distillation, sublimation, ignition and the use of the blow-pipe; testing of substances by reagents; impurities in water; adulterations in foods and artificial manures; injurious substances in soils.

Systematic and Economic Botany.—Classification of plants and characters of the most important orders.

This course is illustated by a large collection of plants in the college herbarium, and also by analysis of several plants collected in the fields and woods of the farm.

Green-house Plants.—Special study of all plants grown in our green-houses, and the shrubs, etc., on the lawn.

Department 3.—Veterinary Science.

Materia Medica.—The preparation, actions, uses, and doses of medicines—continued from the spring term of the first year. Lectures on special subjects, such as pleuro-pneumonia, the rinderpest, tuberculosis, etc.

Veterinary Obstetrics.—Description of fœtal coverings. Pneumonia in connection with puberty, œstrum, gestation, sterility, abortion, normal and abnormal parturition. Diseases incidental to pregnant and parturient animals.

Department 4.—English.

English Classics.—The critical study of Milton's "L'Allegro" and "Il Penseroso."

Department 5.—Mathematics.

Surveying and Levelling.—Fields surveyed with chain and cross-staff; measurements of heights.

Road-making.—Determination of proper slopes; shape of road bed; drainage of roads; friction on different roads; various road coverings; the maintenance of roads; cost, etc.

APPENDIX 3.

TIME TABLE FOR FALL TERM.

The following Time Table indicates our class-room work from the 1st October to the 22nd December.

TIME TABLE.

First Year.

Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
8.45	Agriculture.	Arithmetic.	Agriculture.	1. Physiology and Hygiene (6 weeks), and Zoology (5 weeks). 2. Arithmetic. 3. Book-keeping.	Agriculture.
9.45	Literature.	Physiology and Hygiene (6 weeks,) Zoology (5 weeks.)	Grammar and Composition.		Grammar and Composition.
10.45	Veterinary Anatomy.	Chemistry.	Veterinary Anatomy.	Chemistry.	Chemistry.

Second Year.

Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
8.45	Literature.	Agricultvre.	Mechanics.	Agriculture.	Mechanics.
9.45	Agriculture.	Literature.	Drawing.	Hort'ure (8 weeks) Entomology (3wks)	Agricultural Chemistry.
10.45	Agricultural Chemistry.	Hort'ure (8 weeks) Entymology (3wks)	Agricultural Chemistry.	Veterinary Pathology.	Veterinary Pathology.

Third Year.

Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
8.45	Dairying.	Shakespeare's Richard II.	Natural History and Microscopy.	Bacon's Essays.	Natural History and Microscopy.
9.45	Chemistry.	Chemistry.	Drawing.	Agriculture.	Agriculture.
10.45	Addison's Spectator.	Pope's Essay on Criticism.		Themes.	Tennyson's In Memoriam, etc.

APPENDIX 4.

EXAMINATION PAPERS.

I. Papers Set Easter Examinations, 1889.

FIRST YEAR.

Agriculture.

Examiner:—Thomas Shaw.

1. What are the principal points of merit in good ploughing?

2. Why is it not a safe rule to apply manures on the basis of the amount of ingredients required by certain crops?

3. What effect have the age and condition of the animals upon the value of the manure?

4. What influence does lime exert as a fertilizer?

5. Enumerate the advantages of a rotation of crops, and give a suitable rotation for sandy or gravelly soils.

6. To which localities is soiling best adapted. Give the chief objections urged against it and answer these.

7. Give the best method for the eradication of wild mustard.

8. Why is it often hazardous for beginners to choose prize-winning animals as the foundation of their herds and flocks?

FIRST YEAR.

Inorganic Chemistry.

Examiner:—C. C. James, M.A.

1. Give a brief statement of the properties of hydrogen, nitrogen, and chlorine.

2. Give the names and formulas of the principal compounds of ammonia.

3. Explain the chemical changes taking place in the burning of limestone, and the application of gypsum to manure.

4. Give an account of the allotropic forms of carbon, and of sulphur.

5. Give names and formulas of the compounds of oxygen with carbon, sulphur, iron, nitrogen, hydrogen.

6. Sketch the apparatus in use for making chlorine gas. State the chemical equation representing the action.

7. What are the impurities (name and formulas) of common salt? How can they be easily detected?

8. Wherein does the bleaching action of sulphur di-oxide differ from that of chlorine?

9. How is the density of water affected by heat and by pressure?

10. How many pounds of chlorate of potash will be necessary to produce sufficient gas to explode exactly the gas obtained from five pounds of water by the use of potassium? What is the compound resulting, and how much?

FIRST YEAR.

ORGANIC CHEMISTRY.

Examiner:—C. C. James, M.A.

1. Define and criticize the term "Organic Chemistry." Give basis and peculiarities of its compounds.

2. Give formulas of butyl alcohol, glycogen, lactose, butyrin, dextrin, cellulose, cane sugar, distearin, dextrose, carbamide.

3. Explain malting, brewing, vinegar making, and soap making.

4. State the exact constituents of milk.

5. Distinguish amides, albuminoids, and alkaloids.

6. Describe four fermentations.

7. Explain: radical, isomeric, levulose.

8. Explain: "under proof," methylated spirits, wood spirits, formic acid, theine.

FIRST YEAR.

ZOOLOGY.

Examiner:—J. Hoyes Panton, M.A., F.G.S.

1. Show in what way mollusks and worms have aided in the formation of soil.

2. Explain what is meant by "alternation of generations" and alternation of host," and give examples.

3. Give the theories regarding the origin and formation of coral reefs.

4. Describe fully the life history of the so-called liver fluke (Fasciola hepatica.)

5. Explain the term metamorphosis as applied in Zoology, and illustrate by examples from two sub-kingdoms.

6. Mimicry.—Give examples showing it, and state its use in the animal kingdom and explain the terms hybernation and migration as applied to animals.

7. Compare the characters of a ganoid fish with those of a telcostean, and give the distribution of those fishes in time and space.

8. Identify the specimens before you, giving sub-kingdom, class, and order to which each belongs.

FIRST YEAR

VETERINARY ANATOMY.

Examiner :—F. C. Grenside, V.S.

1. State how to distinguish the temporary from the permanent incisors of the horse, and explain the appearance of a four, five, and six-year-old mouth respectively.
2. Explain the differerences between the incisors of the horse, and ox.
3. Describe the mucous membrane of the horse's stomach.
4. Describe the rectum, and explain how Defecation is accomplished.
5. Name the secretions that take part in Chylification, and state the particular function of each secretion.
6. Draw a diagram of the Trachea, Bronchia, and bronchial tubes, and explain each.
7. Mention the organs that occupy the space between the right and left lung.
8. Describe the bladder, and process of urination.
9. Draw a diagram of a Malpigian body of the kidney, and explain it.

FIRST YEAR.

GRAMMAR.

Examiner :—E. Lawrence Hunt, B.A.

1. Analyse and parse the following :—
   (*a*) He sprang hastily from his grassy couch.
   (*b*) The superhuman energy which their German leader there displayed saved them from the dreaded calamity.
2. Substitute equivalent phrases or clauses for the adjectives and adverbs *a* and *b*.
3. Classify the pronouns.
4. Distinguish the active from the passive voice. What are the advantages of using the passive voice? Illustrate by examples.
5. Form sentences illustrating the rule that the verb must agree with its subject in number and person.
6. Criticise the following :—
   (*a*) He paid the workmen who has just went home.
   (*b*) The children who you gave them oranges to looks dreadful sick.
   (*c*) I intended to have wrote last week.

FIRST YEAR.

ENGLISH LITERATURE.

Examiner :—J. Hoyes Panton, M.A., F.G.S.

1. "The swain responsive, as the milk-maid sung,
   The sober herd, that lowed to meet their young,
   The noisy geese, that gabbled o'er the pool,
   The playful children just let loose from school,

The watch-dog's voice, that bayed the whispering wind,
And the loud laugh, that spoke the vacant mind,
Those all in sweet confusion sought the shade,
But now the sounds of population fail,
No cheerful murmurs fluctuate the gale."

(*a*) Specify the words not of English origin.

(*b*) Note the figures of speech in the extract.

(*c*) Give the chief characteristics of this poet as a writer, and name his chief works.

2. Give meaning and derivation of ponderous, elapsed, mansion, disaster, transitory, impotence, and mole.

3. Quote the description of the village preacher beginning, "Thus to relieve the wretched was his pride."

4. Explain the following extracts:—"coming day," "hollow-sounding bittern," "stern to view," "mantling bliss," "sickly trade" and "western main."

5. "For who to dumb forgetfulness a prey,
This pleasing anxious being e'er resigned,
Left the warm precincts of the cheerful day
Nor cast one longing lingering look behind."

(*a*) Re-write this stanza in prose so as to show the meaning.

(*b*) Indicate figures of speech in the extract, and cite others from the poem.

(*c*) Give meaning of words underlined.

6. Explain the phrases:—"the boast of heraldry," "with dirges due, in sad array," "narrow cell," "storied urn," "some village Hampden," "fretted vault."

7. What are the leading thoughts in the Elegy? What distinguished men have referred to its excellence?

8. Paraphrase:—

"Let not ambition mock their useful toil,
Their homely joys, and destiny obscure,
Nor grandeur hear with a disdainful smile
The short and simple annals of the poor."

FIRST YEAR.

Composition.

Examiner:—E. Lawrence Hunt, B.A.

1. What is meant by purity, and precision of diction? Distinguish:—character and reputation; womanly and womanish; childish and childlike. Write a sentence in which each is properly used.

2. Explain the terms:—loose sentence, periodic sentence, balanced sentence; and state the advantage of each. Compose a sentence of each kind, of two or three lines apiece, on the Holstein and the Jersey; or, on intelligence and industry. Draw up a series of contrasts about two of the authors whose works you have studied this year.

3. Compose one simple, one compound, and one complex sentence on "How to Study"; then change each into the other two.

4. What must be attended to in the formation of sentences to promote clearness? illustrate by examples.

5. Make the following sentences more forcible by changing the construction; and briefly state in each case why the one form is more forcible than the other:—(*a*) Diana of the Ephesians is great. (*b*) The scenes of my childhood are dear to my heart, (use exclamatory form). (*c*) You cannot put your hand into the fire and not be burned, (use interrogative form).

6. State concisely the advantages of figurative language. Define and give examples of:—simile, apostrophe, motonymy, euphemism. Re-write each sentence in plain language and note the loss.

7. Punctuate the following:—2 chron XII 10 Jas R Black Esq MP Surely said Rip I have not slept here all night He recalled the occurrences before I fell asleep the strange man with the keg of liquor the mountain ravine the wild retreat among the rocks the woe begone party at ninepins the flagon Oh that flagon that wicked flagon said Rip what excuse shall I make to Dame Van Winkle.

8. Express, in your own words, the thoughts, in the following passage from Ruskin, p. 33,—Sesame and Lilies:—

"But, granting that we had both the will and the sense to choose our friends well, how few of us have the power! or, at least, how limited, for most, is the sphere of choice! Nearly all our associations are determined by chance or necessity, and restricted within a narrow circle. We cannot know whom we would; and those whom we know, we cannot have at our side when we most need them. All the higher circles of human intelligence are, to those beneath, only momentarily and partially open.....Meantime, there is a society continually open to us, of people who will talk to us as long as we like, whatever our rank or occupation; talk to us in the best words they can choose, and with thanks if we listen to them.....Kings and statesmen are lingering patiently in those plainly furnished and narrow ante-rooms, our book-case shelves."

FIRST YEAR.

Arithmetic.

Examiner:—E. Lawrence Hunt, B.A.

1. Calculate the profits from a flock of 30 sheep, stating the details of cost and returns.

2. Calculate the profits from 20 acres of barley, supplying the necessary data.

3. Oats are 30 cents a bush.; peas, 55 cents; barley, 60 cents; rye, 40 cents; Indian corn 95 cents. (*a*) Find the cost of 20 pounds of the mixture. (*b*) How many bushels of each will make a mixture worth 50 cents a bush?

4. A drains 12 acres at a cost of $35 an acre. Take any rotation of crops and find approximately what the resulting increase in each crop per acre must be, to give A 8% interest on the cost of drainage.

5. A plants 10 acres with orchard at a cost of $24 an acre, and gets no returns for 4 years. If the land itself was worth $65 an acre, find the value of the orchard at the end of 4 years; compound interest at 6%.

6. On Jan. 1, 1889, A sells B 650 bushels of wheat at $1.05 a bush., and takes B's note for the amount, due 6 months hence, bearing interest at 5%. On April 22, A gets this discounted at the bank at 8%. Find the amount he received for the note. Write the form of the promissory note if it is negotiable by endorsement.

7. A sends B $1,481.90 to invest in cattle. If B charges one and a-half per cent. commission, find the amount invested in cattle.

8. A owns $9,650 of the 8% stocks at 110½. He sells out (brokerage a-half per cent.) and invests the proceeds in a farm. He rents the farm to B for one-third of the annual proceeds. B's income from the farm is $900. Find the rate per cent. of interest A receives on his money, and the difference in his income.

FIRST YEAR.

BOOK-KEEPING.

Examiner:—E. Lawrence Hunt, B.A.

1. "A farmer's work is of such a nature that a thorough system of book-keeping is practically impossible. The results cannot be satisfactory, nor will they justify the labor of the undertaking." Discuss fully these statements, mentioning the chief difficulties of keeping accurate accounts on the farm; and indicating the system whereby the necessary knowledge may be obtained.

2. Make out and close an account with cows.

3. Briefly explain the method of closing the books.

4. Mention the accounts affected by the following:—(*a*) Sold 10 lambs to S. Jamieson at $5 each. (*b*) Paid $12 insurance on barns. (*c*) Sold 200 bbls. apples at $1.25 a bbl. (*d*) Put 40 loads manure at $1 per load on field No. 1. (*e*) Sold 20 doz. eggs at 10 cents a dozen to R. Jones, grocer, entered in pass-book. (*f*) Sowed 20 bushels fall wheat worth $1.10 per bush. in field No. 2. (*g*) Sold Holstein bull $225 to D. Black, taking his note due 6 months hence and bearing interest at 8%. (*h*) Oct. 18, D. Black pays his note with interest. (*i*) Holding P. Grey's promissory note of $800 legally due Dec. 30, I got it discounted at the Bank of Commerce, Sep. 15, at 7%.

SECOND YEAR.

AGRICULTURE.

Examiner:—Thomas Shaw.

1. Give reasons based on the disposition, habits, and physical conformation of Ayrshires for a belief in their mixed ancestry.

2. Give the leading characteristics of the Sussex and Kerry breeds of cattle.

3. How do the Devon, Ayrshire, Guernsey, Holstein, and Norfolk Polled breeds compare for dairy purposes?

4. Describe the color, head, and udder of the Jersey.

5. Enumerate some of the principal properties of fine wools.

6. In selecting breeding stock what are the principal considerations?

7. Give the principal methods to be adopted in the complete eradication of the Canada thistle.

SECOND YEAR.

PRACTICAL LIVE STOCK.

Examiner:—Thomas Shaw.

1. Do you consider the Hereford bull (Conqueror) a good representation of the beefing breeds? If so, give the reasons in detail.

2. Point out the principal deficiencies of conformation in the Devon bull "Rose's Duke" [929].

3. Point out the most prominent deficiencies in the Grade cow "Lady Norton." (1) As to symmetry. (2) As to milking indications.

4. Give the strong and weak points in the Oxford Down Ram "Duke of Gloucester."

SECOND YEAR.

AGRICULTURAL CHEMISTTY.

Examiner :—C. C. James, M.A.

1. State the relationship of the following substances to plant development :—ammonia, silica, iron, chlorine.

2. Give the conditions of germination and the chemical changes accompanying it.

3. What is meant by "the retentive power of soils?" What changes or actions underlie it?

4. Discuss the composition, value and application of wood and of coal ashes.

5. What is meant by N-free extract? How is it determined and what is its use in the animal?

6. Distinguish albumoids and amides as to (*a*) composition ; (*b*) occurrence ; (*c*) uses.

7. What circumstances affect the composition and feeding value of timothy hay? Explain how.

8. Explain the sources of the food of the following :—muscle, mechanical force, wool, butter, fat.

9. "The pig is undoubtedly the most economical meat producing machine at the farmer's disposal." Give reasons for this statement.

10. "Milk is not simply a secretion, it is the liquified organ" (Armsby). Explain what is meant and how proven.

SECOND YEAR.

METEOROLOGY.

Examiner :—J. Hoyes Panton, M.A., F.G.S.

1. Show in what way a knowledge of the principles of meteorology is of practical importance to agriculture, horticulture, and commerce.

2. Explain how the physical features of a country may modify its climate, and give illustrations from districts in Canada.

3. Thermometer—name the different kinds, and state how read and how the readings may be of use. Describe Rutherford's, and reduce 16 F. to C. and 28 C. to F.

4. Upon what does the amount of moisture in the atmosphere depend? Describe the instrument used to ascertain it.

5. Where are the following winds found :—mistral, dust winds, chinook? Account for their presence.

6. Compare the rainfall of North and South America and account for the difference.

7. Define latent heat, isobars, isothermals, and area of low pressure.

8. Account for the heavy rains in India and the absence of rain in some parts of Africa.

SECOND YEAR.

ENTOMOLOY.

Examiner :—J. Hoyes Panton, M.A., F.G.S.

1. Show how a knowledge of insect life becomes of service in preventing their ravages.

2. Give the life-history of the root-louse, and name the families in which beneficial beetles are found.

3. Name the genera in which the most injurious cutworms are found. Describe the larva of any, and give remedies to prevent their attacks.

4. Name the different insects that are destroyed by the application of Paris green.

5. Give the remedies for the wire-worm, and contrast its larva with that of the crane-fly, May-beetle and cutworm.

6. What insects belonging to the order Hemiptera are injurious, and to what order do the saw-flies belong?

7. Some insects are injurious in the larval condition only, some in the perfect, and some in both. Give examples of each.

8. Explain what is meant by an emulsion. Give one of the best, and state how and when to use it.

9. Describe the larva and imago of the canker worm, and give two remedies—one depending upon a habit of the larva and the other upon the nature of the mature insect.

SECOND YEAR.

VETERINARY PATHOLOGY.

Examiner :—F. C. Grenside, V.S.

1. Give the causes of corns, and explain means of relieving them.
2. Describe the symptoms and treatment of punctures and bruises in horses' feet.
3. Give the symptoms of lock-jaw.
4. Explain the causes of digestive troubles in the horse.
5. Give the causes, symptoms, and treatment of hoven in the ox.
6. Give the differential symptoms of impaction of the rumen and fardel round.
7. Give the symptoms and treatment of spasmodic colic in the horse.
8. Explain the differential symptoms of acute indigestion and flatulent colic.
9. Describe the symptoms of pneumonia.
10. Describe the symptoms and treatment of Lymphangitis.

SECOND YEAR.

PRACTICAL HORSE.

Examiner :—F. C. Grenside, V.S.

1. Explain the different modes of giving medicines to horses and how we should be guided in the choice of the methods.

2. Give the normal temperature of horses, cattle, and sheep. Explain how to take the temperature, and the theories with regard to the production of heat in the animal economy.

3. Explain the measures to be adopted in physicing a horse.

4. Describe how to treat a case of choking in the ox.

5. Explain the diseases and irregularities of the teeth of horses.

SECOND YEAR.

GRAMMAR.

EXAMINER :—E Lawrence Hunt, B.A.

1. Define inflection and briefly indicate its extent in modern English. Give, in detail, the inflections of pronouns.

2. What are the advantages of giving different grammatical values to the same word? Illustrate with the words, iron, house, but.

3. Define conjugation. Distinguish the conjugation of English verbs. Conjugate the following: keep, deal, fly, flee, flow, lose, loose, lie, rid, abide, grow, sink, hide.

4. Analyze the following and parse each word :—

"Passion, I see, is catching; for mine eyes,
Seeing those beads of sorrow stand in thine,
Began to water."

6. Criticise the following :—

(*a*) Neither the employer nor his workmen were to blame.
(*b*) He likes you better than me.
(*c*) He likes me better than you.
(*d*) He insisted on the rule's being observed.
(*e*) The soldiers, after ten hours' fighting, laid down to sleep.
(*f*) Whom do men say I am?
(*g*) Next to the governor comes the mayor and council.
(*h*) I intended to have done that last month.

SECOND YEAR.

JULIUS CÆSAR.

Examiner :—S. C. Smoke, B.A.

1. Sketch briefly the political situation in Rome at the time of the events described in this play.

2. "There was a Brutus once that would have brook'd
Th' eternal devil to keep his state in Rome,
As easily as a king."

(*a*) To what Brutus is reference here made?
(*b*) Quote any other reference to him in this play.
(*c*) Give some account of the religious beliefs of the Romans of this time and account for the reference here to "the eternal devil." How long after this was it that Christianity was introduced into Rome?

3. "And that same eye, whose bend doth awe the world,
Did lose his lustre."

"Hoping it was but an effect of humor,
Which sometime hath his hour with every man."

Remark upon and explain the use of *his* in these extracts.

4. "Till then, my noble friend, chew upon this."

What is the meaning of *chew* here? What other word of the same root-meaning is now used in this sense?

5. "He hears no music." Of whom is this said and what feature of his character is it intended to describe? Quote any similar passage from another of Shakespeare's plays.

6. Say by whom the following passages were spoken, and explain fully their meaning:—

(*a*) "Those that with haste will make a mighty fire
Begin it with weak straws."

(*b*) "It is the bright day that brings forth the adder."

(*c*) "Cowards die many times before their deaths."

(*d*) "O world? thou wast the forest to this hart,
And this, indeed, O world, the heart of thee."

(*e*) "What villain touched his body, that did stab,
And not for justice?"

(*f*) "You know that I hold Epicurus strong,
And his opinion: now I change my mind,
And partly credit things that do presage—"

7. Quote from this play any five passages of not less than four lines each, and say why you have thought them worthy of being committed to memory.

8. What is a drama?

SECOND YEAR.

Political Economy.

Examiner:—W. A. Douglas, B.A.

1. Name the four classes of the subject.

2. Tell to which class the following facts belong: (1) Strikes; (2) wages; (3) machinery; (4) increase or diminution of value; (5) ships; (6) division of labor.

3. Wealth—state which of the following indicates an increase and which a diminution of wealth in the commodity named: (1) Water became worth $3 per gallon; (2) an ass's head became worth four score pieces of silver; (3) steel rails that formerly cost $200 per ton are now sold at $25; (4) Some lots in Toronto are worth nearly one million dollars per acre.

4. State the circumstances under which water may be classed as wealth.

5. Production:

(1) Give examples of how people try to work at the best time, best place, and in the best manner.

(2) How much law do we require to make people observe these rules?

(3) What law aims to make people work at the best place?

(4) Name three methods adopted to increase production.

(5) Name three advantages of division of labor.

6. Distribution: Of the three following items: rent, interest, wages—

(1) Which increases with population?

(2) Which declines in the course of years?

(3) Which depends on the toil of the recipient?

(4) Which continues independently of the toil of the recipient?

7. Exchange :
   (1) Show how an exchange may enrich both parties
   (2) Show the relation of exchange to the division of labor.
   (3) Name three plans adopted to facilitate exchange.
   (4) Name a law adopted to stop exchange.
   (5) Name some impediments to exchange.

8. Value—give examples of the following :—
   (1) Increased value caused by labor
   (2) Increased value not caused by labor.
   (3) Increased value coincident with increased poverty.
   (4) Increased value coincident with increased wealth.
   (5) Distinguish value in use and value in exchange.

9. Money :
   (1) Name two of its uses.
   (2) Name one essential condition that money must possess.
   (3) Distinguish between money and bank or government notes.

II.—Papers Set at Midsummer Examinations.

FIRST YEAR.

Agriculture.

Examiner :—Thomas Shaw.

1. Give the modes of preparing soil for wheat best adapted to Ontario conditions.

2. Mention the best time to sow winter wheat, rye, oats, barley and pease in this Province, and the respective amounts of seed required per acre.

3. State the place in the rotation that should ordinarily be occupied by wheat, barley, oats, pease, root crops, rape, meadow, ordinary pasture.

4. State the advantages of growing rape, and when should it be sown ?

5. What beneficial effects followed the introduction of turnip culture into Great Britain ? and what is the probable effect the general introduction of the silo will have upon their cultivation in Canada ?

6. Give the soils best adapted to the growth of the carrot ?

7. Give the leading principles that should govern the pruning of apple orchards.

8. Mention some of the most important essentials to be borne in mind in the construction of a cattle barn.

FIRST YEAR.

Geology.

Examiner :—J. Hoyes Panton, M. A., F. G. S.

1. Draw diagrams illustrating the different kinds of valleys, and state how they have been formed.

2. How do you account for the absence of strata in some parts of the world ? Name the systems represented in Ontario.

3. Give the economic products of the Silurian system, and give brief notes regarding the condition of animal and plant life at that time.

4. Show in what respects the terms saliferous, cretaceous, and carboniferous are misleading as applied to the rock systems in geology.

5. Compare the following minerals: apatite, gypsum, graphite, and chalk; and name the rock systems in which they are found.

6. Give reasons for believing that the interior of the earth is in a highly heated condition, and the most popular view regarding the distribution of the heated material.

7. State the chief characters of the metamorphic rocks, and give their distribution in Ontario, with some of the most valuable economic minerals in them.

8. Compare the coal of Pennsylvania with that of the North-west, as regards its age and the materials from which it was formed.

FIRST YEAR.

BOTANY.

Examiner:—J. Hoyes Panton, M. A., F. G. S.

1. Name the parts of a flower, and describe them as represented in the Shepherd's Purse and the Dandelion.

2. Classify roots with reference to shape and duration, giving examples of each.

3. Explain the terms cohesion and adhesion as applied to the stamens, and give the terms applied.

4. Give the characters of the order you have attended in the Botanical Instructive Bed, and describe the fifth plant.

5. Give examples of monoecious and dioecious flowers, and state how this affects the perpetuation of the species of such plants.

6. Compare the chief characters of the lily with those of the apple.

7. Give examples illustrating how parts of a plant may become developed into food.

8. Analyze and identify the plant before you.

9. What is meant by tissue in plants, and what are the different kinds? Draw figures illustrating each.

FIRST YEAR.

VETERINARY MATERIA MEDICA.

Examiner:—F. C. Grenside, V. S.

1. Explain the theory of the allopathic mode of cure.

2. Name the circumstances which modify the actions of medicines.

3. Define the following terms: antiseptic, emollient, cathartic, and diuretic.

4. Define the meaning of the term alkoloid, and name the active principles of belladona and aconite.

5. Give actions and dose of aloes for the horse.

6. Give two prescriptions of purgative drenches for the ox.

7. State how linseed oil is obtained, the dose for horse and ox, and its uses.

8. Explain how arsenic is supposed to establish its action as an alterative. Name some diseases in which it is particularly beneficial.

9. Give the source and properties of Iodine.

10. Give the names of any of the drugs that we have studied that act as stomachics.

FIRST YEAR.

ENGLISH LITERATURE—SELECTIONS FROM WORDSWORTH.

Examiner:—E. Lawrence Hunt, B. A.

1. State, either in your own words or in the poet's, what you consider four of the most desirable and essential traits of character in the ideal "Happy Warrior."

2. In the poem of "The Fountain," shew clearly why the same scene produced such different feelings in the two friends.

3. (*a*) Give in your own words the outline of the thoughts in the "Ode to Duty."
(*b*) Quote what you consider the choicest stanza.

4. (*a*) Quote from "Peele Castle" the lines referring to the poet's imagination. Quote any lines which illustrate this power, and show how they do so. What is the chief distinguishing feature of true poetry?

(*b*) Describe, after Wordsworth, the picture of Peele Castle, by George Beaumont; and, in contrast, the representation which Wordsworth would have made.

(*c*) "Not for a moment could I now behold
"A smiling sea, and be what I have been." Why? Explain the illusion.

5. (*a*) "'Tis her privilege,
"Through all the years of this our life, to lead
"From joy to joy:" Explain.

(*b*) How did Wordsworth look on nature in boyhood? in youth? and in manhood?

6. Explain the following:—

(*a*) "We are laid asleep in body, and become a living soul."

(*b*) "We see into the life of things."

(*c*) "I have owed to them
"In hours of weariness, sensations sweet."

(*d*) "When thy mind
"Shall be a mansion for all lovely forms,
"Thy memory be as a dwelling-place
"For all sweet sounds and harmonies."

Write a note on the person addressed in (*d*).

(*e*) "On whose head must fall,
"Like showers of manna, if they come at all." (H. W.)

FIRST YEAR.

ENGLISH COMPOSITION.

Examiner:—James Mills, M. A.

1. State the principal differences between prose and poetry.

2. (*a*) "Art is long, and time is fleeting,
"And our hearts though tough and brave,
"Still, like muffled drums, are beating
"Funeral marches to the grave."

(*b*) "The power of music all our hearts allow,
"And what Timotheus was is Dryden now."

Change (*a*) into prose, and transpose (*b*) by removing the measure and the poetic arangement.

3. Quote the rules for the use of the *Colon* and the *Semicolon*.

4. Punctuate the following passages, giving the rule for each mark inserted:—

(1) Greece fell but how did she fall did she fall like Babylon did she fall like Lucifer never to rise again.

(2) It will I am sure it will more and more as time goes on be found for his good.

(3) Charity on whatever side we contemplate it is one of the highest Christian graces.

5. Write a short composition on "Farming as an Occupation," paying special attention to spelling, capital letters, and punctuation.

FIRST YEAR.

Mensuration.

Examiner:—E. Lawrence Hunt, B.A.

1. A barn is 110 yards long and 66 wide. With the same amount of wall, how much more floor would there be, if the barn were square? if it were round?

2. The fall, etc., being the same, how many 2-inch tile are required to discharge as much water as one 6-inch tile in the same time?

3. A silo is 30 by 18 feet and 18 feet high. If there are 45 pounds in a cubic foot of silage, find the number of tons in the silo, when the silage is 15 feet deep.

4. The water from the roof of a barn 80 feet square is drained into a tank in the form of a frustrum of a cone, the diameters of the ends 9.6 feet and 13.8 feet and the height 7.2 feet.

(*a*) Find the depth of rainfall required to fill the tank.

(*b*) Find the amount of zinc required to line the tank.

5. A log 40 feet long and of uniform thickness, has a circumference of 16 and a half feet. Find the largest prism, having its ends equilateral triangles, that can be cut from the log.

SECOND YEAR.

Agrictlture and Arboriculture.

Examiner:—Thomas Shaw.

1. Give the style of finished hog adapted to the markets of the present, and mention the modification that has taken place in this respect during recent years.

2. Give the care and food best adapted to breeding sows during the period of gestation.

3. Describe the process of curing pork for farm use.

4. Mention various rations suitable to be fed to pigs during the period immediately following weaning.

5. What do you understand by the term "early maturity?" Why should it be sought? How may it be attained?

6. Describe the feeding and management during the first year best adapted to calves intended ultimately for shipping for beef purposes, when the whole milk is wanted for dairy uses.

7. What remedy would you use for young foals affected with constipation?

8. Give the food and management adapted to spring foals the first winter.

9. Mention the varieties of trees best adapted to Ontario conditions to plant as wind-breaks, and give the reasons.

10. In planting trees in arable land for purposes of ornament, how would you proceed? for purposes of shade? which varieties would you choose?

SECOND YEAR.

PRACTICAL EXAMINATION.—JUDGING SHEEP.

Examiner:—Thomas Shaw.

1. Point out what you consider the defects of conformation in the Oxford Down ewe No. 375.

2. Mention the good points of conformation in the Shropshire Down lamb of ewe No. 143, and in what particular or particulars does the lamb excel its dam? What do you consider its chief deficiency?

3. Which of the three ewes, having regard to individuality only; the Shropshire Down No. 143, the Oxford Down No. 375, and the Dorset No. do you consider most suitable for producing mutton-lambs with the least expenditure of feed, and state the reasons?

SECOND YEAR.

DAIRYING.

Examiner:—James W. Robertson.

1. What are the advantages of underdrainage?

2. Describe the way to grow and treat a corn crop in order to secure the largest feeding value per acre in the form of silage.

3. Name, in the order of their merit, the points of a dairy cow, indicating large milking power.

4. State the composition of milk and describe how it is elaborated.

5. Give a scale of points for use in judging butter.

6. Describe a centrifugal cream separator.

7. Briefly describe the process of Cheddar cheese-making.

8. Describe the necessary buildings and equipment for a cheese factory of 500 cow capacity.

SECOND YEAR.

PRACTICAL HORTICULTURE.

Examiner:—J. Hoyes Panton, M.A., F.G.S.

1. State how you would proceed to prune a tree.

2. Describe some different forms and methods of bedding plants.

3. Arrange the following plants in a circular bed: Alleranthera, Alyssum, Canna, Ricinus, Ageratum, Geranium, Dahlia.

4. A vegetable garden contains three acres. Arrange it as you think best for practical purposes, and give a diagram illustrating your arrangement.

5. Name trees or shrubs best suited for hedges, and state under what circumstances you would use one in preference to another.

6. Give ten shrubs that are well suited for ornamental purposes, mentioning size and time when they are in bloom.

7. Name some plants well adapted for hanging baskets.

8. Identify the specimens before you.

SECOND YEAR.

SYSTEMATIC AND ECONOMIC BOTANY.

Examiner :—J. Hoyes Panton, M.A., F.G.S.

1. Upon what characters does classification largely depend? Illustrate by referring to the Rose, Lobelia, Indian turnip, and the beet.

2. Describe the cell and its contents, and name some of the modifications which it undergoes as growth proceeds.

3. Give the life history of the so-called smut, and the remedies recommended to destroy it.

4. Name orders of plants of economic value in supplying dyes, oils, sugar and cloth.

5. What are the chief characters of the orders :—Leguminosæ, Araceæ and Graminæ?

6. Compare a seed with a spore, and distinguish between saprophyte and parasite as applied to plants—give examples.

7. Name fifteen weeds and give the orders to which they belong and how you would identify at least five of them.

8. Identify the specimen before you.

SECOND YEAR.

VETERINARY OBSTETRICS.

Examiner :—F. C. Grenside, V. S.

1. Describe the ovaries and Fallopian tubes.

2. Explain the sources, properties, and functions of the liquor Amnii.

3. Explain the constitution of the umbilical cord

4. Give the causes of difficult parturition, and state its relative frequency in the mare and the cow. Explain why it is more difficult to afford relief in the mare.

5. Give the average periods of gestation in the mare, cow, ewe, sow, and bitch.

6. Explain the proper mode of removing the foreleg at the shoulder of the foetus in Utero. Give the cases in which this operation would be an advantage.

7. Explain how to afford relief in the following cases of mal-position: Fore legs presented, and head deviated towards the sternum; knees presented; hocks presented.

8. Describe the symptoms of the sequels of retained after-birth.

9. Give the treatment of inverted womb.

10. Give the symptoms of paturient apoplexy.

SECOND YEAR.

L'Allegro & Il Penseroso

Examiner:—S. C. Smoke, B. A.

1. Compare the poems L'Allegro and Il Penseroso, (1) as to subject, (2) as to method of treatment, and (3) as to the effect produced on yourself.

2. Explain the force of the following italicised epithets: *Low-browed* rocks, *heart easing* mirth, *ivy-crowned* Bacchus, *frolic* wind, *eating* cares, *immortal* verse, *half-regained* Eurydice, *twilight* groves, *monumental* oak.

3. Quote the passages beginning respectively with the following lines:
"Straight mine eye hath caught new pleasures,"
"Oft on a plot of rising ground,"
"There in close covert by some brook."

4. "Hard by, a cottage chimney smokes,
"From betwixt two aged oaks;
"Where Corydon and Thyrsis met,
"Are at their savoury dinner set
"Of herbs, and other country messes,
"Which the neat-handed Phillis dressess."

"Thee, chantress, oft, the woods among,
"I woo to hear thy even-song;
"And, missing thee, I walk unseen
"On the dry smooth-shaven green,
"To behold the wandering moon,
"Riding near her highest noon,
"Like one that had been led astray,
"Through the Heaven's wide pathless way;
"And oft, as if her head she bowed,
"Stooping through a fleecy cloud.'

(*a*) Which of these two extracts impresses you as being the more truly poetic.
(*b*) What test do you apply to reach your conclusion?
(*c*) What is the primary meaning of the word *poet?*
(*d*) Show how the recollection of this meaning assists in the proper criticism of a poem.

SECOND YEAR.

Road-Making, Levelling and Surveying.

Examiner:—E. Lawrence Hunt, B. A.

1. Write an essay on the advantages of good country roads.

2. State concisely what you consider the four most important general principles to be kept in view in making or improving country roads.

3. Classify roads as to the road coverings, and give detailed directions for the construction of any one.

4. What are the objections to putting large stones on a road?

5. Describe the process of making the road which is now being made in the Experimental Farm lane.

6. With a scale of 1 inch to the chain, draw a sketch of the field whose measurements are given in the following field book :

Left Offsets.	Chain-Line.	Right Offsets.
	500 to 0_3	
	375	280
	225	160
	125	50
	From 0_2 turn to the left	
	1125 to 0_2	
To 0_3 400	825	
	450	600
	From 0_1	

7. Explain the process of taking levels to determine whether there be sufficient fall to drain a certain field.

8. With a scale of 1 inch to the 100 ft. for length, and of 1 in. for 2 ft. for height, determine the height of A above B and the grade between the first two stations. Record your measurements in the field book. (A sketch of an undulating line accompanied this question.)

1. Papers Set at the Matriculation Examinations, October, 1889.

Arithmetic.

Examiner :—E. L. Hunt, B. A.

1. A farmer feeds 2 tons, 13 cwt., 65 lbs. of hay to each of 7 horses. Find the cost at $11 a ton.

2. Simplify $\frac{3}{4} + \frac{5}{12} \times \frac{2}{3} - \frac{7}{9}$ of $\frac{4}{2\frac{1}{1}}$.

3. Multiply 4.025 by .0036, and divide the product by 1.8.

4. Estimate the profits from a 10-acre crop of wheat, supplying the detail of cost and returns.

5. A can do a piece of work in 15 days. After he is working at it for 2 days, B joins him. A and B work together for 3 days, and are then joined by C. The three together finish the work in 5 days. If B and C do an equal amount of the work, find how long it would take each by himself to do the whole work.

Composition.

Examiner :—C. C. James, M. A.

I. Point out any errors in the following sentences, re-writing the sentence correctly :
(1) Whom do men say that I am ?
(2) Neither you nor he are going to occupy that room.
(3) As neither of them is here, let us start.
(4) Every one will answer their own questions.
(5) There is not as many in this room as there might be.

II. Write a short essay on one of the following subjects :
(1) The Importance of the Study of Forestry.
(2) Any trip taken by yourself.
(3) Perseverance.

English Grammar.

Examiner :—C. C. James, M. A.

I. State and illustrate the various methods of forming the plural of English nouns, giving examples.

II. Compare the adjectives pleasant, gentle, nigh, ill, happy, first, old, beautiful, little, golden.

III. Distinguish between possessive, relative, and interrogative pronouns, giving examples.

IV. What is meant by mood and voice.

V. Analyze the following sentence :

In *every* country, then, and at every period, the investigation of the *principles* on which the *rational practice* of agriculture is founded, *ought* to have commanded the *principal* attention of the greatest minds.

VI. Parse the words in italics.

VII. Distinguish principal and principle ; practice and practise.

VIII. Express the ideas contained in V. in other words.

GEOGRAPHY.

Examiner :—J. Hoyes Panton, M.A., F.G.S.

1. Define latitude, isthmus, strait, bay, and give examples.
2. Where and what are : Anticosti, Sicily, Vesuvius, Panama, Siam, Lisbon ?
3. Name the largest rivers in Europe and America.
4. Name the capitals of the British Isles and of the provinces of Canada.
5. Describe the physical features of the North-West.
6. Draw an outline map of North America, indicating the position of Chicago, Washington, and Winnipeg.

READING AND DICTATION.

Examiner :—J. Hoyes Panton, M.A., F.G.S.

APPENDIX 5.

CLASS LISTS:

I.—EASTER EXAMINATIONS, 1889.
II.—MIDSUMMER EXAMINATIONS, 1889.

I.—EASTER EXAMINATIONS, 1889.

FIRST YEAR.

HONOURS.

Classes.	Agriculture.	Inorganic Chemistry.	Organic Chemistry.	Zoology.
I.	1 Hutt, H. L. 2 Sleightholm, J. A. B. 3 Harcourt, J. 4 Cowan, R. E. 5 Dolsen, W. J. 6 Rowen, E. 7 Hadwen, G. 8 Wilkinson, J. J. 9 Buchanan, D. / Mulholland, F. 11 Watson, G. C. 12 White, J. / Thompson, J. P.	1 Holliday. 2 Bayne. 3 Harcourt, J. 4 Hutt. 5 Sleightholm. 6 Dolsen. 7 Buchanan.	1 Harcourt, J. 2 Hutt. 3 Sleightholm. 4 Whitley. 5 Bayne. 6 Buchanan. 7 Holliday.	1 Bayne. 2 Sleightholm. 3 Hutt. / Harcourt, J. 5 Hadwen.
II.	1 Cowan, J. H. 2 Webster, F. E. / Urquhart, W. H. A. 4 Elliott, R. 5 Noxon, H. S. 6 Hewgill, E. A. 7 Bate, E. H. 8 Holliday, W. B. / Bayne, P. R. C. 10 Brown, H. H. 11 Whitley, C. F. / McCrae, H. E. / Field, H. 14 Rorke, J. R. / Cathcart, W.	1 Whitley. 2 Hadwen.	1 Dolsen. 2 Hadwen. 3 Mulholland. 4 Hewgill. 5 Cowan, R. E. 6 Bate. 7 Mattice.	1 Dolsen. 2 Cowan, R. E. 3 Mattice. 4 Whitley. 5 Holliday. 6 Buchanan. / Thompson, J. P. 8 Bate. 9 Cowan, J. W. 10 Field.

CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

FIRST YEAR.

Classes.	Agriculture.	Inorganic Chemistry.	Organic Chemistry.	Zoology.
Pass. III.	1 Mattice, W. A.	1 Webster.	1 Brown.	1 Mulholland.
	Campbell, C. S.	2 Shaw.	2 Webster.	2 Noxon.
	3 Shaw, P. G.	3 Hewgill.	3 Cowan, J. H.	Rorke.
	4 Seymour, F. B.	4 Mulholland.	4 Urquahart.	4 Shaw.
	5 Farlinger, F. E.	5 Cowan, J. H.	5 Rowen.	5 Fairbairn.
	6 Wells, E.	6 Thompson, J. P.	6 Shaw.	6 Rowen.
	7 Fairbairn, O. G.	White.	7 Thompson, J. P.	7 Dunne.
	Smith, D.	8 Mattice.	8 Field.	8 Brown.
	9 McDonald, H.	9 Rorke.	9 Elliott.	9 Campbell.
	10 Thomson, H. C.	10 Noxon.	10 White.	10 McDonald.
	11 Grant, R. S.	11 Cowan, R. E.	11 Macfarlane.	11 Seymour.
	12 Woolverton, E. L.	12 Urquhart.	12 Noxon.	12 Hewgill.
	13 Stagg, J. C.	13 Field.	13 Rorke,	13 Wilson.
	14 Dunne, H. R.	Brown.	14 McCrae.	14 White.
	15 Macfarlane, T. W. R.	McDonald.	15 Stagg.	Elliott.
	Bertram, H.	16 Bate.	16 Fairbairn.	16 Wilkinson.
	Benyon, E. A. G.	Rowen.	McDonald.	17 Cathcart.
	Wilson, F. G.	Watson.	Grant.	18 Watson.
				19 Webster.
	....	McCrae.	Wilkinson.	20 Urquhart.
	....	Elliott.	Wilson.	21 Wells.
	....	Wilkinson.	Watson.	22 Stagg.
	....	Stagg.	Campbell.	23 McCrae.
	....	Dunne	Wells.	
	....	Thomson, H. C.	Thomson, H. C.	Thomson, H. C.
	....	Macfarlane.	Dunne.	Macfarlane.
	....	Grant.	Smith.	Grant.
	....	Fairbairn.	Farlinger.	Smith.
	....	Wells.	Woolverton.	Woolverton.
	....	Cathcart.	Bertram.	Benyon.
	....	Campbell.	Benyon.	Bertram.
	....	Smith.	Seymour.	Farlinger.
	....	Woolverton.	....	....
	....	Benyon.	....	....
	....	Bertram.	....	....
	....	Farlinger.	....	....
	....	Seymour.	....	....
	....	Wilson.	....	....

Names unnumbered are those of students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 60 per cent.; for pass 33 per cent.

CLASS LISTS (EASTER EXAMINATONS)—*Continued.*

FIRST YEAR.

Class.	Veterinary Anatomy.	Grammar.	English Literature.	Composition.
HONOURS. I.	1 Harcourt, J. 2 Buchanan. 3 Bayne. 4 Hutt.	1 Whitley. 2 Harcourt, J. 3 Buchanan.	1 Hutt. 2 Holliday. 3 Whitley. 4 Bayne.	1 Whitley. 2 Cowan, R. E. 3 Hutt. 4 Bayne.
HONOURS. II.	1 Urquhart. 2 Whitley. 3 Dolsen. 4 Rowen. 5 Cowen, R. E. 6 Hadwen. 7 Sleightholm, Rorke, Bate.	1 Brown. 2 Hutt. 3 Holliday. 4 Sleightholm. 5 Cowan, R. E. 6 White. 7 Dolsen. 8 Noxon, Thompson, J. P. 10 Webster. 11 Bayne. 12 Fairbairn.	1 Sleightholm. 2 Hadwen. 3 Field. 4 Harcourt, J. 5 Rorke. 6 Cowan, R. E. 7 Rowen.	1 Dolsen. 2 Holliday, Harcourt, J. 4 Sleightholm. 5 Brown, Rowen. 7 Buchanan. 8 Rorke. 9 Wells. 10 Cowan, J. H. ....
PASS. III.	1 McDonald. 2 Mulholland, Thompson, J. P. 4 Fairbairn. 5 Wilkinson. 6 Macfarlane, Elliott. 8 Hewgill, Mattice. 10 Noxon, Dunne. 12 White. 13 Brown. 14 Cathcart. 15 Watson. 16 Cowan, J. H. 17 Campbell, Field. 19 Webster. 20 Wells. 21 Holliday, Shaw. 23 Thomson, H. C., Stagg. McCrae. Grant. Smith. Seymour. Woolverton. Bertram. Benyon. Farlinger. Wilson (Ill.)	1 Rorke. 2 Rowen. 3 Stagg. 4 Wells. 5 Mulholland. 6 Shaw. 7 Elliott. 8 Hadwen. 9 Field. 10 Thomson, H. C. 11 McCrae. 12 Cowan. 13 Wilkinson. 14 McDonald, Hewgill. 16 Woolverton. 17 Campbell. 18 Bate, Dunne, Grant, Watson. Mattice. Cathcart. Urquhart. Wilson. Farlinger. Bertram. Macfarlane. Smith. Benyon. Seymour.	1 Buchanan. 2 Shaw. 3 Mulholland, Noxon. 5 Thompson, J. P. 6 Dolsen. 7 Mattice. 8 White. 9 Brown. 10 Bate. 11 Fairbairn, Seymour. 13 McDonald. 14 Wilkinson. 15 Webster, Urquhart. 17 Cowan, J. H. 18 Thomson, H. C. 19 Hewgill, Cathcart. 21 Elliott. 22 Stagg. 23 Macfarlane. 24 Bampbell. 25 Wells. Dunne. Grant. Benyon. Watson. Wilson. McCrae. Woolverton. Smith. Bertram. Farlinger.	1 Webster, Field. 3 Thompson, [illegible] 4 Fairbairn. 5 Stagg. 6 Thomson, H. C. 7 Hadwen. 8 Wilkinson. 9 Mulholland. 10 Bate. 11 White. 12 Hewgill. 13 Shaw. 14 Noxon. 15 McCrae. 16 Watson. 17 McDonald, Urquhart. 19 Seymour. 20 Mattice. 21 Campbell. 22 Elliott. 23 Grant. Smith. Cathcart. Dunne. Macfarlane. Farlinger. Woolverton. Bertram. Benyon. Wilson (Ill.) ....

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CLASS LISTS (EASTER EXAMINATIONS)—*Continued.*

FIRST YEAR.

		ARITHMETIC.	BOOK-KEEPING.	GENERAL PROFICIENCY.
HONORS.	I	1 Cowan, R. E. 2 Hutt 3 Harcourt, J. 4 Dolsen 5 Noxon 6 Buchanan, Thompson, J. P.	1 Thompson, J. P. 2 Whitley 3 Dolsen 4 Harcourt, J. 5 Cowan, R. E. 6 Hadwen 7 Hutt	1 Harcourt, J. 2 Hutt 3 Sleightholm, Whitley
	II	1 Sleightholm 2 Brown 3 Cowan, J. H. 4 Dunne 5 Rowen 6 Whitley, Wilkinson	1 Buchanan 2 Sleightholm 3 Cowan, J. H. 4 Elliott 5 Webster	1 Dolsen 2 Buchanan 3 Bayne 4 Cowan, R. E. 5 Hadwen 6 Holliday 7 Thompson, J. P.
PASS.	III.	1 Mulholland 2 Bayne 3 Rorke 4 Hadwen 5 Webster 6 Field 7 White 8 Hewgill 9 Bate 10 Thomson, H. C. 11 Grant, Elliott 13 Watson 14 Stagg 15 Macfarlane 16 Holliday 17 Cathcart 18 Urquhart 19 McCrea 20 Wells, Campbell, McDonald 23 Farlinger, Fairbairn, Shaw, Mattice, Seymour Woolverton Smith Benyon Bertram Wilson	1 Hewgill 2 Watson 3 Rorke, Stagg 5 Bayne, Brown 7 Noxon 8 Campbell, Mulholland, Mattice 11 Rowen, McDonald, Field 14 Wilkinson 15 Holliday 16 Wells 17 Bate 18 Fairbairn 19 White 20 Shaw 21 Dunne 22 McCrea 23 Cathcart, Grant Wilson, (Ill.) Seymour Smith McFarlane Farlinger Urquhart Thomson, H. C. Woolverton Bertram Benyon	1 Rowen 2 Mulholland 3 Brown 4 Cowan, J. H. 5 Rorke 6 Noxon 7 Webster 8 Field 9 White 10 Hewgill 11 Bate 12 Shaw 13 McDonald

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CLASS LISTS (EASTER EXAMINATIONS).—*Continued.*

SECOND YEAR.

Class.		Agriculture.	Live Stock.	Agricultural Chemistry.	Meteorology.
Honours.	I.	1 Brodie, G. A. 2 Linfield, F. B. 3 Montieth, S. N. 4 Rendall, W. 5 McLaren, P. S.	1 Brodie. 2 McLaren. 3 Monteith. Linfield. 5 Tinney. 6 Rendall.	1 Linfield. 2 Brodie.	1 Brodie. 2 Tinney. 3 Linfield. ....
	II.	1 Tinney, T. H. 2 McCallum, W. 3 Asbury, E. 4 Marsack, F. A. Derbyshire, J. A. 6 Makinson, T. C.	1 Monk. 2 Asbury. 3 Derbyshire. 4 Gelling. 5 McCallum. 6 McEvoy.	1 Tinney. 2 Rendall.	1 Rendall. 2 Monteith. ....
Pass.	III.	1 Monk, N. 2 McEvoy, T. A. 3 Gelling, J. A. 4 Marsack, H. 5 McKergow, J. G.	1 Marsack, F. 2 McKergow. 3 Marsack, H. 4 Makinson.	1 Monteith. 2 McEvoy. 3 Galling. 4 McCallum. 5 Marsack, H. 6 McLaren. 7 Derbyshire. 8 Makinson. 9 Marsack, F. 10 McKergow. Asbury. Monk.	1 McCallum. 2 Marsack, F. 3 McKergow. 4 McLaren. 5 Makinson. 6 McEvoy. 7 Gelling. 8 Monk. 9 Derbyshire. 10 Asbury. 11 Marsack, H. ....

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CLASS LISTS (EASTER EXAMINATIONS).—*Continued.*

SECOND YEAR.

Class.	Entomology.	Veterinary. Pathology.	Practical Horse.	Grammar.
HONOURS. I.	1 Brodie.	1 Tinney. 2 Brodie. 3 Linfield.	1 Brodie. 2 Tinney. 3 Rendall. 4 Linfield.	1 Tinney.
HONOURS. II.	1 Linfield. 2 Tinney.	1 Marsack, H.	1 McLaren. 2 Marsack, F.	1 Linfield. 2 Brodie. 3 McCallum.
PASS. III.	1 Rendall. 2 Marsack, F. 3 Gelling. 4 Monteith. 5 McEvoy. 6 McLaren. Makinson. 8 McKergow. 9 Monk. McCallum. Derbyshire. Marsack, H. Asbury.	1 Rendall. 2 McCallum. 3 Marsack, F. 4 McEvoy. Monk. 6 Gelling. 7 McLaren. 8 Makinson. 9 McKergow. Monteith. 11 Derbyshire. Asbury.	1 Makinson. McEvoy. 3 Monteith. McCallum. 5 Gelling. Monk. 7 Derbyshire. 8 McKergow. 9 Asbury. 10 Marsack, H.	1 Gelling. 2 Monteith. 3 Marsack. 4 Derbyshire. 5 McEvoy. 6 McLaren. 7 Rendall. McKergow. 9 Monk. 10 Marsack, H. Asbury. Makinson.

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CLASS LISTS (EASTER EXAMINATIONS).—*Continued.*

SECOND YEAR.

Class.		Literature.	Political Economy.	General Proficiency.
Honours.	I.	1 Linfield. 2 Tinney.	1 Rendall. 2 McEvoy. 3 Linfield. 4 Tinney. 5 Monteith. 6. Brodie.	1 Brodie. 2 Linfield. 3 Tinney. ....
	II.	1 Brodie. 2 Rendall. 3 Monteith. 4 Marsack, H. 5 Derbyshire.	1 McLaren. 2. Gelling.	1 Rendall. 2 Monteith. ....
Pass.	III.	1 McEvoy. 2 McLaren. 3 Gelling. 4 Monk. 5 McCallum. 6 Makinson. 7 McKergow. 8 Asbury. 9 Marsack.	1 Asbury. 2 McCallum. 3 Marsack, F. 4 Derbyshire. 5 Monk. 6 Marsack, H. 7 Mackinson, McKergow.	1 McLaren. 2 McEvoy. 3 McCallum. 4 Gelling. 5 Marsack, F. 6 Derbyshire. 7 McKergow. ....

Names unnumbered are those of students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 60 per cent.; for pass, 33 per cent.

Class Lists.

II. MIDSUMMER EXAMINATION, 1889.

FIRST YEAR.

Class	Agriculture.	Geology.	Botany.	Materia Medica.
HONORS. I.	1 Hutt, H. L. 2 Sleightholm, J. A. B. 3 Harcourt, J. 4 Cowan, R. E. 5 Dolsen, N. G.; Mulholland, F. 7 Bate, E. H. 8 Buchanan, D.; Cowan, J. H. 10 Mattice, W. A.; Rowen, E.; Whitley, C. F. 13 Hadwen, G. 14 Thompson, J. P.; Hewgill, E. A.	1 Hutt. 2 Harcourt. 3 Bayne.	1 Harcourt, J. 2 Hutt. 3 Sleightholm.	1 Hutt. 2 Cowan, R. E. 3 Harcourt, J. 4 Dolsen.
HONORS. II.	1 Webster, F. E.; Brown, H. H. 3 Noxon, H. S. 4 Campbell, C. S.	1 Whitley. 2 Sleightholm. 3 Dolsen; Holliday. 5 Cowan, R. E. 6 Hadwin. 7 Mattice; Bate. 9 Brown. 10 Mulholland. 11 Fairbairn. 12 Thompson, J. P.	1 Hawden. 2 Whitley, 3 Buchanan. 4 Holliday. 5 Bayne. 6 Mulholland. 7 Newcomen.	1 Buchanan. 2 Bate. 3 Cowan, J. H. 4 Mulholland. 5 Brown; Hewgill. 7 Hawden. 8 Mattice. 9 Macfarlane. 10 Newcomen. 11 Whitley.
PASS. III.	1 Holliday, W. B. 2 Elliott, R.; Bayne, P. R. C. 4 Stagg, J. C. 5 Field, H. 6 Shaw, P. G. 7 Thomson, H. C.; Wells, E. 9 McCrae, H. E. 10 Wilson, F. 11 Fairbairn, O. 12 McFarlane, T. W. R.; Farlinger, F. E. 14 McDonald, H. 15 Wood, W. D. 16 Smith, D. 17 Seymour, F. B. 18 Newcomen, W. F. Young, T. L. Dunne, H. R. Alloway, L.	1 Buchanan. 2 Campbell. 3 Webster; Noxon. 5 Cowan, J. H. 6 Field. 7 Rowen. 8 Wilson. 9 Macfarlane. 10 McDonald. 11 Hewgill. 12 Newcomen. 13 Thomson, H. C. 14 Dunne. 15 Elliott. 16 Wood. 17 Shaw. 18 Stagg. 19 Alloway. 20 Wells. 21 McCrea.	1 Cowan, R. E. 2 Hewgill. 3 Brown. 4 Field. 5 Dolsen. 6 Shaw; Webster. 8 Elliott. 9 Bate. 10 Thompson, J. P. 11 Rowen. 12 Fairbairn; Mattice. 14 Noxon. 15 Wood. 16 Cowan, J. H. 17 Macfarlane. 18 Wilson; Campbell. 20 Stagg. 21 Wells. 22 Dunne. McCrea. Smith. Thomson, H. C. McDonald. Alloway. Young. Farlinger. Seymour.	1 Bayne. 2 Noxon; Sleightholm. 4 Rowen; Campbell. 6 Holliday. 7 Thomson, H. C. 8 Wood. 9 McDonald. 10 Stagg. 11 Wilson. 12 Thompson, J. P. 13 Webster; Field. 15 McCrea. 16 Shaw, Elliott, Wells. Alloway. Seymour. Fairbairn. Smith. Young. Farlinger. Dunne.

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The minimum for first-class honors is 75 per cent.; for second-class honors 60 per cent.; for pass 38 per cent,

CLASS LISTS (MIDSUMMER EXAMINATIONS.)—*Continued.*

FIRST YEAR.

CLASS.	ENGLISH LITERATURE.	COMPOSITION.	MENSURATION.	DAIRYING.	GENERAL PROFICIENCY.
HONOURS. I.	1 Whitley.		1 Dolsen. 2 Whitley. 3 Thompson, J.P. 4 Bayne. Sleightholm.	1 Sleightholm. 2 Harcourt, J. 3 Hewgill. Mulholland. Hutt. Whitley. 7 Cowan, R. E. Dolsen. Thompson, J.P. 10 Webster. Cowan, J. H. 13 Wells. Elliott.	1 Harcourt, J. 2 Hutt. 3 Whitley.
HONOURS. II.	1 Hutt. 2 Dolsen. Harcourt. 4 Sleightholm.	1 Whitley. 2 Newcomen. 3 Harcourt, J. 4 Holliday. 5 Hutt. 6 Sleightholm. 7 Cowan, R. E. 8 Field.	1 Brown. 2 Harcourt, J. Cowan, R. E. 4 McDonald. Webster. 6 Newcomen. 7 Cowan, J. H. 8 Wells. 9 Noxon. 10 Mulholland. Hutt.	1 Mattice. 2 Bate. 3 Hawden. 4 McCrea. 5 Rowen. 6 Campbell. 7 Seymour. 8 Thomson, H.C. 9 Holliday. 10 Bayne. Noxon. 12 Brown.	1 Sleightholm. 2 Cowan, R. E. 3 Mulholland. 4 Buchanan. 5 Bayne. 6 Holliday.
PASS. III.	1 Thompson, J. P. 2 Buchanan. 3 Newcomen. 4 Elliott. 5 Holliday. Cowan, R. E. 7 Hewgill. 8 Rowen. 9 Bate. 10 Bayne. 11 Webster. 12 Mulholland. 13 Campbell. 14 Field. 15 Noxon. 16 Fairbairn. 17 Brown. 18 Wells. Alloway. McCrea. 21 Shaw. Cowan, J. H. Thompson, H.C. McDonald. Wilson. Hadwen. Stagg. Macfarlane. Wood. Dunne. Farlinger. Smith. Young. Mattice. Seymour.	1 Bayne. Brown. Wells. 4 Buchanan. 5 Hawden. 6 Bate. Fairbairn. 8 Mulholland. 9 Cowan, J. H. 10 Noxon. 11 Thomson, J.P. 12 Shaw 13 Stagg. 14 Thomson, H.C. 15 Alloway. Campbell. Elliott. 18 McDonald. Webster. 20 Hewgill. 21 Dolsen. 22 Macfarlane. 23 McCrea. Rowen. 25 Dunne. Wilson. Wood. Young. Smith. Farlinger. Mattice. Seymour.	1 Thomson, H.C. 2 Holliday. 3. Field. 4 McCrea. Hawden. Rowen. 7 Hewgill. 8 Campbell. 9 Buchanan. 10 Wood. 11 Stagg. 12 Shaw. 13 Bate. 14 Elliott. 15 Fairbairn. 16 Dunne. 17 Wilson. Macfarlane. Alloway. Young. Smith. Mattice. Seymour. Farlinger.	1 Field. 2 Wood. 3 Buchanan. Wilson. 5 Macfarlane. 6 Shaw. 7 Fairbairn. 8 Stagg. 9 Farlinger. 10 Newcomen. 11 Smith. 12 Dunne. 13 McDonald. Alloway. Young.	1 Bate. 2 Thomson, P.C. 3 Hewgill. 4 Brown. 5 Cowan, J. H. 6 Dolsen. 7 Rowen. 8 Webster. 9 Noxon. 10 Newcomen. 11 Field. 12 Campbell. 13 Elliott. 14 Shaw. 15 Wells.

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CLASS LISTS.

MIDSUMMER EXAMINATIONS.—1889.

SECOND YEAR.

Class.	Agriculture and Arboriculture.	Practical Judging of Sheep.	Dairying.	Analytical Chemistry.	Horticulture. (Written Exam.)
HONORS. I.	1 Brodie, G. A. 2 Linfield, F. B. 3 Rendall, W. 4 Tinney, F. H. 5 McLaren, P. S. / McCallum, W.	1 Brodie. 2 Linfield. 3 Monteith, / Tinney. 5 Rendall. 6 McLaren.	1 Linfield. 2 Brodie. 3 Monteith. / Tinney.	1 Linfield. 2 Tinney. 3 Brodie. 4 Rendall.	1 Brodie. 2 Linfield.
HONORS. II.	1 Monteith. 2 Asbury.	1 McCallum. 2 McEvoy. 3 Makinson. 4 Asbury. 5 Gelling. / McKergow. 7 Monk.	1 Rendall. 2 Derbyshire.	1 McKergow.	1 Tinney. 2 Rendall. 3 McCallum. 4 Monteith.
PASS. III.	1 Derbyshire. 2 McKergow. 3 Gelling. 4 Monk. 5 McEvoy. 6 Makinson.	1 Derbyshire.	1 McLaren. 2 Gelling. 3 McCallum. 4 McKergow. 5 Asbury. 6 Makinson. 7 McEvoy. 8 Monk.	1 McLaren. 2 Derbyshire. 3 McCallum. 4 Monteith. 5 Asbury. 6 McEvoy. 7 Makinson. 8 Gelling. 9 Monk.	1 Gelling. 2 McLaren. 3 McEvoy. 4 Makinson. 5 McKergow. 6 Derbyshire. 7 Asbury. 8 Monk.

CLASS LISTS (MIDSUMMER EXAMINATIONS.—*Continued.*

SECOND YEAR.

CLASS.	SYSTEMATIC AND ECONOMIC BOTANY.	VETERINARY PATHOLOGY AND OBSTETRICS.	ENGLISH LITERATURE.	ROAD-MAKING, LEVELLING AND SURVEYING.	PRACTICAL PLOUGHING.
HONORS. I.	1 Brodie. 2 Linfield. 3 Tinney.	1 Brodie. 2 Tinney.	1 Brodie 2 Linfield.	1 Brodie. 2 Rendall.	1 Rendall. 2 McLaren. 3 Brodie. 4 Linfield. 5 Tinney. 6 Monteith. 7 McCallum.
HONORS. II.	1 Rendall.	1 Linfield. 2 Rendall.	1 Tinney.	1 Linfield. 2 McCallum. 3 Tinney.	1 Asbury. 2 Gelling.
PASS. III.	1 McLaren. 2 Monteith. 3 Makinson. 4 McKergow. 5 Gelling. 6 Derbyshire. 7 McEvoy. 8 McCallum. 9 Monk. 10 Ashbury.	1 Makinson. 2 McLaren. 3 McKergow. / McEvoy. 5 McCallum. 6 Monk. 7 Asbury. / Gelling. Monteith. Derbyshire.	1 McLaren. 2 Rendall. 3 Monteith. 4 McEvoy. 5 Makinson. 6 Gelling. 7 Derbyshire. / McCallum. 9 Monk. McKergow. Asbury.	1 Gelling. 2 Monteith. 3 McKergow. 4 Derbyshire. 5 McEvoy. 6 McLaren. / Monk. 8 Asbury. / Makinson.	1 McEvoy. 2 Makinson. 3 Monk. 4 Derbyshire. 5 McKergow.

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CLASS LISTS (MIDSUMMER EXAMINATONS)—*Continued.*

SECOND YEAR.

CLASS.	HORTICULTURE PRACTICAL EXAMINATIONS.	CARPENTERING.	PRACTICAL EXAMINATIONS IN FARM WORK.	GENERAL PROFICIENCY, WRITTEN EXAMINATIONS.
HONOURS. I.	1 Brodie. 2 McEvoy. 3 Monteith. 4 Linfield. 5 Rendall. 6 Asbury.	1 Rendall. 2 Brodie. 2 Linfield.	1 Brodie. 2 Rendall. 3 Linfield. 4 Monteith. 5 Asbury. 6 Tinney.	1 Brodie. 2 Linfield. 3 Tinney. ....
HONOURS. II.	1 Tinney. 2 McKergow.	1 Monteith. 2 Tinney. 3 Asbury.	1 McLaren. 2 McEvoy.	1 Rendall. ....
PASS. III.	1 Gelling. 2 McLaren. 3 Monk. 4 Makinson. 5 Derbyshire. 6 McCallum.	1 McLaren. 2 McCallum. 3 McEvoy. 4 McKergow. 5 Gelling. 6 Derbyshire. 7 Monk. 8 Makinson.	1 McCallum. 2 Gelling. 3 McKergow. 4 Monk. 5 Makinson. 6 Derbyshire.	1 McLaren. 2 McCallum. 3 Gelling. ....

UNIVERSITY OF TORONTO.

DEPARTMENT OF AGRICULTURE—CLASS LISTS, 1889.

THIRD YEAR.

CLASS	CHEMISTRY.	BOTANY.	ENGLISH.	DRAWING.	GEOLOGY.
HONOURS. I.	Harcourt, G. Hutton, J. R. Lehmann, A. Soule, R. M.	Hutton.	Hutton. Raynor.	Harcourt. Hutton.	....
HONOURS. II.	Morgan. J. H. A. Raynor, T. G.	Harcourt. Lehmann. Morgan. Raynor. Soule.	Harcourt. Morgan. Soule.	Lehman. Raynor.	Hutton. Morgan. Raynor. Soule. .....
PASS. III.	....	....	Lehmann.	Morgan. Soule.	....

DEPARTMENT OF AGRICULTURE—CLASS LISTS, 1889—*Continued.*

THIRD YEAR.

CLASS.	ENTOMOLOGY.	LATIN.	DAIRYING.	AGRICULTURE.
HONOURS. I.	Hutton.			Harcourt. Morgan. Soule.
HONOURS. II.	Harcourt. Lehmann. Soule,		Harcourt. Hutton. Lehmann.	
PASS. III.	Morgan. Raynor.	Raynor.		Lehmann.

PART II.

REPORT OF THE

PROFESSOR OF NATURAL HISTORY AND GEOLOGY.

ONTARIO AGRICULTURAL COLLEGE,
GUELPH, December 31st, 1889.

To the President of the Ontario Agricultural College:

SIR,—In submitting to you a report of the Department of Natural History, it will be convenient to consider it under the following topics:—

1. Museum.
2. Library.
3. Reading-room.
4. Practical work.

1. COLLEGE MUSEUM.

While we cannot boast of a very large museum, still we are yearly improving it, and hope in time to see one of a pre-eminently practical nature. Last year some very much needed changes were made, and in many respects the specimens were arranged so as to aid materially students in the prosecution of studies connected with natural history and geology. I think the time has come when a small annual grant, say of one hundred dollars, should be made so as to enable us to buy a few specimens, such as insectivorous birds, etc., so as to add to our list when an opportunity is afforded. I would suggest that this year cases for plants be put up along the walls of the museum, in which specimens of the weeds common to Ontario will be placed so as to render it an easy matter for visitors to identify obnoxious plants that have come under their observation in localities where they reside.

We have received a few donations to our collection during 1889, for which I express thanks to the donors, and hope they and others will remember we are always ready to receive any specimens that will aid us in instruction.

The following is a list of the contributors:—W. F. Newcamen, student, fossil shells from Niagara; James Edmonstone, Johnson, Ont., four plants; C. Frith, Durham, calf's double head; Miss Robertson, Guelph, ant eggs from Africa; A. Wiggins, Fairmont, iron pyrites; Prof. James, O.A.C., eight minerals; John Ramsay, Eden Mills, two minerals; Rev. John Wilkie, Indore, collection of Himalaya ferns; George Carlaw, Warkworth, cutworms; F. H. Worthington, student, seeds from West Indies.

2. LIBRARY.

This attractive room is at present very convenient, and is each year becoming better arranged and equipped for educational purposes. We should have an annual grant of at least two hundred dollars for the purchase of new books. The college is largely

referred to for information upon subjects connected with agricultural science, to furnish such we should be equipped with the very best books on science. Such books are expensive, and consequently, without funds, we are unable to have the books at our command we need from time to time for reference.

We certainly are in much need of some two to three hundred dollars worth of books at present for the various departments.

The present grant is largely spent in the purchase of papers, journals, etc., for the reading-room. Although we appear to have a large collection of books, yet many of them are of little service in our work, hundreds of them being bound up volumes of Blackwood, etc., sent to us when the Depository of the Educational Department at Toronto was abolished.

Our Library now contains 5,480 volumes, of which 114 have been added this year. The books added may be grouped as follows:—

Reports, chiefly agricultural	52
Botany	5
Geology	2
Agriculture	8
Chemistry	2
Literature	20
Encyclopædias	4
Entomology	1
General Science	1
Parliamentary reports	18
Examination papers, bound	1
	114

3. Reading-room.

This is one of the most commodious and pleasant rooms in the College, and is becoming yearly more used for the purpose it was intended. It is well furnished for reading and study; excellent tables and chairs, and convenient reading desks, upon which are found the best agricultural journals published, a list of which is given below.

Rules regarding the proper use of the reading-room are posted in conspicuous places.

The following is a list of papers, journals and magazines which come to the College, and are for the use of the students in attendance:—

Papers and Magazines.

(a) *Sent free by the Publishers.*

Name.	Where published.
1. Journal of Commerce	Montreal.
2. Canadian Baptist	Toronto.
3. Christian Guardian	"
4. Canada Presbyterian	"
5. Monthly Weather Review	"
6. Presbyterian Review	"
7. Sheep Breeder and Wool Grower	Chicago.
8. Manitoba Weekly Free Press	Winnipeg.
9. Canadian Horticulturist	St. Catharines.
10. Canadian Entomologist	London, Ont.
11. Bee Journal	Beeton.
12. North York Reformer	Newmarket.
13. Acton Free Press	Acton.
14. Ontario Evangelist	Erin, Ont.

(b) *Furnished by the College.*

	Name.	Where published.
1.	Daily Globe	Toronto.
2.	" Mail	"
3.	" Empire	"
4.	" Mercury	Guelph.
5.	" Herald	"
6.	Rural Canadian	Toronto.
7.	Grip	"
8.	Poultry Review	"
9.	Farmer's Advocate	London, Ont.
10.	Canadian Stock-Raiser's Journal	Hamilton.
11.	Nor'-West Farmer	Winnipeg.
12.	Breeder's Gazette	Chicago.
13.	North British Agriculturist	Edinburgh (Scotland).
44.	Farmers' Gazette	Dublin (Ireland).
15.	Mark Lane Express	London (England).
16.	American Garden	Greenfield (Mass.)
17.	American Naturalist	Philadelphia.
18.	Veterinary Journal	London (England).
19.	Veterinarian	"
20.	Cultivator and Country Gentleman	Albany, N.Y.
21.	Scientific American	New York.
22.	Live Stock Journal	England.
23.	Live Stock Journal	Chicago.
24.	American Dairyman	New York.
25.	Botanical Gazette	Crawfordsville, Indiana.
26.	Agricultural Science	Geneva, N.Y.
27.	Canadian Honey Producer	Brantford.

4. Practical Work.

In the department of Natural History much has been done to make the study of science popular and practical. A trip to Niagara Falls with students, at their own expense, gave them an excellent opportunity to see the varied flora of the park and the magnificent exposure of rocks in that region, besides the general face of the country through which they passed on the way. The quarries of Guelph are convenient for illustrations in geology. For use in the third year we have now some ninety-five drawings illustrating microscopic plants injurious to garden, orchard and field crops.

These are also drawn upon slides for the magic lantern, and can be used any evening for instructive purposes.

On the canvas rust, blight, mildews, etc., appear like plants 4–7 feet in height. The diagrams and slides are arranged in the same order as the subjects are treated in the lecture-room.

This affords wonderful aid to students and impresses lessons which might soon be forgotten. We are constantly preparing slides for this purpose so that science will be illustrated on board, paper and canvas, and so presented as to be attractive, popular and instructive. In all we have upwards of 300 slides for the magic lantern, illustrating facts in Zoology, Botany and Geology.

In the spring of this year much time was occupied in preparing a bed of plants to be used in connection with lectures in botany. We commenced it the previous year and completed it this, so that the botanical instructive bed has become an important adjunct of the work in the class-room.

It is 224 feet in length and 15 feet in width. The rows containing the plants are 13 feet long, and a certain number of rows are set apart to illustrate typical plants in

each order according as the order is large or small. Some orders have six rows, others only one, consequently a student knows at once whether the order is a common one or not by the number of plants set apart to illustrate it. In the Compositæ he sees 30, Ranunculaceæ 20, Papaveraceæ 1.

In the whole bed we have 40 orders, 275 genera and 550 species, which are arranged as follows :—

1. A systematic arrangement embracing 40 orders, 225 genera, 325 species.

2. A promiscuous arrangement embracing 225 species not grouped in orders. This is to test the student's knowledge of the orders to which the various plants belong.

3. An arrangement to illustrate the various methods of arranging plants in beds, such as carpet, moss, ribbon, and miscellaneous bedding,

Every plant is labelled so that students and visitors can readily identify them. In front of the first plant in each order the name of the order is indicated upon a large label, and the divisions, polypetalous, gamopetalous and apetalous are also shown by larger labels. The following is a list of the plants found in the first bed, illustrating the systematic arrangement of the flowers into orders as discoursed in the class-room :—

ORDER I.

Polypetalous Exogens.

Ranunculaceæ (Crowfoot Family).

Row 1—

1	Hepatica acutitoba	Liver leaf.
2	H. triloba	Lobed "
3	Anemone pulsatilla	Pasque flower.
4	A. nemorosa	Wood anemomy.
5	Ranunculus acris	Buttercup.

Row 2—

1	Adonis vernalis	Spring adonis.
2	Coptis trifolii	Goldthread.
3	Aconitum Napellus	Monkshood.
4	Pæonia tenuifolia	Cut-leaved pæony.
5.	P. officinalis	Pæony.

Row 3—

1	Aquilegia Canadensis	Columbine.
2	Thalictrum dioicum	Meadow rue.
3	" speciosum	
4	Aquilegia cærulea	Cærulean Columbine.
5	Delphinium splendens	Larkspur.

Row 4—

1	Clematis viorna	Clematis.
2	C. corymbosa	"
3	Helleboras viridis	Hellebore
4	Eranthes hyernalis	Winter aconite.
5	Nigella damascena	Love-in-the-mist.

ORDER II.

Berberidaceæ (Barberry F.)

Row 5—

1 Epimedium Alpinum ..... Epimedium.
2 Caulophyllum thalictroides ..... Blue cohosh.
3 Podophyllum peltatum ..... Mandrake.
4 Epimedium .....
5 Berberis purpurea ..... Purple barberry.

ORDER III.

Papaveraceæ (Poppy Family).

Row 6—

1 Sanguinaria Canadensis ..... Blood root.
2 Papaver rhoeas ..... English poppy.
3 Chelidonium majus ..... Celandine.
4 Glaucum luteum ..... Horn poppy.
5 Bocconia cordata ..... Bocconia.

ORDER IV.

Fumariaceæ (Fumitory F.)

Row 7—

1 Dicentra Canadensis ..... Squirrel corn.
2 " Cucullaria ..... Deer fly.
3 " Spectabilis ..... Bleeding heart.
4 " Formosa ..... Dicentra.
5 Corydalis aurea ..... Golden corydalis.

ORDER V.

Cruciferæ (Cress F.).

Row 8—

1 Iberis umbellata ..... Candytuft.
2 Brassica napus ..... Turnip.
3 Lepidium Virginicum ..... Pepperwort.
4 Arabis ..... Rock-cress.
5 Sinapis arvensis ..... Wild mustard.

Row 9—

1 Sisymbrium officinale ..... Hedge mustard.
2 Dentaria diphylla ..... Toothwort.
3 Lunaria biennis ..... Honesty
4 Camelina sativa ..... False flax.
5 Sinapis alba ..... White mustard.

Row 10—

1 Alyssum maritinum ..... Sweet alyssum.
2 Brassica oleracea ..... Cabbage
3 Capsella bursa pastoris ..... Shepherd's purse.
4 Rhaphanus sativus ..... Radish.
5 Matthiola annua ..... Stock.

ORDER VI.

Violaceæ (Violet F.).

Row 11—

1	Viola pubescens	Yellow violet.
2	" blanda	White violet.
3	" Canadensis	Canadian violet.
4	" cucullata	Common blue violet.
5	" tricolor	Pansy.

ORDER VII.

Caryophyllaceæ (Pink F.).

Row 12—

1	Cerastium arvense	F. mouse ear chickweed.
2	Tunica saxifraga	Tunica.
3	Dianthus deltoides	Deltoid pink.
4	Lychnis vespertina	White cockle.
5	Dianthus barbatus	Sweet William.

Row 13—

1	Saponaria Caucasia	Soapwort.
2	Cerastium vulgatum	Mouse ear chickweed.
3	Silene inflata	Bladder Campion.
4	Lychnis githago	Cockle
5	Dianthus Chinensis	China pink.

Row 14—

1	Arenaria serpyllifolia	Thyme-lea'd sandwort
2	Saponaria officinalis	Bouncing Bet.
3	Vaccaria vulgaris	Cow-herb.
4	Stellaria media	Chickweed.
5	Lychnis diurua	Day-blooming lychnis

ORDER VIII.

Portulacaceæ (Purslane F.).

Row 15

1	Claytonia Virginica	Spring beauty.
2	Portulaca grandiflora	Portulaca.
3	" oleracea	Purslane.
4	" grandiflora	Portulaca.
5	Calandrinia discolor	Calandrina.

ORDER IX.

Malvaceæ (Mallow F.).

Row 16—

1	Malva rotundifolia	Mallow.
2	Abutilon striatum	Indian mallow.
3	Malva moschata	Musk mallow.
4	Malope trifida	Malope.
5	Althaea rosea	Hollyhock.

ORDER X.

Linaceæ (Flax F.).

Row 17—

1	Linum flavum	Yellow flax.
2	" grandiflorum	Red flax.
3	" usitatissimum	Common flax.
4	" perenne	Perennial flax.
5	" usitatissimum	Flax.

ORDER XI.

Geraniaceæ.

Row 18—

1	Geranium sanguineum	Crimson geranium.
2	Impatiens balsamina	Balsam.
3	Oxalis versicolor	Sorrel.
4	Tropaeolum majus	Nasturtium.
5	Pelargonium coridatum	Pelargonium.

Row 19—

1	Tropaolum majus	Nasturtium.
2	Geranium	Bronze geranium.
3	"	Silver "
4	" maculatum	Wild "
5	" Robertianum	Herb Robert.

ORDER XII.

Leguminosæ (Pulse F.).

Row 20—

1	Lotus corniculatus	Bird's-foot trefoil.
2	Vicia cracca	Wild tare.
3	Pisum sativum	Pea.
4	Trifolium rubens	Crimson clover.
5	Baptisia tinctoria	Wild false indigo.

Row 21—

1	Medicago lupulina	Black medick.
2	Trifolium arvense	Rabbit-foot clover.
3	Medicago sativa	Lucerne.
4	Onobrychus sativa	Sainfoin.
5	Melilotus officinalis	Sweet clover.

Row 22—

1	Trifolium repens	White clover.
2	Trifolum pratense	Red "
3	Lathyrus latifolius	Everlasting pea.
4	Vicia sativa	Tare.
5	Lupinus perennis	Lupine.

ORDER XIII.

Rosaceæ (Rose F.).

Row 23—

1	Waldsteinia fragaroides	Barren strawberry.
2	Fragaria vesca	Wild strawberry.
3	Geum uniflorum	Avens.
4	Spiraea	Spiraea.
5	Rosa rugosa	Single rose.

Row 24—

1	Potentilla argentea	Cinquefoil.
2	" verna	Green cinquefoil.
3	" sulphurea	Yellow cinquefoil.
4	Spiraea	Spiraea
5	Rubus strigosus	Raspberry.

ORDER XIV.

Saxifragaceæ (Saxifrage F.).

Row 25—

1	Saxifraga	Saxifrage
2	Mitella diphylla	Bishop's cap.
3	Tiarella cordifolia	False mitrewort.
4	Hydrangea hortensia	Hydrangea.
5	Ribes rubrum	Red currant.

ORDER XV.

Crassulaceæ (Orpine F.).

Row 26—

1	Sedum acre	Stone-crop.
2	Sedum ternatum	
3	Sempervivum tectorum	House-leek.
4	Sedum sieboldii	
5	Sedum telephinum	Live-forever.

ORDER XVI.

Onagraceæ (Evening primrose F.).

Row 27—

1	Circaea lutetiana	Enchanter's nightshade.
2	Oenothera biennis	Evening primrose.
3	Clarkia pulchella	Clarkia.
4	Fuchsia	Fuchsia.
5	Epilobium angustifolium	Willow-herb.

ORDER XVII.

Umbelliferæ (Parsley F.)

Row 28—

1	Carum petroselinum	Parsley.
2	Apium graveolens	Celery.
3	Pastinaca sativa	Parsnip.
4	Daucus carota	Carrot.
5	Eryngium amethystinum	Eryngo.

ORDER XVIII.

Cucurbtaceæ (Gowad F.).

Row 29—

1	Cucurbita verrucosa	Vegetable marrow.
2	Cucumis melo	Mush melon..
3	Cucumis sativus	Cucumber.
4	Citrullus vulgaris	Watermelon.
5	Cucurbita pepo	Pumpkin.

ORDER XIX.

Gamopetalous Exogens.

Compositæ (Composite F.).

Row 30—

1 Achillæa Millefolium ..... Yarrow.
2 Gaillardia grandiflora ..... Gaillardia.
3 Cereopsis .....
4 Achillæa filipendula ..... Golden yarrow.
5 Ambrosia artemisæfolia ..... Ragweed.

Row 31—

1 Taraxacum dens-leonis ..... Dandelion.
2 Senecio vulgaris ..... Groundsel.
3 Pyrethrum roseum ..... Pink feverfew,
4 Maruta cotula ..... Mayweed
5 Cineraria maritima ..... Cineraria.

Row 32—

1 Centaurea cyanus ..... Bluebottle.
2 Anthemus tinctoria ..... Yellow camomile.
3 Rudbeckia hirta ..... Cone-flower.
4 Tanacetum vulgare ..... Tansy.
5 Solidago Canadensis ..... Goldenrod.

Row 33—

1 Bellis perenius ..... Daisy.
2 Leucanthemum vulgare ..... Ox-eye daisy.
3 Lappa major ..... Burdock.
4 Erigeron Philadelphicum ..... Fleabane,
5 Helianthus annuus ..... Sunflower.

Row 34—

1 Cirsium arvense ..... Thistle.
2 Hieracium auranticum ..... Hawkweed.
3 Echinops sphaerocephalus ..... Bee-plant.
4 Cirsium lanceolatum ..... Bull thistle.
5 Chicorium Intybus ..... Chicory.

Row 35—

1 Sonchus oleraceus ..... Sow-thistle.
2 Gazania splendns ..... Gazania.
3 Gnaphalium polycephalum ..... Everlasting.
4 Inula helenium ..... Elecampane.
5 Dahlia variabilis ..... Dahlia.

ORDER XX.

Lobeliaceæ (Lobelia F.).

Row 36—

1 Lobelia speciosa ..... Lobelia.
2 " " ..... "
3 " inflata ..... Indian tobacco.
4 " syphilitica ..... Great blue lobelia
5 " Cardinalis ..... Cardinal flower.

ORDER XXI.

Campanulaceæ (Campanula F.).

Row 37—

1	Campanula	Carpathica	Low harebell.
2	"	Americana	Tall wild bell.
3	"	medium	Canterbury bell.
4	"	latifolia	
5	"	rotundifolia	Harebell.

ORDER XXII.

Plantaginaceæ (Plantain F.).

Row 38—

1	Plantago	major	Plantain.
2	"	lanceolata	Rib-grass.
3	"	lanceolata	Rib.grass.
4	"	"	"
5	"	"	"

ORDER XXIII.

Primulaceæ (Primrose F.).

Row 39—

1	Primula	veris	Cowslip.
2	"	sieboldi	
3	"		
4	Dodecatheon	meadia	Shooting star.
5	Lysimachia	vulgaris	Loose-strife.

ORDER XXIV.

Scrophulariaceæ (Figwort F.)

Row 40—

1	Veronica	officinalis	Speedwell.
2	Linaria	purpurea	Purple toadflax.
3	Minrulas	ringens	Monkey flower.
4	Penstemon	pubescens	Penstemon.
5	Chelone	glabra	Turtle-head.

Row 41—

1	Pedicularis	Canadensis	Wood betony.
2	Linaria	vulgaris	Toadflax.
3	Antirrchinum	majus	Snapdragon.
4	Digitalis	purpurea	Fox glove.
5	Verbascum	Thapsus	Mullein.

ORDER XXV

Verbenaceæ (Vervian F.).

Row 42—

1	Verbena	venosa	Verbena.
2	"	"	"
3	Lantana	camara	Lantana.
4	Phryma	leptostachya	Lopseed.
5	Verbena	hastata	Vervian.

ORDER XXVI.

Labiatæ (Mint F.)

Row 43—

1	Marrubum vulgare	Horehound.
2	Perilla nankinensis	Perilla.
3	Colens veitchii	Foliage plant.
4	Salvia officininalis	Sage.
5	Lavandula vera	Lavander.

Row 44—

1	Thymus variegata	Thyme.
2	Mentha viridis	Spearmint.
3	Leonurus cardiaca	Motherwort.
4	Nepeta cataria	Catnip.
5	Monarda fistulosa	Wild bergamot.

ORDER XXVII.

Borraginaceæ (Borage F.)

Row 45—

1	Myosotis palustris	Forget-me-not.
2	Cynoglossum officinalis	Burr.
3	Echinospernum lappuba	Stickseed.
4	Echium vulgare	Blueweed.
5	Symphytum officinalis	Comfrey.

Row 46—

1	Lithospernum arvense	Redroot.
2	Heliotropium Peruvianum	Heliotrope.
3	Borage officinalis	Borage.
4	Anchusa officinalis	Anchusa.
5	Lithospermum canescens	Hoary puccoon.

ORDER XXVIII.

Polemoniaceæ (Phlox F.)

Row 47—

1	Phlox subulata	Low phlox.
2	" "	"
3	" divaricata	Wild "
4	Gilia tricolor	Gilia.
5	Polemnonium caeruleum	Jacob's ladder.

ORDER XXIX.

Convolvlaceæ (Convolvulus F.)

Row 48—

1	Convolvulus arvensis	Bindweed.
2	Ipomaea purpurea	Morning glory.
3	C. arvensis	
4	I. purpurea	
5	" "	

ORDER XXX.

Solanaceæ (Nightshade F.)

Row 49—

1 Petunia nyctaginifolia ..... Petunia.
2 Datura fastuosa ..... Datura.
3 Solanum tuberosum ..... Potato.
4 Lycopersicum esculentum ..... Tomato.
5 Nicotiana rustica ..... Tobacco.

ORDER XXXI.

Asclepiadaceæ (Milkweed F.)

Row 50—

1 Asclepias tuberosa ..... Butterfly-weed.
2 .....
3 A. cornuti ..... Milkweed.
4 A. phytolaccoides ..... Poke-milkweed.
5 A. incarnata ..... Swamp milkweed.

ORDER XXXII.

APETALOUS EXOGENS

Chenopodiaceæ (Goosefoot F.)

Row 51—

1 Blitum capitatum ..... Strawberry blite.
2 Spinosa oleracea ..... Spinage.
3 Atriplex rubra ..... Atriplex.
4 Beta vulgaris ..... Beet.
5 Chenopodium album ..... Lamb's quarters.

ORDER XXXIII.

Amarantaceæ (Amaranth F.)

Row 52—

1 Achyranthes ..... Achyranthes.
2 Gomphrena globosa ..... Everlasting,
3 Celosia cristata ..... Cockscomb.
4 Iresine Lindeni ..... Iresine.
5 Amarantus retroflexus ..... Pigweed.

ORDER XXXIV

Polygonaceæ (Buckwheat F.).

Row 53—

1 Polygonum aviculare ..... Doorweed.
2 Rumex acetosella ..... Sorrel.
3 Fagoyprrum esculentum ..... Buckwheat.
4 Rumex crispus ..... Dock.
5 Rheum rhaponticum ..... Rhubarb.

ORDER XXXV.

Euphorbiaceæ (Spurge F.)

Row 54—

1 Euphorbia maculata ..... Spotted spurge.
2 " hypericifolia .....
3 " Cypraissias ..... Cypress spurge.
4 .....
5 Ricinus communis ..... Castor oil plant.

ORDER XXXVI.

ENDOGENS.

Araceae (Arum F.)

Row 55—

1. Arisaema triphyllum ..... Indian turnip.
2. Symphoricarpus foetidus ..... Skunk cabbage.
3. Acorus Calamus ..... Calamus.
4.
5. Calla Ethiopica ..... Calla lily.

ORDER XXXVII.

Iridaceae (Iris F.)

Row 56—

1. Crocus vernus ..... Spring crocus.
2. Gladiolus cardinalis ..... Gladiolus.
3. Pardanthus chinensis ..... Blackberry lily.
4. Sisyrinchium Bermudiana ..... Blue-eyed grass.
5. Iris versicolor ..... Common flag.

Row 57—

1. Iris arenaria ..... Flag.
2. " Sibirica ..... "
3. " Germanica ..... "
4. " fimbriata ..... "
5. " Persica ..... "

ORDER XXXVIII.

Liliaceae (Lily F.)

Row 58—

1. Convallaria majalis ..... Lily-of-the-Valley.
2. Tulipa gesneriana ..... Tulip.
3. Scilla rosea ..... Scilla.
4. Uvularia grandiflora ..... Bellwort.
5. Yucca filamentosa ..... Yucca.

Row 59—

1. Erythronium Americanum ..... Dog-tooth violet.
2. Allium stellatum ..... Star onion.
3. Funkia variegata ..... Funkia.
4. Lilium tigrinum ..... Tiger lily.
5. Polygonatum ..... Solomon's seal.

Row 60—

1. Allium tricoccum.....Leek.
2. Hyacinthus Orientalis .....Hyacinth.
3. Trillium grandiflorum.....Trillium.
4. Fritillaria.....Fritillaria.
5. Lilium.....Orange lily.

ORDER XXXIX.

Amaryllidaceae (Amaryllis F.)

Row 61—

1. Galanthus nivalis.....Snowdrop.
2. Narcissus pseudo-narcissus.....Daffodil.
3. Narcissus poeticus.....Narcissus.
4. Polianthes tuberosa.....Tuberose.
5. Agave Americana.....American aloe.

ORDER XL.

Gramineae (Grass F.)

Row 62—

1. Festuca ovina.....Sheep's fescue.
2. T. pratensis.....Meadow "
3.
4. Dactylus glomerata.....Orchard grass.
5. Triticum repens.....Couch grass.

Row 63—

1. Poa pratensis.....Kentucky blue grass.
2. P. Compressa.....Wire grass.
3. Phleum pratense .....Timothy.
4. Alopecurus pratensis.....Meadow foxtail.
5. Setaria glauca .....Com. foxtail.

Row 64—

1. Panicum crus-galli.....Barnyard grass.
2. Arrenatherum avenaceum.....Tall oat grass.
3. Lolium perenne.....Perennial rye.
4. Bromus secalinus .....Chess.
5. Avena fatua.....Wild oat.

Row 65—

1. Phalaris arundinacea.....Ribbon grasss.
2. Hordeum vulgare .....Barley.
3. Triticum vulgare.....Wheat.
4. Avena sativa.....Oat.
5. Zea Mays.....Indian corn.

40 orders. 225 genera. 325 species.

The following bulletins have been issued from the Natural History Department during '89.

STRAWBERRIES.

Having had strawberries planted among some of our grape vines for three years, until the vines became thoroughly established, I have thought it expedient to give our experience in the form of a bulletin, which may be of service to those who read it.

Few berries are more luscious than the strawberry, and few plants can be more successfully cultivated, and yet how many farm homes there are in which this fruit is seldom eaten.

It is hoped the time is not far distant when the fruit and vegetable garden will form an important feature in the vicinity of the farmhouse, and that on the farmer's table will be seen the fruits of each summer month, when strawberries, raspberries, etc., will be found at home and not require to be sought after in distant "berry patches." A little taste and comparatively little time and care will supply these attractive treats to those who desire them.

Conditions Surrounding the Plants.

Location: Latitude north 43.38°, height above sea level 1,100 feet, above Lake Ontario 858 feet.

Exposure: South-west.

Soil: Clay loam.

Meteorological: Mean annual temperature, 42.2°, 1880-1886; mean summer temperature, 57.1°, winter, 27.3°; highest temperature (1881), 98°, lowest (1884), 35°; average number of days rain fell per year, 72; rainfall, including snow, 24.7 inches; prevailing winds, south-west 43 per cent., north-west 31 per cent.

Management.

The plants are placed in rows three feet apart, and the plants one foot apart in the row. Arranged in this way the cultivation can be largely done with the horse hoe. They were allowed to occupy the ground for three years, when they were removed to another place. The ground was well manured before planting, and another application made the second year. In winter they were protected by scattering some pea-straw over them.

First year—The runners were kept well back, so as to get strong single plants.

Second year—The same course was followed as far as possible.

Third year—The plants were allowed to grow freely and the runners untouched.

Thorough cultivation and keeping the ground free from weeds were observed.

Varieties.

Wilson's Albany, 10 rows; Crescent Seedling, 20 rows; Early Canada, 4 rows; Arnold's Pride, 1 row; Captain Jack, 10 rows; Alpha, 2 rows; Nicanor, 2 rows; Maggie's, 2 rows; Cumberland Triumph, 4 rows; Monarch of the West, 4 rows.

Results.

Wilson's Albany has done excellently, and may be ranked first. It yields well, and is a very suitable variety for shipping.

Crescent Seedling ripened sooner than Wilson, and has been quite productive, but there is a tendency among these berries to be imperfect, owing to incomplete fertilization of the flowers, but this is overcome by having a variety rich in pollen planted near or

among the rows. We overcame the difficulty by planting the Wilson side by side. Crescent Seedling seems to bear more pistillate flowers than staminate. The foliage of the Crescent, being somewhat sparse, does not assist in keeping the berry so clean as the varieties that grow more leaves.

Early Canada ripens soon, but is liable to be caught by frost, and on the whole has done poorly with us.

Arnold's Pride is a clean, good-sized nice berry, but has not been very prolific.

Monarch of the West proved to be a large berry, but only gave a fair yield.

Captain Jack was somewhat late, but very prolific and a good berry.

Alpha has been a slim bearer, but it has a delightful flavor.

Nicanor gave only a fair crop and ordinary berry.

Maggie's was rather small in berry and as comparatively poor a bearer.

Cumberland Triumph is a large and irregularly shaped berry, with only a fair yield. It is a variety more for the amateur than one desiring to raise berries for market.

Conclusions.

1. Strawberries will do well in a locality such as ours, if the soil is rich, friable and well drained.

2. Ground for strawberries should have a good supply of plant food, be easily worked, and should certainly be well drained, kept clean of weeds and well cultivated.

3. We are inclined to favor growing in rows where large quantities are to be grown, and to renew the plants every two years.

4. In well drained, sheltered and good soil, planting out in September is advisable, so as to enable the plant to get thoroughly established. A fair crop next season may be expected; but if such conditions are absent, then plant in spring, and only a medium crop may be looked for.

5. Strawberries may be grown in almost any climate if care be taken. Where the climate is severe protect the plants by scattering over them pea-straw or some other light covering. Avoid heavy substances such as manure; some place boughs with good results.

6. The following is a list which embraces varieties that are likely to succeed well:—Wilson, Crescent Seedling, Daniel Boone, Manchester, Sharpless, Alpha, Prince of Berries, Bidwell and Jewell. Crescent Seedling and Manchester, being poor in pollen, require such as Wilson among them. Sharpless is large, delicious, but somewhat late. Bidwell is a good family berry, sweeter and larger than the popular varieties, Wilson and Crescent.

CHESS.

Bromus Secalinus—Order Graminæ.

Questions are repeatedly sent to the college asking for information concerning chess. The answers to these sometimes entail a good deal of work. Consequently I have thought it expedient to prepare a bulletin upon the subject, and thus put the information in a form that will be of service to those interested. It may appear strange that it is worth while to say so much about this plant, but when it is remembered that there are persons

in various parts of the province who maintain that it is a modification of the wheat plant, brought about by winter-killing of the wheat, it will not be such a matter of surprise that I should deem it expedient to write something about this apparently doubtful member of the grass family, endeavoring to show that it is a species (*Bromus secalinus*) just as much as any other plant is, and that it does not depend for its existence upon a modification of wheat plants growing in adverse conditions.

Much discussion has taken place regarding its origin in some other way than a plant perpetuated by its seed. As it usually appears among fall wheat that has been winter-killed it seems quite natural to suppose it is a degenerated condition of the wheat, and there are not a few farmers who insist upon this as being the only correct explanation of its presence under such circumstances. Thus it is that few questions at a Farmers' Institute will lead up to a more lively discussion than that which deals with the origin of chess.

It seems remarkable that, if this is the true origin of the plant, one cannot readily grow it from wheat, while there is no difficulty whatever in raising it from seeds of chess. Those who sow wheat containing chess never fail to get a good crop, while those who are very careful to sow clean seed seldom are troubled with the weed.

The following are some reasons why a person should be ready to conclude that this plant is no exception to others and depends for its perpetuation upon the seeds which it matures :

1. The plant is widely different from wheat in appearance, so much so that botanists place it in the genus Bromus, while wheat belongs to the genus Triticum. Couch grass (*Triticum repens*) being in the same genus as wheat, comes much nearer in its characters than chess does, and yet no one ever hints that it is derived from wheat. If chess is a degenerated condition of wheat we might reasonably expect some resemblance to the plant from which it was derived.

2. The most devoted evolutionist would not expect to see develop in the short space of a few months, owing to the effect of frost, a plant so unlike in structure, form and habit to that from which it is derived. It is only through long periods of time that such modifications in a plant can take place as to change its character so much that it may be viewed as a new species. But in this case one season brings about such a remarkable change that the plant is ranked in another *genus*—a more comprehensive term than *species*.

3. If chess be sown it yields chess. If it were degenerated wheat, and sown under favorable surroundings, it should soon return to wheat; for we observe both in animal and plant life that a deteriorated form will return to its proper nature when conditions are suitable for growth. Some have gone so far as to say chess will not grow from seed, but this is a mistake that can easily be seen by sowing some of the seed.

4. Chess will mature seed under adverse conditions, though the plant be only two or three inches high, while if surroundings are favorable it grows three or four feet high before seed is matured. This may account for its never being seen in good crops, while it may be seeding the ground for a more suitable time, when the crop in which it is seeded is injured by frost; then this hardy annual (the seeds of which possess great vitality) is ready to take the vacant soil and yield a crop no longer hid from the farmer's eye.

5. The conclusions arrived at by all men who make plant life a special study are (*a*) that chess is a typical plant, producing seed yearly, which gives rise to plants of the same character; (*b*) that a seed of wheat cannot be sown so as to produce chess, and (*c*) that chess cannot produce wheat under the most favorable conditions of growth.

6. In instances where parts of a plant, apparently a combination of chess and wheat, were so mixed as to seem but one plant, close examination proved them to be parts of separate plants, and that the apparent union was not real. In some cases microscopic examination has been required to prove it.

7. Wheat has been grown in some places and often winter-killed and no chess has appeared. There are places where chess is unknown, and wheat in these passes through all the vicissitudes which seem favorable to the development of this weed in other parts where the plant is common. Farmers careful in using clean seed often have winter-killed wheat unaccompanied by chess.

8. Liberal rewards have been offered by agricultural papers to any one who could prove conclusively that chess is derived from wheat, and as yet no successful competitor has appeared, though as high as $500 was the prize.

With these facts before us, it does seem difficult for a person to accept a theory which demands greater concessions than the most sweeping form of evolution. Though this plant may appear under circumstances difficult to explain, we are forced to believe that if its origin is carefully considered it will not require one to pin his faith to views so antagonistic to the teachings of science as those required to be accepted by persons claiming wheat as its source.

Remedy.

The great remedy for chess is to be exceedingly particular about the seed you sow. A few scattered seeds among wheat do not seem to amount to much in the heap, but if they were taken out we would be surprised at the quantity mixed among the grain.

METEOROLOGY.

Report of Observations taken at the Ontario Agricultural College during 1888

Observations are regularly taken at the hours of 7 a.m., 1 p.m., and 9 p.m. daily, and recorded in a book printed for the purpose. The instruments in use are as follows :—

Anemometer—Recording the direction of the wind and indicating the number of miles travelled. During the greater part of '89 this has been out of order.

Barometer—Showing the atmospheric pressure at the time of observation.

Maximum thermometer—Indicating the highest temperature between times of observation.

Minimum thermometer—Indicating the lowest temperature between times of observation.

Hygrometer—With *dry* and *wet* bulb thermometer, for the purpose of showing the condition of the atmosphere with reference to moisture.

Pluviameter—Used in measuring the rainfall.

Thermometer—For observing ordinary temperature.

Besides taking observations from these instruments, the cloudiness of the sky is observed, and general remarks on the weather for the day are recorded in the daily register. At the close of each month a summary of the month's observations is made out. From these monthly summaries the condensed statement of the year's meteorology is made up.

FORM OF MONTHLY SUMMARY.

Meteorology.

A summary of the meteorological observations taken at Ontario Agricultural College during the month of.....

Normal height of barometer at Guelph (1,100 feet above sea level and 858 feet above Lake Ontario, 28.86 inches. Latitude north 43°-38'.

Barometer—

Highest barometer.
Lowest "
Highest mean barometer.
Lowest " "
Monthly " "
Monthly range.

Thermometer—

Highest thermometer.
Lowest "
Highest mean thermometer.
Lowest " "
Monthly " "
Monthly range.

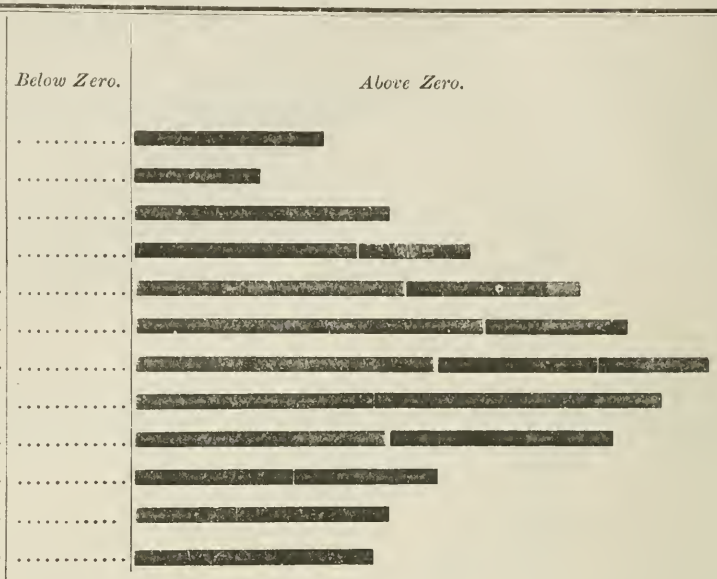
Pluviameter—

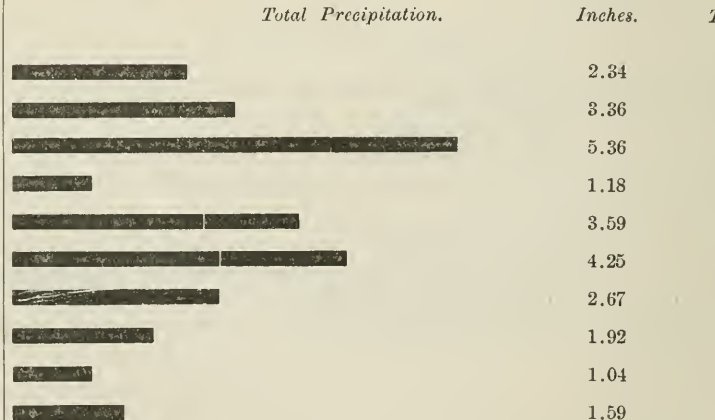
Days rain fell.
Greatest rainfall.
Days snow fell.
Greatest snowfall.
Total precipitation.

Anemometer—

Direction of wind.
Greatest number of miles travelled in twenty-four hours.
Greatest velocity per hour.
Mean velocity per month.

Diagram Illustrating the Mean Meteorological Results for 1889.





Cloudiness :

January	6.4	May	5.1	September	5.0
February	6.6	June	4.6	October	5.8
March	5.3	July	3.9	November	7.4
April	5.1	August	4.6	December	6.7

—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Barometer—	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
Highest barometer	29.992	29.464	29.236	29.260	29.032	28.270	29.132	29.132	29.082	29.310	29.410	29.500
Lowest barometer	27.801	28.080	28.180	28.232	28.464	28.148	28.566	28.618	28.150	28.348	28.158	28.042
Highest mean barometer	29.446	29.425	29.142	29.143	29.000	29.258	29.047	29.111	29.071	29.281	29.408	29.463
Lowest mean barometer	27.935	28.264	28.199	28.342	28.442	28.418	28.589	28.649	28.197	28.601	28.213	28.146
Monthly mean barometer	28.987	28.931	28.189	28.897	28.631	28.790	28.847	28.688	28.843	28.782	28.746	28.833
Monthly range	2.188	1.384	1.056	1.028	.568	1.122	.566	.514	.932	.962	1.252	1.458
Thermometer.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.
Highest temperature	47.5	41.2	53.0	76.0	88	87	88.0	99.4	88.5	62.0	51.4	60
Lowest temperature	-.7	-18.5	10.0	17.2	25	42	51.0	41.5	39.2	17.2	11.0	1.1
Highest mean temperature	35.8	32.0	40.3	63.5	73.7	71.6	75.4	71.7	72.3	49.1	47.8	39.7
Lowest mean temperature	7.5	-8.8	20.4	28.3	35.4	49.6	60.4	56.7	41.8	26.0	18.7	12.6
Monthly mean temperature	25.0	14.8	30.5	41.5	54.2	61.4	67.9	64.7	57.4	38.3	33 7	32.4
Monthly range	48.2	59.7	43 0	58.8	53.0	45	37.0	57.9	49.3	44.8	40.4	58.9
Pluviameter.												
Number days rain fell	2	.....	2	3	14	11	10	6	8	8	11	8
Number days snow fell	14	14	3	2	.....	.....	.....	.....	.....	.....	3	2
Greatest rainfall, inches	.15	.....	2.5	.48	1.50	1.18	.67	.85	.39	.44	.33	.82
Rainfall for month, inches	.15	.....	4.5	1.03	3.59	4.25	2.67	1.92	1.04	1.59	1.76	2.79
Greatest snowfall, inches	6.00	6.00	8.0	1.00	.....	.....	.....	.....	.....	.....	5.00	.8
Snowfall for month, inches	21.95	33.6	8.6	1.52	.....	.....	.....	.....	.....	.....	7.00	1.15
Total precipitation	2.34	3.36	5.36	1.18	3.59	4.25	2.67	1.92	1 04	1.59	2.46	2.90
Anemometer.												
Predominating winds	Owing to the great storm in January our apparatus was so injured that our observations for the year have been incomplete.											
Greatest number of miles in 24 hours												
Mean velocity for the month												
Clouds.												
Cloudy days	17	11	13	15	11	11	6	11	8	16	20	14
Clear days	10	16	11	12	12	11	16	12	10	9	7	6
Mean cloudiness for the month	6.4	6.6	5.37	5.1	5.1	4.6	3.97	4.67	5.00	5.8	7.4	6.7

Mean Meteorological Results for the Year 1889.

—	1889 — Guelph.	Average of 40 years. — Toronto.
Barometer.		
Month of highest mean pressure	December.	September.
Highest mean monthly	29.463	29.664
Lowest " "	28.189	29.572
Month of the lowest mean	March.	June.
Highest pressure	29.992	30.358
Lowest "	27.804	28.692
Thermometer.		
Mean temperature of the year	43.4°	44.17
Warmest month	July.	July.
Mean temperature of the warmest month	67.9°	67.64°
Coldest month	February.	February.
Mean temperature of the coldest month	14.8°	22.73°
Highest temperature	99.4°	91°
Lowest temperature	—18.5°	11.9°
Range of the year	117.9°	10.2°
Pluviameter.		
Total depth of *rain* in inches	25.3	28.3
Number of days on which *rain* fell	83	110
Month in which the greatest depth of *rain* fell	March.	September.
Greatest depth of *rain* in one month in inches	4.5	3.55
Month with most *rainy* days	May.	October.
Greatest number of *rainy* days in one month	14	13
Total depth of *snow* in inches	73.8	.....
Number of days on which *snow* fell	38	.....
Month in which the greatest depth of *snow* fell	February.	.....
Greatest depth of *snow* in one month in inches	33.6	.....
Month with most *snowy* days	Jan. and Feb.	.....
Greatest number of *snowy* days in one month	14	.....
Total precipitation in inches	32.6	.....

Your obedient servant,

J. HOYES PANTON.

PART III.

REPORT OF

THE PROFESSOR OF CHEMISTRY.

ONTARIO AGRICULTURAL COLLEGE,
GUELPH, December, 1889.

To the President of the Agricultural College:

SIR,—I have the honor to present herewith through you, my report upon the work done during the year 1889, in the Department of Chemistry, and shall endeavor to make it as concise as possible consistent with its results. The college work, that of giving instruction to the students of the first, second and third years, has developed nothing of special importance that need be reported upon here—that part of our work we can dispose of simply with the remark that as full a course of lectures has been given in all cases as the time would permit, and as far as possible experiments have been called upon to assist in the work.

Outside of the lecture work much has been done in the way of analyzing fertilisers, etc., and reporting upon the same to the farmers specially interested. Much that is done through correspondence, cannot of course, find its way into this report, being of interest merely to the person to whom answer has already been communicated. From the work done I shall select merely that which I think is of general public interest.

In my report of 1888, I promised to gather together our laboratory results on milk analysis. I have done so, and in May I issued a condensation of the following bulletin:

THE COMPOSITION OF MILK.

The enormous production of milk on the farms of Ontario and its daily use in every household are quite sufficient reasons for the issuing of a bulletin upon its nature or composition, especially at this time of the year, the commencement of the milk producing season. The facts are based on the work done at this institution during the past five years, where we have had special opportunities for studying the subject, as well as upon accumulating work on milk analysis, which, once published, becomes the common property of all interested.

The constituents of normal cow's milk are the following:—Water, fat, albuminoids, sugar, and ash or mineral matter. We shall briefly refer to them.

WATER.—This constitutes from 80 per cent. to 90 per cent. of the whole milk, and hence the total solids constitute from 10 per cent. to 20 per cent. In our experience here we have found the water of normal milk to vary from 83.9 per cent., the lowest to 90.5 per cent., the highest, and the average from all animals, under all circumstances, to be 87.19 per cent.

FAT.—When fresh milk is observed under the microscope, it is found to be a clear liquor in which are floating clusters of fat globules, these fat globules varying in size from

less than one ten-thousandth of an inch in diameter to about one two-thousandth of an inch in diameter. The large globules are observed in Jersey milk, and the small in Holstein. The fat, being lighter than the liquid or serum in which it is floating, gradually comes to the surface in the form of cream, and among the many circumstances affecting the rising of the cream the size of the fat globule is very important. The larger the globules the more quickly and thoroughly they will separate in a layer at the surface. There is a variation in different animals, and in the same animals under different treatment, in the amount of total solids, and there is also a variation in the respectivo amounts of the constituents that make up the the total solids; the variation, however, is principally due to the quantitity of the fat, *i.e.*, the fat in the milk of different animals and of the same animal varies far more than the albuminoids, sugar and ash; hence it is that in making or stating an analysis of milk, the water, fat and ash alone are generally considered. The fat may vary from 2 per cent. to 8 per cent. of the total milk. We have found it to vary from 2.4 per cent. to 7.5 per cent., and the average of all classes of milk to be 4.03 per cent. The fat, however, is far more complicated than at first is apparent. It is, in reality, a mixture of fats or oils, of which the four leading kinds are: *stearin*, *palmitin*, *olein* and *butyrin*. The two former are hard fats, the two latter soft or liquid fats. The texture or consistency of the butter depends upon the relative amounts of hard and soft fats found in the milk, and this is influenced greatly by the foods of which the animal partakes. Butyrin is peculiar to butter; when the butter becomes rancid, the cause is in the fact that the butyrin has, by fermentation, been changed into butyric acid. Oleomargarine contains a considerable quantity of hard fats and less liquid fats, with no butyrin, unless it has been added in milk or butter.

Albuminoids.—These are the nitrogenous compounds of milk, the flesh and muscle formers, the basis of the curd or cheese. In normal conditions they are dissolved in the serum or liquid. There are two forms, viz., casein and albumen. Some lately published investigations of Dr. Babcock, of Wisconsin, (Bulletin No. 18), tend to the conclusion that minute quantities of *fibrin* also are found in normal milk. Casein, which passes into the cheese, is thrown out of solution, or coagulated by acids and by rennet; albumen is coagulated by heat. In the first milk or colostrum, the albumen is in excess, but in the after milk as we use it the casein is in excess; the casein forms about 3.6 per cent., the albumen about 0.7 per cent.

Sugar.—Milk sugar or lactose has the same composition as ordinary cane sugar, but is less soluble, less sweetening in its effect, gritty to the taste. It forms about 4.5 per cent. of milk, and is liable to speedy change. During lactic fermentation, by exposure to the air, the milk sngar changes to lactic acid, *i.e.*, the milk sours As a result of the formation of the acid, the casein is thrown out of solution, *i.e.*, the milk coagulates or curdles.

Ash.—There is but little variation in the quantity of salts or mineral matter above or below 0.7per cent. From thirty samples we got an an average of 0.695 per cent. The addition of such substances as borax, soda, salt, give a large increase in the ash. In 100 lb. of milk, there are about 0.20 lb. of phosphoric acid, 0.17 lb. of potash, and 0.16 lb. of lime, all of which are intended for the building of bones and the ash material of the animal body.

The milk produced at the Ontario Experimental Farm may be taken as an average of pure milk, produced from fairly good animals of all the various breeds and grades, with varied but good feeding and with good care. Our average of 92 samples, taken from five years' results, will therefore be a little above what is produced on many farms and supplied in many towns and cities.

Water	87.19	
Fat	4.03	Total solids....12.81.
Albuminoids and sugar	8.08	
Ash	0.70	

In contrast with this average let us place the duplicate analysis of a sample of milk taken from a city milk seller, and sent to us for analysis.

Water	88.023	88.019
Fat	3.148	3.147
Albuminoids and sugar	8.239	8.249
Ash	0.590	0.585

Our conclusion in regard to this sample of milk is, that either it is produced from poor food, *i.e.*, adulterated through the animal, or that it has been adulterated after being produced. Milk sellers should be compelled to produce a better class of milk than this, or should be prohibited from selling it. Milk as poor as the above should be classed as watered or adulterated.

In determining the value of milk, too great stress is frequently put upon our simplest instruments for detrrmining the amount of fat present. Let me say a word or two about these instruments and their use.

Lactometer.—This instrument, giving the specific gravity or weight of the milk, is sometimes relied upon as a true test of the quantity of fat in a sample of milk. We find the specific gravity of milk to vary from 1.028 to 1.040, though generally it will be between 1.029 and 1.036. The latest ten readings given here averaged 1.0299. The specific gravity of the fat is 0.911 ; both pure water and the fat of the milk are, therefore, lighter than the whole milk. If the milk be skimmed the specific gravity will be increased, if it be watered it will be decreased ; but if the milk should be both skimmed and watered, the specific gravity may be altered so little that the lactometer will give no abnormal reading, and by it alone we can conclude nothing as to the condition of the milk.

Cream Gauge.—This alone is also not always a safe indicator of the quantity of the fat. The size of the globules and the surrounding conditions exert a marked influence upon the rise of the cream.

Lactoscope.—This instrument indicates for us the *opacity* of the milk and thus the quantity of fat, as the globules prevent the passage of light rays through the milk. The size of the globules, the brightness of the day, the way in which the light strikes, the seeing power of the eye, the freshness of the milk, all exert a marked influence, and many cases have been observed when the results were erroneous.

The above three instruments, in the hands of experienced persons who thoroughly understand their use, and who are familiar with the nature and peculiarities of milk, will prove very useful for the comparison of samples of milk, and as indicators of extreme conditions, but to determine accurately the composition of any sample of milk and to put beyond doubt its value, one of the several chemical methods must be adopted.

Milk Standards.—At present, to determine whether a milk is adulterated, the sample offered and a sample freshly drawn from the cow have to be analyzed. If we had a standard fixed by law, the matter would be much simplified, and we cannot urge too strongly the wisdom of having a fair milk standard, up to which all samples of milk must come to be recognized as normal and unadulterated. It would simplify the inspection and analysis, ensure a better quality of about the same average, and have a tendency to weed out the poor contributors. Adulteration through the animal could then be prevented.

In addition to our own average let us note a few others :

	Water.	Fat.
Inland Revenue Department, Ottawa, 162 samples	87.52	3.86
Minnesota Dairy Report, 125 cows	85.64	4.47
Boston Milkmen. (Babcock.) 130 samples	86.89	3.45
New Jersey. (Newton.) 85 dairies	86.20	4.22
Martin and Moller's Report, New York, 296 cows	86.27	4.21
Br. Dairy Farmer's Ass., 8 years, 173 cows	86.08	4.04

After careful consideration of many reports and tables of analyses, the standard used by some other countries commends itself as being fair for our condition, workable and conducive of good results. It has also the recommendation of the Department of Inland Revenue, Ottawa.

Water	88.00	per cent.
Total solids	12.00	"
Fat	3.50	"
Solids other than fat	8.50	"

If we have a milk standard established by law, the question of adulteration is easily settled. At present, in many cases it is absolutely impossible to determine whether a certain sample of milk was produced poor by the animal, cow, or made poor by the animal, man. Having a standard, every sample that did not come up to it, would be rated as watered or adulterated; and it should be as great a crime to water the milk by watery food, as to water the milk by the addition of water to the milk. The effect of a fair standard, I believe, would be stimulating, wholesome, and quite justifiable in the case.

ONTARIO OATS.

Having been requested to contribute to the proceedings of the 1889 meeting of the American Association for the Advancement of Science held at Toronto, I undertook an investigation into the chemical composition of Ontario oats. The following is an elaboration of some results submitted to that meeting.

These conclusions are submitted to the farmers of Ontario with the hope of adding somewhat to their information and of contributing to agricultural science. The composition of oats has been quite extensively investigated in some countries, but as yet we have had little or nothing contributed from our own province.

Importance of the Crop.

The great importance or value of the oat crop is due to the following causes:

1. A great variety of soils can be used for the production of this crop.
2. Land of good fertility properly handled can be made to yield enormous crops.
3. The grain is an almost universal food for man and beast, being well balanced, building up muscle, fat and bone, and supplying heat, force, and even a nerve stimulant.
4. In addition to the grain the straw is a very valuable article of farm produce.

Composition of Ontario Oats.

From the Ontario oats used at the Ontario Experimental Farm during the present year I took ten fair samples which may be considered as representing the best of our home-grown oats. The following table gives the chemical composition of these ten samples as determined in our chemical laboratory at the College:—

Chemical Analysis.

Variety.	Water.	Crude Protein.	Fat.	Soluble Carbohydrates.	Crude Fibre.	Ash.
Egyptian White	12.95	9.28	4.83	55.49	14.15	3.30
White Australian	13.69	10.94	4.01	56.75	11.55	3.15
Rennie's Prize White	13.60	9.75	4.13	57.47	12.23	2.81
Acclimatized Black Tartarian	12.40	10.45	5.37	57.50	11.22	3.06
Bavarian	13.30	11.19	5.95	55.57	10.30	3.69
Black Champion	12.75	10.88	4.35	59.61	9.59	2.82
Improved Scotch Potato	13.54	9.19	7.49	57.71	9.11	2.96
Cluster or Triumph	11.53	11.81	6.41	51.97	15.41	2.87
Welcome	12.99	8.53	4.23	61.89	9.23	3.13
Early Calder	12.93	6.19	5.64	55.74	16.33	3.17
Average	12.96	9.82	5.24	56.97	11.91	3.10

Let us now compare our average with that given by others :—

——	No. of Samples.	Water.	Crude Protein.	Fat.	Soluble Carbohydrates.	Crude Fibre.	Ash.
Average above given	10	12.96	9.82	5.24	56.97	11.91	3.10
Koenig	153	12.37	10.41	5.23	57.78	11.19	3.02
Brewer	20	10.56	11.41	4.97	61.10	9.01	2.95
Jenkins	25	10.94	11.38	4.81	60.05	9.85	2.97
Richardson, U. S.	179	6.42	10.76	6.64	66.67	6.33	3.18
Average	387	9.45	10.67	5.84	62.18	8.78	3.08

The average of the Ontario samples will thus be seen to be closely identical with the average of the German samples analysed by Koenig.

The grain of the cereals varies less than the straw, the endeavor of the plant being always to produce a perfect grain at the expense of the straw. Nevertheless seasons, soils and cultivation all have their effect in causing variations. The variations possible in the oat grain are thus given by Armsby, collected from many German analyses.

——	Water.	Protein.	Fat.	Soluble Carbohydrates.	Fibre.	Ash.
Minimum	7.6	6.3	4.4	48.0	4.1	
Maximum	16.4	18.5	7.3	71.8	16.1	
Average	13.7	12.0	6.0	56.6	9.0	2.7

The greatest variation is thus, as also shown in the previous table, in the amount of crude fibre, due to the husk of the grain.

Oats are a remarkably well balanced food, containing a large quantity of the most valuable constituents, viz., protein and fat; they approach what may be called a perfect food. They, however, contain a larger proportion of husk or fibre than do other grains, such as wheat and barley. The quantity of husk or fibre can be approximately determined by examination, and we have thus an easy mode of determining the comparative values of two samples of oats as to their food values—the more husk, in most cases, the less valuable. Without going further into examples I cannot do better than quote here one sentence from Bulletin 9, Department of Agriculture, Washington, D.C., 1886, as follows: "The proportion of husk to kernel and the compactness of the grain prove to be the all-important factors, and the weight per bushel the best means of judging of the value of the grain." (*Clifford Richardson.*)

Physical Characteristics.

Variety.	Color.	Weight per bushel.	Weight of 100 kernels.	No. of kernels per bushel.
		lb.	grams.	
Egyptian White	yellow to dark	39.94	2.829	640,391
White Australian	dark yellow	38.24	2.894	599,365
Rennie's Prize White	yellow	39.61	3.716	483,503
Acclimatized Black Tartarian	black	36.80	2.583	646,351
Bavarian	dark yellow	35.83	3.023	537,625
Black Champion	dark brown	33.15	2.380	631,790
Imported Scotch Potato	yellow	40.43	3.103	591,004
Cluster or Triumph	light yellow	36.91	3.253	514,669
Welcome	yellow	35.19	3.160	505,132
Early Calder	yellow	37.78	2.154	795,586
Average		37.39	2.910	594,542

The average weight per bushel of the United States oats (see bulletin quoted above) was 37.2 lb., the average weight of 100 kernels 2,507 grams. The individual samples giving the heaviest and lightest weights came from the following States: Colorado, 48.8 lb.; Dakota, 48.6 lb.; Alabama, 24.7 lb.; Florida, 26.9 lb. Taking the average of the States in the great divisions we have the following interesting table:—

Northern States, 38.0 lb. per bushel.
Southern States, 34.5 lb. "
Western States, 37.8 lb. "
Atlantic Slope, 37.0 lb. "
Pacific Slope, 43.2 lb. "
All States, 37.2 lb. "

The best samples of oats came from the rich soils of the northern and western States.

A Suggestion in Conclusion.

In studying the samples of Ontario oats I was much impressed with the great variety in each sample as regards the size, shape and plumpness of the grains. What were apparently choice samples contained a large proportion of inferior kernels. It occurred to me that there is a possibility of great improvement by, in some way, culling each sample of seed grain. It may at present be impossible for the farmer to select and inspect minutely every individual grain he sows; but I believe that the farmer who can find the

time and means or devise a method of selecting his grains individually as he does his animals will have taken one step, one very important step, in advance of his less careful neighbor. "Trifles make perfection, and perfection is no trifle."

Sugar Beets and Beet Sugar.

In the year 1889 the available sugar output of the world, we are told, amounted to about 5,000,000 tons, of which 2,248,000 tons were cane sugar and 2,735,000 tons were beet sugar. The almost universal consumption of sugar by civilized man brings this question home to us as one of importance here in Ontario. The Agricultural Department at Washington has taken up the sugar production question as one of great vital interest, and from the chemical department at Washington we have from year to year received many comprehensive and interesting bulletins on the subject of sugar production. Laboratories in charge of chemists have been established in various States to experiment upon the methods of sugar extraction. To show the great work accomplished in one State by the union of science and art, by carrying on field work and laboratory work hand in hand, I shall take the liberty of quoting a sentence or two from one of the latest bulletins to hand. Dr. Wiley, in presenting a report to the Secretary of Agriculture, says :—

"In 1884 the Department established, in connection with the exposition at New Orleans, a complete sugar laboratory. At the same time the experimental diffusion battery, used by the Department in its work of the preceding year, was placed on exhibition.

"During the same year the Department of Agriculture established at Magnolia plantation, Lawrence, La., a complete chemical control of the sugar factory.

"The practical result of the work first undertaken in Louisiana by the Department of Agriculture is seen already in a more scientific agriculture, a better knowledge of the problem of sugar manufacture, a more scientific method in the sugar-house, and the introduction of recent and improved machinery. Before the time first mentioned the average yield of sugar per ton on the best plantations in the State was scarcely 145 pounds. It is now over 200 pounds.

"Perhaps there has never been an instance in the history of the Department where its efforts have been so promptly manifested in such wonderful practical results. It is but just to the Department, in submitting the data herein contained, to call attention to the above facts in the history of the sugar industry of Louisiana."

The aid which chemistry has brought to sugar production in the United States is thus clearly demonstrated.

Early in the present year two samples of sugar beets were received at the chemical laboratory. I determined the sugar to be 50 per cent. and 11.48 per cent. and reported that unless beets could be produced having a higher percentage of sugar there are doubts as to whether successful sugar production could be carried on.

During the year German and Bohemian seed was distributed to farmers in various sections by Mr. R. H. Lawder, Toronto, and this fall some twenty-six samples of beets grown from this improved seed were received at the laboratory, and the results of my analysis are contained in the table submitted below.

In connection with this work I am exceedingly indebted to Mr. Wilfrid Skaife, B. A. Sc., of Montreal, for the loan of a Soleil Polariscope with which the polarizing was done.

In each case I selected a fair sample beet, had it grated or pulped, juice extracted in a small hand press, determined degrees brix of juice, clarified by subacetate of lead solution and polarized. The following table gives the results of this analysis :

Analysis of Sugar Beets.

Name of Grower and Location.	Nature of Land.	Weights of beets analyed.	Degrees Brix Saccharometer.	Polariscope reading.	Per cent. of sugar in beets.	Coefficient of purity.
		lb. oz.				
Mr. Martin, Whitby Town	rich garden soil	1 13½	19.70	13.50	12.83	68.0
" Reid, Whitby Township	stiff clay	3 4	16.60	13.00	12.35	78.3
" Pindar, "	heavy clay	2 5	19.55	14.50	13.78	74.2
" Bateman, "	rich clay	1 10½	20.15	16.00	15.20	79.4
" Lick, "	stiff clay	2 12½	12.65	8.00	7.63	63.3
" Lick, "	"	1 5	21.60	17.50	16.63	81.0
" Sinclair, "	"	1 15	20.05	15.50	14.73	77.3
" Walker, "	clay loam	2 12	18.60	14.50	13.78	77.9
" Leng, Pickering Township	clay	1 10	17.15	12.50	11.88	72.9
" Trebell, Reach Township	sandy loam	2 3	15.10	11 50	10.93	76.2
" Forman, "	clay, not stiff	3 0	18.80	14.00	13.30	74.5
" Forman, "	" "	1 5	21.30	15.50	14.73	72.8
" Whitefield, "	strong clay	0 11½	18.60	15.00	14.25	80.6
" Steele, W. & G., Reach Township	sandy loam	2 14	16.35	11.00	10.45	67.3
" Graham, Scugog Island		2 7	15.35	11.00	10.45	71.6
" Earls, Peterborough	loam	2 0	22.75	17.50	16.63	76.9
" Graham, Smith Township	clay loam	2 11	20.25	14.00	13.30	69.1
" Bowman, Hamilton Township	sandy loam	3 2	20.30	14.50	13.78	71 4
" Russell, "		2 3	21.45	16.50	15.68	76.9
" Wright, Hope Township		0 10	22.15	17.00	16.15	76.7
" McKenzie, E., Whitby		2 12½	15.85	12.50	11.88	78.8
Sir W. P. Howland, Toronto	garden soil	0 7	21.95	17.50	16.63	79.7
John Hume, Port Hope		3 12	16.55	12.50	11.88	75.5
Ontario Experimental Farm, Guelph		2 1½	21.00	18.00	17.10	83.7
Unknown		0 11½	18.10	14.00	13.30	77.3
Unknown		2 5	21.50	16.00	15.20	74.4
Average of 26 samples		2 2	18.95	14.35	13.63	75.7

Weight of beets.—This refers to beets after being washed and topped.

Degrees Brix.—This gives the percentage of total solids in juice.

Polariscope reading.—This gives percentage of sugar in juice.

Coefficient of purity.—This gives the percentage of sugar in total solids of juice and is a guide to determine the possibility of extracting sugar thoroughly. In some of the beets above given the low coefficient of purity would seriously interfere with the economical extraction of sugar. High percentage of sugar and high coefficient of purity are found, however, in several instances and prove that good beets can be grown for sugar extraction in some instances.

As the whole question is to be taken up in bulletin by the Agricultural Department at Toronto I would refer any wishing further information upon the experiments of the past year along this line to the office at Toronto.

Phosphates.—A block of phosphate of lime from Loughboro' Township, County of Frontenac, was sent to Cincinnati in 1888 to the Centennial Exposition. The weight was 870 lb. It came from a vein ranging in width from six to sixteen feet and being seventy feet in length. As this represents fairly a great deal of the supply of Canadian phosphate of lime I give an analysis of it made here.

Insoluble matters	0.608%
Phosphoric acid	38.370%, or
Phosphate of lime	83.790%

Four samples of commercial phosphates made by mixtures of bones and other animal matters gave of total phosphoric acid the following :—

9.01% ; 5.84% ; 8.71% ; 10.95%.

Wool Refuse.—A sample of wool refuse gave 3.70 per cent. of nitrogen. Woollen waste of various kinds has had at various times a prominent place in agriculture, its use being for crops requiring nitrogen and for soils in need of organic matter. The use of wool waste at the present day should be very carefully considered for the following reasons :—

1st. Woollen goods are very much adulterated ; formerly the refuse contained from 15 to 20 per cent. of nitrogen.

2nd. They are slow in action, much slower than many other nitrogenous manures, such as guano and dried blood.

3rd. They are now quite variable in composition, 2 to 7 per cent. of nitrogen.

Pea Meal.—Early in the spring Mr. Wm. Donaldson, of South Zorra, sent me a sample of pea meal obtained from a mill where split peas are produced :—Below we give the analysis side by side with the average of whole peas :

	Whole Peas.	Sample of Pea Meal.	
Water	13.20	8.47	p. c.
Crude protein	22.40	25.93	"
Fat	3.00	2.51	"
Soluble carbohydrates	52.60	50.30	"
Crude Fibre	6.40	9.85	"
Ash	2.40	2·90	"

The main and only appreciable difference according to the chemical analysis is that the pea meal sent was much drier than ordinary peas, and correspondingly higher in nitrogen and fibre, so that on the whole the pea meal was a little stronger, had more nitrogen, than the ordinary peas.

Corn Analysis.—At the time of completing this report an extensive series of corn analyses is being carried forward in the laboratory in connection with the experimental work of the dairy department. From the corn raised by Prof. Robertson, forty-two samples have been selected of which duplicate analysis are being made by Messrs Zavitz and Harcourt. The results will be handed to Prof. Robertson, and given to the public by him in some form of his reports.

REPORT ON THE METEOROLOGICAL OBSERVATIONS, LYSIMETERS, DRAINAGE WATERS, ETC.

By Mr. C. A. Zavitz, B.S.A.

Prof. C. C. James :

Sir,—I have the honor of herewith submitting for your consideration, the report of that part of my work which comes under your supervision.

On June 30th, the thermometers were placed in the soil the roof of the rain gauge was removed, and everything prepared to commence reading the instruments by the first of May.

The soil in each lysimeter excepting the one with sod was cultivated on May 1st, and a fertiliser was applied to each at the rate of six hundred pounds per acre. The fertiliser was purchased at Hamilton, cost about $40 per ton, and contained, nitrogen, phosphoric acid and potash. No. 2 lysimeter was sown with barley on May 1st. No. 1 was continued as sod, and the rest were summer fallowed.

The drainage water from each lysimeter was collected during the summer, measured and a sample taken for chemical analysis, but owing to the pressure of other work none of the samples have yet been analysed.

The accompanying tables show the amounts of rain fall and drainage waters during five summer months, and a summary of readings of the air and ground thermometers, barometer, etc.

Rain Gauge.—The rain which fell during the summer, as compared with that of the two previous years was as follows :—

	1887.	1888.	1889.
	ins.	ins.	ins.
May	1.58	1.08	3.59
June	2.36	2.92	4.25
July	.61	2.21	2.67
August	2.71	2.16	1.92
September	1.52	1.55	1.04
	8.78	9.92	12.47

Lysimeters.—The amounts of drainage water received from the different lysimeters at the times when collected, are as follows :—

June 1st,	Pasture-loam	Receiving jar broken.
	Fallow-loam	1,600 c.c.
	Barley-loam	1,225 c.c.
	Sand	955 c.c.
	Clay	3,108 c.c.
	Loam	790 c.c.
July 1st,	Pasture-loam	Receiving jar broken.
	Fallow-loam	8,600 c.c.
	Barley-loam	1,065 c.c.
	Sand	4,830 c.c.
	Clay	2,305 c.c.
	Loam	3,035 c.c.
Oct. 1st	Sand	1,205 c.c.
	Clay	705 c.c.

Average of each Thermometer for each Month and for Whole Period.

Instruments.	May.	June.	July.	August.	September.	Average of the Whole Period.
Barometer	28.737	28.859	28.954	28.907	28.915	28.874
Attached thermometer	53.8	61.9	69.9	67.3	60.3	62.6
Temperature of the air	52.3	59.8	67.8	64.4	58.3	60.5
Temperarure maximum	62.9	72.4	83.9	76.1	69.2	72.9
Temperature minimum	40.4	52.1	51.5	50.0	43.3	47.2
Soil temperature at 1 inch in depth	55.9	62.0	72.4	69.2	61.1	64.1
" 3 inches in depth	54.7	61.5	69.7	67.0	60.9	62.7
" 9 "	54.2	58.8	67.4	65.1	61.1	61.3
" 24 "	51.4	56.3	63.2	63.5	61.3	59.5
" 36 "	50.9	53.1	62.2	62.2	61.3	57.9
" 48 "	49.0	51.1	60 1	60.4	60.1	56.1
Soil temperature at 3 inches in sand	53.7	60.0	69.0	66.6	60.4	61.9
" 3 " clay	55.3	61.1	71.6	67.5	60.0	63.1
" 3 " loam	55.9	61.6	71.3	66.9	59.7	63.1
" 9 " sand	54.8	69.0	66.9	65.3	60.6	61.3
" 9 " clay	55.3	59.4	68.3	66.6	61.6	62.6
" 9 " loam	54.8	59.8	67.5	66.1	60.6	61.7

THE INCREASE AND THE DECREASE OF THE AVERAGE OF EACH THERMOMETER FOR EACH MONTH.

(+ represents increase, and — represents decrease.)

INSTRUMENTS.	May to June.	June to July.	July to August.	August to September.
Air thermometer	+ 7.5	+ 8.0	— 3.4	— 6.1
Thermometer 1 inch in soil	+ 6.1	+10.4	— 3.2	— 8.1
" 3 inches in soil	+ 6.8	+ 8.2	— 2.7	— 6.1
" 9 "	+ 4.6	+ 8.6	— 2.3	— 4.0
" 24 "	+ 4.9	+ 6.9	+ 0.3	— 2.2
" 36 "	+ 2.2	+ 9.1	.0	— 0.9
" 48 "	+ 2.1	+ 9.0	+ 0.3	— 0.3

GREATEST VARIATION IN TEMPERATURE of each Thermometer between two readings (*a*) Increase. (*b*) Decrease.

SITUATION OF THERMOMETER.	INCREASE.				DECREASE.			
	Date.	From.	To.	Variation.	Date.	From.	To.	Variation.
Thermometer in air	Sept. 23	36.2	69.0	32.8	July 29	75.2	52.4	22.8
Ther. in soil at depth of 1 inch	Aug. 28	58.5	96.8	38.3	Aug. 28	96.8	64.0	32.8
" " 3 inches	Aug. 22	45.5	81.5	36.0	June 15	80.3	55.9	24.4
" " 9 "	July 16	61.2	85.7	24.5	July 17	85.7	57.8	27.9
" " 24 "	June 19	53.4	67.5	14.1	June 22	67.5	56.3	11.2
" " 36 "	July 18	50.0	62.7	12.7	July 20	63	53.0	10.0
" " 48 "	May 15	47.5	56.1	8.6	May 15	56.1	47.9	8.2
Ther. in sand at depth of 3 inches	May 23	38.7	68.7	30.0	Aug. 22	78.7	55.3	23.4
" clay " 3 "	May 23	41.0	73.0	32.0	May 23	73.0	44.8	28.2
" loam " 3 "	May 23	39.1	70.4	31.3	July 26	81.4	56.0	25.4
" sand " 9 "	July 18	55.3	69.2	13.9	Aug. 13	71	57.7	13.3
" clay " 9 "	Aug. 23	63.5	86.6	23.1	Aug. 23	86.6	70.0	16.6
" loam " 9 "	July 19	53.3	70.9	17.6	July 18	69.6	53.3	16.3

TABLE OF HIGHEST SINGLE READINGS OF THERMOMETERS at different depths with d ate o same (for air also).

SITUATION OF THERMOMETER.	DATE OF MAXIMUM TEMPERATURE.			MAXIMUM TEMPERATURE.
	Month.	Day.	Hour.	
Thermometer in air	September	2	1 p.m.	86
Thermometer in soil at depth of 1 inch	August	28	1 p.m.	96.8
" " " 3 inches	May	18	1 p.m.	88.2
" " " 9 "	July	17	1 p.m.	85.7
" " " 24 "	September	2	9 p.m.	73.0
" " " 36 "	July	7 and 14	1 p.m.	69.7
" " " 48 "	August	25	1 p.m.	62.6
Thermometer in sand at depth of 3 inches	August	27	1 p.m.	85.2
" clay " 3 "	July	8 and 18	1 p.m.	90.7
" loam " 3 "	July	8 and 18	1 p.m.	89.8
" sand " 9 "	July	10	1 p.m.	72.7
" clay " 9 "	July	10	1 p.m.	76.8
" loam " 9 "	July	10	1 p.m.	77.4

Table of each day's reading of Recorded Rain; also of following day.

Inches of rain.	DATE.	Barometer.	Attached Thermometer.	Air.	Temperatures of Soil. 1 inch.	3 inches.	9 inches.	24 inches.	36 inches.	48 inches.	Sand 3 inches.	Clay 3 inches.	Loam 3 inches.	Sand 9 inches.	Clay 9 inches.	Loam 9 inches.
	May 15	28.818	54.8	46.7	52.2	52.4	54 6	51.6	51.8	49.0	52.4	53.6	52.6	55.6	55.9	54.6
	" 16	28.816	58.8	55.6	60.5	59.1	55.2	54.8	50.3	47.9	55.2	58.7	58.4	55.3	55.9	55.7
	" 17	28.948	71.3	63.0	68.1	65.5	58.6	51.6	49.6	50.6	64.6	65.1	65.0	58.9	59.5	60.1
	" 21	28.568	45 6	44.6	50.6	50.7	54.8	53.6	52.3	49.3	52.4	52.3	54.1	58.3	57.9	56.8
	" 22	28.657	41.6	40.9	46.4	45.8	51.1	52.9	52.3	49.7	46.5	47.1	46.6	52 6	52.3	50.8
	" 27	28.455	52.3	49.3	53.3	53.5	54.5	52.3	51.2	49.1	53.6	53.5	53.4	55.0	55.4	54.7
	" 28	28.663	37.2	36.1	40.8	41.9	49.7	51.8	51.2	49.1	43.5	42.8	43.5	51.1	50 5	49.2
	" 29	28.892	42.8	38.4	48.0	43.9	46.0	50.6	50.9	49.3	43.5	43.8	43.4	47.2	50.0	46.1
	" 30	28.598	41.6	43.5	42.0	42.6	44.8	49.4	50.1	48.9	42.5	42.6	42.1	45.5	45.1	44.3
	" 31	28.621	52.7	54.5	54.5	53.5	48.9	48.3	49.2	48.6	52.9	53.4	53.6	48.2	49.2	49.7
	June 1	28.637	52.5	45.4	49.7	49.5	50.3	48.6	48.9	48.0	49.8	50.4	49.9	50.6	50.7	50.8
	" 2 (Sunday)	28.744	51.5	49.8	50.3	50.3	50.6	48.9	49.0	48.0	50.8	50.8	50.9	50.4	51.0	51.1
	" 3	28.722	55.9	52.2	53.7	54.2	51.4	49.2	49.0	48.0	53.4	53.9	53.9	51.2	51 7	52.0
	" 4	28.570	51.2	51.3	54.6	54.2	53.1	48.9	49.0	48.0	54.9	55.2	55.4	53.2	53.4	54 1
	" 5	28.478	49.6	48.7	51.2	51.5	52.2	49.6	49.2	48.0	49.2	52.9	53.5	52.6	52 6	52.9
	" 7	28.568	57.6	56.4	55.6	54.5	52.6	50.1	49.6	48.1	53.5	51.7	52 6	53.8	53.9	54.1
	" 8	28.604	60.9	58.6	56.4	59.6	56.2	51.1	50.0	48.3	56.5	59.4	59.8	55.9	56.4	57.5
	" 9	28.694	61.0	59.0	60.2	58.6	55.5	52.9	50.4	48.6	58.3	58.5	58.4	55.9	56.7	56.1
	" 10	28.882	61.8	59.4	61.4	60.8	58.7	53.9	51.0	49.2	61.2	58.1	62.5	58.6	58.8	60.0
	" 16	28.926	69.0	78.4	68.9	66.0	61.0	56.0	54.0	51.7	64.0	65.2	65.0	62.1	62.0	62.0
	" 17	28.722	70.5	70.3	72.5	71.3	64.9	57.0	54.6	52.3	69.3	71.6	66.5	64.0	65.0	66.1
	" 19	28.590	69.3	64.3	57 0	57.3	60.6	54.7	53.3	53.0	61.3	61.4	61.6	62.7	61.9	63.6
	" 20	29.938	58.3	53.6	57.9	57.6	55.6	57.9	56.2	55.1	56.3	57.4	57.1	60.0	58 9	58.4
21	" 21	28.667	63.0	60 6	67.3	63.4	63.2	57.3	54.2	51.9	64.5	65.4	63.5	62.8	62.6	62.7
	" 22	28.680	62.2	56.6	62.2	60.6	62.0	60.0	58.3	53.3	60.7	63.2	64.2	62.6	62.9	63.5
	" 27	29.033	65.4	61.6	67.0	66.6	63.3	58.7	57.2	55.4	63.5	61.8	63.4	64.7	64.0	63.7
	" 28	29.060	65.3	60.7	62.4	67.0	56.4	57.2	51.9	54.0	58.6	61.7	62.0	58.8	62.4	63.3
	July 2	28.923	78.0	72.8	79.3	75.6	69.1	62.3	59.6	56.4	74.6	77.3	76.1	67.8	69.2	69.3
	" 3	28.749	75.1	70.1	72.7	70.2	69.1	62.4	60.0	57.0	61.0	71.7	69.7	67.2	68.5	68.6
	" 10	28.856	77.6	75.6	78.2	74.8	70.9	64.6	61.8	59.0	75.4	78.9	78.7	41.8	71.8	72.5
	11	28.879	70.2	71.3	74.5	70.7	69.3	65.0	62.7	59.2	71.2	75.1	73.5	69.0	70.8	70.9

TABLE of each days readings of Recorded Rain; also of following day.—*Concluded.*

Inches of Rain.	DATE.	Barometer.	Attached Thermometer.	Air.	Temperatures of Soil.											
					1 inch.	3 inches.	9 inches.	24 inches.	36 inches.	48 inches.	Sand 3 inches.	Clay 3 inches.	Loam 3 inches.	Sand 9 inches.	Clay 9 inches.	Loam 9 inches.
	July 13	28.766	71.7	70.6	71.5	70.8	70.1	65.2	63.0	60.0	70.3	71.6	71.4	71.6	71.8	71.8
	" 14 (Sunday)	28.786	61 0	57.0	69.0	66.0	65.0	63.5	69.7	60.0	65.1	68.8	66.6	68.9	62.4	67.7
	" 22	28.819	69 4	66.8	75.7	70.8	69.4	61.4	62.9	60.2	68.6	72.5	71.0	68.0	68.9	68.3
	" 23	28.816	73.7	71.1	75.0	72.2	67.0	64.9	63.0	60.3	70.5	72.4	72.3	68.6	69.2	69.2
	" 27	28.656	73.0	68.4	72.4	70.1	66.8	63.9	63.4	60.6	69.1	69.0	69.6	67.1	67.8	66.2
	" 28 (Sunday)	28.778	59.0	58.0	61.3	59.5	66.0	64.6	63.0	60.5	58.3	66.5	60.0	68.0	67.0	67.7
	" 29	28.870	63.1	60.6	67.1	64.7	65.5	64.5	62.2	60.4	68.6	61 4	68.6	65.0	64.7	64.3
	" 30	28.845	60.3	60.9	58.5	60.3	61.3	60.7	62.7	60.7	59.8	59.6	61.6	59.9	62.5	62.8
	Aug. 2	28.773	64.3	63 3	68.8	65 5	61.4	64.5	62.6	60.6	64.6	66.5	65.5	66.1	65.9	65.4
	" 3	28.867	67.1	64.5	70.9	68.5	65.8	63.9	62.6	60.6	67.6	67.8	66.0	66.1	67.3	66.7
	" 9	28.796	64.8	63.3	68.3	66.5	67.1	64.8	63.0	60.6	65.2	67.1	66.7	65.2	68 5	68.0
	" 10	28.658	66.8	66.6	74.4	73 7	63.9	63.9	62.8	60.7	70.3	72.9	73.2	62.9	64.5	63.3
	" 20	28.874	74.8	71.3	73.4	71 5	67.2	62.2	60.9	59.6	67.0	70.8	70.1	67.0	67.3	67.8
	" 21	28.727	71.8	70.0	70.4	69.5	67.4	65.4	61.2	59.7	65.8	65.7	66.0	67.2	66.6	67.3
	Sept. 5	28.750	70.1	68.7	71.8	69.8	69.4	64.7	63.2	61.1	69.4	68.7	69.2	66.6	69.6	69.7
	" 6	28.915	63.8	59.4	62.6	63.1	65.1	64.6	63.6	61.2	61.9	62.5	61.5	66.3	75.8	65.0
	" 16	28.926	53.2	51.9	53.8	55.6	62.7	63.8	62.9	61.0	56.1	56.5	56.9	64.3	63.1	62.4
	" 17	28.785	54.8	52.0	57.1	57.8	59.5	62.8	62.3	61.0	55.6	56.0	57.1	60.1	59.5	58.8
	" 20	28.287	50.8	51.9	50.9	51.9	55.0	59.2	60.2	59.8	51.3	52.0	52.6	55.2	55.2	54.9
	" 21	38.639	47.5	48.4	47.5	48.4	54.2	58.9	59.4	59.0	49.4	49.3	50.5	55.6	54.8	53.6
	" 30	28.414	60.4	55.7	57.7	56.5	55.3	55.5	56.5	56.5	56.1	56.5	56.5	54.8	54.7	54.8

I would again like to bring to the notice of the Minister of Agriculture the advisability of appointing a permanent assistant in the chemical laboratory, one to whom could be given the carrying on of valuable analytical work. The growth of the experimental work in connection with both farm and dairy presents to us important chemical work, more than we can at present manage. The thorough carrying on both of the lecturing department and of the analytical and experimental department demand, I think, the services of two men, one for each.

During the early months of the year Mr. Zavitz assisted in the laboratory. He is also engaged there now, and assisted by Mr. Harcourt, Prof. Robertson's dairy assistant, he is carrying out analytical work for the dairy department. During the early summer weeks valuable assistance was rendered by Mr. S. C. Calvert, one of our associates, who is at present completing the chemistry course at McGill College, Montreal.

I wish to refer here especially to the valuable work of Mr. Zavitz and to call attention to the fact that his work in the laboratory and his work in the experimental department should be given to two men.

To the Minister of Agriculture and to yourself I wish in closing to express my thanks for the encouragement given to the chemical department, and trust that increased liberality on the part of the Government will enable us to add to our appliances library and conveniences so that I shall be enabled speedily to bring the laboratory and analytical department to that degree of excellence to which it is my desire.

I remain, sir, your obedient servant,

C. C. JAMES,
Prof. of Chemistry.

PART IV.

REPORT OF THE

PROFESSOR OF VETERINARY SCIENCE.

The Veterinary Surgeon has nothing to report this year owing to the sale of all Stock after the destruction of the farm buildings a year ago.

JAMES MILLS, President.

PART V.

REPORT OF THE

FOREMAN OF HORTICULTURAL DEPARTMENT.

December 31st, 1889.

To the President of the Agricultural College:

SIR,—In submitting to you the garden produce supplied to the college during the year, I deem it unnecessary for me to make anything in the shape of a report. Prof. Panton has in this, as in the last two or three years, issued various bulletins on horticulture, which, together with his report of this year will, I presume, cover all that is noteworthy in this department. I might, however, remind you that on account of the very severe late spring frost which we experienced at the end of May, the fruit crop here, in common with that in a larger portion of the province, was very small. Apples, pears, plums, cherries and grapes, were with us a complete failure, reducing to a considerable extent our usual supply. Of the smaller fruits, strawberries, raspberries, gooseberries and currants, a small crop was produced, nearly sufficient to meet the requirements of the college. All other vegetable crops were a large average, and in their season good in quality and abundant in quantity, and such as could be kept are as usual stored in sufficient quantity for winter use; and also a small surplus as here shown, has been sold and added to revenue.

Vegetables and fruit supplied to College at current rates.....	$641 54
Sold for cash.....	80 37
	$721 91

Your obedient servant,

JAS. FORSYTH,

PART VI.

REPORT OF THE PHYSICIAN.

To the Hon. CHARLES DRURY,
Minister of Agriculture :

SIR,—I have the honor to present to you my fifteenth Annual Report. During the year just closed we have had about the usual run of ailments, with one exception, and that was an outbreak of Tonsillitis, attacking many of the students and several of the servants, the disease in most cases showing well marked ulceration, but nothing of a serious nature occurred.

The College is in a good sanitary condition.

The flushing power of the students' water closet and used by them in case of sickness, might be increased to advantage.

I have no doubt that the system of sewerage introduced by you at the College this year will ultimately be of great service from a sanitary point of view.

I have the honour to be, Sir,
Your most obedient servant,

E. W. McGUIRE,
Physician Ontario School of Agriculture.

PART VII.

REPORT OF

THE PROFESSOR OF AGRICULTURE.

Ontario Agricultural College and Experimental Farm,

31st December, 1889.

To the President:

Sir,—I have the honor of herewith submitting my report for the respective Departments of this Institution under my more immediate supervision for the year 1889. These include, in addition to my own report, those of Mr. J. E. Story, the Farm Foreman, and of Mr. C. A. Zavitz, Assistant in the Experimental Department.

In view of the constant assistance given by these gentlemen in the most ungrudging spirit, without which much less would have been accomplished, I feel it my duty to refer to this fact here, and also to bear testimony to the fidelity and diligence of the work-hands generally, and of the students during the past year. In consequence of this many improvements were completed which would otherwise have been impossible in a season so prolific in weed-production, and which produced a harvest so difficult to reap.

The year 1889 has been one of abundant labors at the Experimental Farm. As mentioned in the last report, the fine set of outbuildings, including the barn, horse-stable, sheep-house, bull-house and silo, all went up in smoke on the evening of November 26th, 1888. This calamity disconcerted all the plans, virtually, that had been made prior to that time for conducting the work of 1889, and very much enhanced the difficulty of executing new ones that were formed subsequently.

The inconvenience arising from having to keep the horses in the stables at the Creamery when the stabling and accommodation were imperfect was very great, and it entailed the loss of a large amount of valuable time. The additional oversight in consequence of the renewal of the buildings was also a great tax in the same direction, and the amount of time required for the careful selection of the animals wanted in the re-stocking of the farm, added to the three weeks spent in delivering lectures at the farmers' institutes, left too little to be given to the improvement of the farm and its surroundings.

The improvements undertaken during the year were confined chiefly to the renewal of old fences, the erection of new ones, the destruction of weeds within the farm and along the public roads bordering upon it, and the improvement of the roads around and within the farm.

New Fences Erected.

New fences were put up on both sides of the town line, extending from the Brock Road to the Edinburgh road. This road forms a portion of the town line between the townships of Guelph and Puslinch. The length of the fence thus erected was in all one and one-fourth miles, with the exception of a few rods that had been put up in 1888. This work was commenced in the autumn of 1888, and was all done by farm and student labor with the exception of sinking the post-holes. The old rail snake-fences

were first taken away, and the heaps of stones, rubbish and brush-wood that lined their borders were removed. These stones which lay in heaps in the fence corners and in confused masses nearly all along both sides of the road were removed, the large ones in the winter on stone boats, and the small ones in the summer on wagons. The former were collected for building into a fence in another part of the farm, and the latter were deposited to form the road-bed of the private road that was graded later on in the season. I think it no exaggeration to say that from four hundred to five hundred stone-boat, cart or waggon loads of stones were removed from this road. And here I would like to enter a strong, yet friendly protest against the mischievous practice adopted by so large a number of farmers of gathering stones in promiscuous heaps all along the fence bottoms. They are sure to produce trouble in time, and when a new fence is to be built give rise to a very large amount of labor in their removal. It may be necessary to pile them in heaps for a time, but they should never be allowed to remain there during a whole year.

A ridge eight feet wide was then formed with the plow, upon the centre of which the fence was built. This ridge was gently rounded—not violently so, lest the rains should lower the crown, and so form too large an opening below the bottom board of the fence. The advantages of such a ridge are two—first, the comparative height of the fence is increased, and second, the water is borne away from the posts. This ridge was made smooth by running over it from end to end a plank leveller.

The fence consisted of round cedar posts eight feet apart, sunk three feet in the ground, and pointed in the low parts. The bottom board, following close upon the line of the ground, is pine, and eight inches wide. The top board, of the same material, is six inches broad and comes up even with the top of the posts. Between these boards there are stretched along four strands of ordinary barbed wire, the lower one of which is five inches from the bottom board. Ascending the post the other spaces are 6, 6½, 7½ and 9 inches apart respectively. The height of the fence is four feet.

The portion built in 1888 consisted of but three strands of barbed wire, but this was not found sufficient to keep out the lambs that fed upon the adjoining highway. The spaces in this portion were 7, 8½, 9 and 9½ inches respectively.

The Destruction of Weeds on the Farm.

A good deal of attention was given to this branch of the work. In several of the fields the Canada thistles were growing more numerously than they should be on a model farm. We allowed none of them to go to seed. In some instances they were cut with the spud, especially in fields where they were not very numerous. The principal mode, however, adopted for their destruction was the growing of hoed crops.

Of this, in field number 3, twelve acres of roots were grown; in field number 9, twenty acres of corn, rape and millet were grown, but chiefly corn, and in field number 17 seven and one-half acres of potatoes. (See Farm Foreman's report, pp. 120.) In each of these fields most thorough work was made of the thistles, so that we do not anticipate much trouble on the score of thistles from these fields in the near future. Particular attention was also given to the spudding of the few surviving thistles that were found in fields devoted last year to the growth of corn and roots, as it is the intention to hold the fort if possible in any of the fields in which weeds are virtually subdued.

This cannot probably be successfully done in any case unless such fields are gone over at least twice a year, say June and September, with spud in hand, and every form of weed life detected and destroyed that may be found lingering there, or that may recently have got a hold. This process will require one hand to go over about every ten acres per day, and will certainly prove a wise outlay. Indeed I am convinced that the farmer who will not do this cannot have a farm that is absolutely clean.

It is the intention next year to try and make a thorough cleaning of eighty-five acres, and without the introduction of the bare fallow.

Destruction of Weeds along the Highways.

The highways around the farm are foul with thistles, blue-weed and other mischievous forms of weed life. It is our purpose to have these made absolutely clean. The thistles were cut many times with the spud in 1889.

Blueweed is very abundant along all the roadsides in this part of the country. It is a biennial, branching in its habit of growth, attains to the height of one to two feet, and blossoms from June to September. The flowers are a beautiful blue colour, and each plant produces an enormous number of seeds. Many of these remain in the pods until winter, when they are driven by the fierce winds for miles over frozen surfaces. This plant does not well withstand vigorous cultivation, but becomes very troublesome in pastures and along highways. The only effectual mode of destroying it in such places seems to be to cut it below the crown with the spud. This requires to be done several times each season for two years as younger plants follow from time to time, producing fresh blossoms. When thus treated for two seasons the plants will all be destroyed, unless such as may have been produced in the interval from seeds lodged in the ground. Cutting with the scythe only seems to encourage the growth of the young plants by increasing the number of the branches.

Ox-Eye Daisy was found troublesome in one of the newly sown meadows. Because the meadows were new the plants were found growing singly, but in some they were very numerous. When in blossom they were cut say an inch below the surface with the spud, and pulled with the hand. They were gathered in piles and drawn away with the carts. It is believed that thorough work was done.

Wild flax was also found in many places in the meadows, and this was carefully pulled by hand. The same was done with the wild mustard and the different species of cockle. Burdocks received no quarter, nor did couch grass wherever it was found. Only a few heads of the wild oats were found, and these were of course pulled, and the pigeon weed found in the winter crop shared the same fate.

Improvement of Roads Bordering on the Farm.

The road already referred to as having had new fences put up along its borders was taken in hand in the spring. The tens of thousands of stones were first removed from its borders. The heaviest of these had been drawn away in the winter. The unsightly, scrubby trees were then dug out by the roots, when the borders of the road as far as the ridges which form the fence beds were plowed and harrowed, and then levelled with the plank leveller. These were again plowed later in the season, and levelled again in the same way. Seven or eight furrows were then plowed where the ditches were to be made. Great pains were taken to have these made perfectly straight. The grading of the road-bed was the next operation. This was done chiefly by the aid of the scraper, although shovels were used when necessary, in order to perfect the uniformity of the grading. The road-bed is 34 feet wide between the outer rims of the ditches, is fairly rounded, but only gently so, and is quite wide enough for two loaded hay wagons to past without any difficulty. This cannot be said of many of the graded roads of Ontario. It is also about the proper width for harmony of appearance when compared with the sides bordering upon it. With the aid of a small grant from the Legislature and from each of the neighboring townships this road was gravelled throughout three-fourths of its entire length at the rate of three loads of gravel to the rod. The gravel was made to cover ten feet in width of the road ; no coarse stones were allowed in the gravel, and great pains were taken by Mr. Wm. Squirrel who was put in charge of the spreading. So completely did he succeed in this that a divergence of six inches in the borders of the gravel part of the road-bed could not be seen from end to end. Thus it is everywhere. We find some who do everything neatly that they turn their hand to, and others who do all their work in a slovenly, uncouth manner although they do no more in quantity than the former.

The borders of this road have been levelled as smoothly as the surface of a cultivated field, and the whole road except the part gravelled will be sown to grass in the spring. It is the intention to keep down weeds by the use of the mower, as the grading is of a character that will admit of this. If a herd law is passed in the adjoining townships prohibiting sheep from running at large, shades will be planted along this road, but so as to interfere very little with the use of the mower.

Why is it not easily possible to grade a majority of the roads in the Province as this one has been graded ; that is, to have the grade even and uniform and so thoroughly done that no more will be required to put the same in order than the adding of some

gravel occasionally, or the repairing of a sluiceway? And why may not each farmer level the sides of the highway bordering on his farm and plant trees along the same, thus adding to the value of the farm in case of selling, more, it may be, than twice the outlay?

The most laborious piece of work undertaken during the year was the improvement of the private road running from the Brock road past the outbuildings and on toward the rear of the farm. In our portion of this road many hundreds of loads of stones of all sizes had been buried. They had been dumped promiscuously into the road-bed to the depth of from one to three feet, and to the width of about thirty feet. Deep, wide ditches had then been made at the sides to get earth to cover these, with the result that the road-bed was quite too high, and the ditches quite too low to correspond with the other portions of the road. These were taken out at an enormous expenditure of muscle and piled where they are to be made into a fence. The whole road was then ploughed and levelled twice during the season. The road-bed was scraped to the width of ten feet and to the depth of from nine to twelve inches, and the excavation was filled with small stones. The road was then graded with the plough and scraper, great pains being taken to have the grade uniform and the edge of the borders straight. The width of the road between the outer edge of the ditches is thirty feet. The grade therefore of the road is less in this case than in that of the town-line above described, as the road-bed is a little narrower. Gravel will be drawn upon this road during the winter and spread evenly upon it in the spring.

The borders of this road are being nicely smoothed by means of horse and hand labour, and will be planted with forest trees of different varieties. These will of course require protection for a few years, which will be furnished in the form of a fence on the sides of the borders next the drive. The present year the private road on the opposite side of the farm will be dealt with in the same way.

Four bull-paddocks were enclosed during the year, in which these animals may get exercise. They are 170 feet long and 76 feet broad, and are surrounded by a board fence 6 feet high. The posts, which are cedar, are sunk 4 feet in the ground and are 7 feet apart. Three rows of scantling 2 x 4 inches were stretched along these and sunk one inch into the posts on both sides of the post and directly opposite to each other. The distance of these from the ground (top side) is 13, 34 and 56 inches respectively. Half way between the posts a block was inserted between the scantlings opposite to each other and spiked there to give strength to the fence. The boards are inch hemlock, and of course nailed on both sides of the posts, and will yet be covered with a cap.

All these improvements, and many others not enumerated here, were done with farm and student labour, the only exception being the drawing of the gravel on the town-line, which was done by the neighbouring municipalities; nor was any special grant used in the accomplishment of these improvements unless in the material used in building the fences

The Experimental Work.

Owing to the loss of the buildings and the sale of the live stock, very little was done in the line of live stock experiments. The experiments in the field naturally divide themselves into experiments with cereals, root crops, fodder crops and fertilisers. Experiments with cereals are again sub-divided into those conducted in large plots in the field and small plots in the experimental grounds, proper.

The experiments of the past year in grains were undertaken on a large scale compared with those of former years. And although some valuable lessons are to be learned from them, they are in some respects to myself at least disappointing. This arises from two causes that in common phrase may be termed accidental. I refer to the action of rust on some of the grains, especially the wheat, and the ravages of the cutworm on the principal field devoted to the large plot experiments.

The former of these causes acted with unusual virulence. To so great an extent did rust prey upon the crop of the farm that no one field of grain grown on the place altogether escaped, although the early sown barley was affected but little. Nearly every kind of grain sown grew with unusual luxuriance and gave promise, in most instances, of an abundant yield till within a few days of harvesting, when on several of the varieties rust appeared.

Something of this is to be attributed to the season, rust being present in an unusual degree in most parts of the province. It was perhaps caused in part by the nature of

the soil, much of it being loam with an abundant supply of humus. But these reasons taken together do not furnish a sufficient explanation, as the grain in this neighborhood was afflicted with rust in an unusual degree. It cannot be attributed to lateness of sowing, for the spring crop had scarcely ever been sown so early in the history of the farm. I cannot but conclude that locality has much to do with the scourge. It may be that the gentle current of air coming from the low lying valleys of the Speed, move the fogs in the direction of the wide valley that angles across this and other farms, over which they brood long enough to accomplish the mischief referred to. This view finds further confirmation in observations made in the various sections of the outlying neighborhood. In the vicinity of Puslinch Lake, but a few miles to the southward where the land is a little lighter, there was but little injury from rust, and the same may be said of grain in the opposite direction at an equal distance. To so great an extent has the evil prevailed not only the past season but in previous years, that unless some means can be adopted for obviating the rust difficulty in the near future it will be well perhaps to consider if some plot of ground in another locality had better not be chosen for carrying on duplicate experiments with field grain. Meantime it is the intention next season to prepare field No. 18, the highest lying field on the farm, for the experimental work. The grain experiments will be removed to this when the soil is more uniform.

The visitation of the cutworm was quite unlooked for, although it is of periodical occurrence in many sections. No traces of its ravages had been observed on the farm the previous year. Reference to the means that should be adopted to destroy the cutworm does not, properly speaking, belong to this department, but I desire to mention here notwithstanding that the bare fallow, the growing of peas and the cultivation of hoed crops are amongst the most effective methods of banishing the intruder. Cutworms do not seem to relish peas. The bare fallow destroys them by starving them; and the cultivation of hoed crops acts on the same principle. Fields liable to be infested with them should not be allowed to lie long in grass. Some have argued that a heavy dressing of salt at the time of sowing the grain where their presence is suspected will check their ravages. If the top dressing is quite heavy this remedy may prove of some efficacy. It may be mentioned here, however, that in the field above referred to, where the ravages of the cutworm were so disastrous, salt had been sown on the pasture grown there the previous season to the extent of 400 lbs. per acre. This makes it evident that salt sown on a pasture or meadow that is ploughed in the fall and sown with some kind of crop the following spring, will not prove efficatious in preventing the ravages of the cutworm.

For experimenntal purposes in the farm and live stock departments the sum of $1,720.00 was set aside, and in the dairy department $1,750.00. For the present year the Minister of Agriculture has set aside more than $3,000.00 in the experimental department alone. An expenditure that will, I believe, meet with the hearty approval of every farmer in the land, as it will enable us to embark freely in conducting valuable experiments connected with the production of live stock.

The amount devoted to experimental purposes in the United States for the present year is fully $725,000, or about $15,000 for each of the experimental stations that have been established there. This fact presses home the thought that if we are to keep the agriculture of Ontario in the front rank, we must bestir ourselves in the line of experiment, which is always of necessity conducted with no little outlay.

The Minister has also kindly acceded to my request to have a person employed, whose whole time subject to the supervision of myself and assistant will be given to this department when the same may be found necessary. This arrangement will enable us to overtake a very large amount of work in this important department.

Experiments with Cereals in Plots.

The various experiments carried on in growing cereals in plots were conducted on a much larger scale than ever before in the history of this institution. During the winter of 1889 one of the most extensive importations of seed grain that was ever made to this continent, that is, if we consider the number of the varieties included in the importation was arranged for. Messrs. Oakshott & Millard, seedsmen, of Reading, England, collected

the grains, which embraced 54 samples of barley, 10 of peas, 77 of spring wheats, 71 of oats, and 25 of winter wheats. To these grains, were added a large number of varieties picked up in Canada, and were grown side by side with the former, the full details of which are given in the report of the assistant in this department.

The whole number of grain and grass plots was no less than 464, which does not include the experiments with field roots and potatoes. The work undertaken in this line was almost double that undertaken during any previous year. Experimental work is of no value without it gives results that are either positive or negative, and but few experiments should be regarded as final or conclusive that are not repeated under the same conditions. Some of them require repeating many times owing to the variableness of the seasons and other attendent conditions. When so repeated and the results point generally in the one direction, it may be that even then it is the general trend of the experiments that becomes of value rather than the exact results obtained. This is true both in experiments with grains and animals. With the former important variations may result from climate as affected by locality. This, so far, impairs the worth of all field experiments, hence the great value of having them repeated simultaneously in several sections of the one province. In regard to experiments with animals, individuality plays so important a part that the general trend of the results forms the valuable feature rather than the exact results, as in the case of grains.

Viewed in this light, time is necessary before reliable conclusions can be published which shall serve as guides to the farmer in his practice. We feel, therefore, that this year we have but laid the foundation of a series of experiments which it is believed will be of great value to the farmer.

These experiments will all be repeated the coming season, not only from the same samples as were grown last year, but also from the product of these, when if we have a favorable season we will undoubtedly get some results of much value.

A summary is given below of the various kinds of grains grown in the plots with their general behavior as regards germination, length of straw, yield of grain and straw per plot, and yield of grain per acre.

Grain.	No. of Varieties.	Country.	Germination.	Length of staw, inches.	Grain per plot. lb.	Straw per plot lb.	Grain per acre bush.
Barley.	18	Germany	90.3	33.3	33.9	68.3	34.5
	4	Sweden	89.4	37.5	29.4	63.0	30.6
	1	Russia	90.0	43.0	41.0	84.0	42.7
	2	Scotland	95.0	39.0	22.5	50.0	23.0
	10	England	91.4	37.7	26.6	65.2	27.7
	9	France	83.5	38.6	32.0	66.2	33.3
	12	Ontario	91.4	36.3	35.7	55.3	37.2
	56	Average	77-7	39.3	32.8	63.8	30.3
				Peas in pod.			
Peas.	10	England	89.2	3.8	34.0	39.1	28.3
	6	Ontario	91.3	4.2	48.9	65.0	40.6
	16	Average	89.9	3.3	39.6	48.8	32.9
Spring Wheat.	12	Germany	86.3	37.3	5.0	25.	8.4
	12	Russia	81.2	31.0	4.3	21.3	7.2
	1	Scotland	81.0	6.0	.....	.....	.....
	5	England	.....	.....	2.5	27.5	4.2
	21	France	81.9	36.8	3.9	23.2	6.5
	9	Australia	79.4	26 2	1.9	15.7	3.2
	8	Ontario	76.1	43.1	5.4	28.2	8.9
	68	Average	81.5	36.0	3.9	23.1	6.6
Oats.	16	Germany	79.5	60.	17.9	62.8	52.5
	2	Sweden	67.5	60.1	10.7	71.6	31.6
	6	Russia	77.8	58.3	15.8	65.3	49.5
	14	Scotland	80.9	58.6	12.3	68.9	36.2
	10	England	84.0	52.5	14.1	43.9	41.5
	20	France	82.5	49.2	18.6	52.2	54.8
	3	Australia	72.6	52.0	7.5	46.6	22.1
	19	Ontario	86.5	50.4	18.8	53.5	53.6
	90	Average	77.4	54.1	16.4	7.2	47.8

From the preceding table it is apparant that the seed was in good condition for growing, as the percentage of seeds which germinated is high.

The Barley Plots.—In all, there were 61 plots of barley, including 56 varieties. In point of germination, the Scotch varieties stood the highest, but in yield of both grain and straw they were the lowest. The varieties from Germany behaved well on the whole, and we hope to get from them some kinds that will be useful to grow here. The yield of the 18 varieties from that country was at the rate of 34.5 bushels per acre, being about 13 per cent. above the average of all varieties.

In handling so many varieties maturing at different dates, it is impossible to harvest them all under like conditions, as the time of ripening varies so much that some are more exposed than others to adverse conditions of weather. It is therefore not easy to make a comparison between the different varieties in regard to color that would be accurate.

It is worthy of notice, that of the thirty-seven two-rowed varieties in the table on (page 126) of which the yields are given, they averaged at the rate of 31.7 bushels per acre, while the seventeen samples of six-rowed averaged at the rate of 36.3 bushels per acre, but it must be borne in mind that six of the six-rowed samples were of the common Ontario variety, which all gave a high return, excluding these six lots, the remaining eleven varieties gave an average of 30.5 bushels per acre.

Of the different varieties of barley the common six-rowed Canadian gave on the whole the best results. Every tenth plot was sown with this variety, and the returns from these varied from 41.7 to 52.1 bushels per acre, the average being 46.9 bushels.

The two varieties first in point of yield, are the Cheyne from Germany, and the Improved Scotch, the latter grown at least two years in this country. The yield in both cases was at the rate of 47.9 per acre. The former was two-rowed, and the latter six-rowed, and the quality of grain in both medium. The straw of the Cheyne was taller and gave a greater weight than that of any other variety, but was weak and loops pretty badly. The Italian Rice from Germany behaved very well. It has a beautiful somewhat fan-shaped head; strong and stiff straw, and ripens early. It is two-rowed, and in quality and size of grain is medium. This variety will likely give satisfaction on soils where the grain is inclined to lodge.

The other early ripening varieties are the Skinless, originally from Australia, which matured July 19th, then Oderbrucker from Germany, July 28th and the Early Black from France, on July 30th.

Pea Plots.—Of the sixteen varieties of peas tested, ten came from England and six were procured in Ontario. The varieties from Ontario average at the rate of 40.6 bushels per acre, while those from England averaged 28.3 bushels. The best yielding English variety was the Glory, rather short in the straw and but a medium grower. The pea is pale blue in color and large in size. The Prussian Blue took the lead of the Canadian varieties, yielding at the rate of 45 bushels per acre. This kind gave the highest average of peas per pod, viz., 5.1, and also the largest quantity of straw. Next to this variety in point of yield came the White-eyed Marrowfat, which produced at the rate of 43.9 bushels per acre. As this variety was sown at the same rate per acre, it is probable that had it been sown more thickly it would have come out first in yield.

These plots were sown on April 17th and therefore ripened in good season. There was not the slightest indication of the pea-bug in any of the plots.

Spring Wheat Plots—There were ninty-two plots of spring wheat. Past experience during recent years has demonstrated that in many parts of Western Ontario spring wheat cannot usually be grown successfully. Our object in testing so large a number of varieties is to ascertain if some kinds cannot be secured that will withstand the ravages of rust, and at the same time give a profitable return. A large proportion of the plots were struck with rust some time before they were ripe. This could not have been caused by late sowing, as nearly all the plots were sown April 18th, but three days later than the barley, which I believe is the earliest grain sowing that has been done on the farm since it came into the hands of the Government. It is encouraging to note that some of the plots were almost entirely free from rust, since, as these varieties successfully withstood the rust this year, we can reasonably expect that they will do so in any season.

Of the foreign varieties, those from Germany gave the best average returns, those from Russia came second, and from France third. The best yielding variety was the Wild Goose, (page 131) which gave a return at the rate of 26.7 bushels per acre. This will be recognised by readers as an old variety, noted for uniformily large returns, but not in favor with the millers even at the reduced rate at which it sells, it will probably pay b tter to grow it than many other kinds now grown throughout Ontario.

The best yielding variety of foreign wheats was the Herison bearded, which came from France. It yielded at the rate of 18.3 bushels per acre. It is a red wheat with club head, supported by strong straw, and virtually free from rust. The berry is small but plump. The straw stands well and is of medium height, viz., 42 inches.

The ordinary Bearded March, also from France, gave a return at the rate of 13.3 bushels per acre. The straw was medium, and almost free from rust and the grain above the average in quality. The March Bearded is from the same country, gave a similar yield. There is a rather close resemblence between these two varieties, but yet the year apparently distinct.

The Red Fern variety, now pretty generally known, gave a yield at the rate of 13.3 bushels per acre. It was but slightly rusted.

The Oat Plot.—Of the 92 oat plots grown, the German and Swedish varieties gave the longest straw, but it will be observed that the straw of the latter outweighed that of the former, and the difference in the average yields of grain was even more apparent but in favor of Germany. The straw of the French varieties was below the average in height but gave a greater weight notwithstanding, than those of any of the countries in the table. This was owing doubtless, to their branching habits of growth and the large amount of leaves borne by the plants. They also grew more thickly than those of any other country, caused in part by the smaller size of the grains sown, as the same quantity by weight was sown in each of the plots. The straw from the French oats is certainly most valuable for fodder owing to its fairness, as, when fed direct and uncut, it will be eaten with a relish by stock. The oat plots were, many of them, badly lodged by a storm which swept over them about two weeks before cutting. Nearly all the plots were affected more or less with rust.

The two leading varieties in point of yield came from France Those were the Goanette and Chenailles (see p. 134) both black and both spreading in the head. The yields per acre were 80.9 bushels in each instance. The straw of the first, however, was strong and that of the second weak, the rust on the first was slight and on the second medium in quantity. Both varieties also ripen early and the grain in each instance is larger and has a thin hull.

Next in point of yield are two German varieties the Oderboucker and the Danebrog both of which are white and both have spreading heads. The yield in both instances was at the rate of 75 bushels per acre. The straw of the Oderboucker was stronger than that of the Danebrog and stood up well. Both had some rust but the Oderboucker less than the Danebrog. The grain of the former was long and plump and was highly recommended by the Oatmeal Miller's Association when assembled in convention in Toronto last autumn. No less than eighty-two varieties grown upon this farm were submitted to them at their request. Their object was to ascertain which of those would be most suitable for making roller meal.

The three varieties from Russia behaved very well on the whole but of these the most promising is the Siberian, a white oat with a spreading head. It yields at the rate of 73½ bushels per acre and was also recommended by the Oatmeal Miller's Association, as indeed were all three of the Russian varieties. This variety, however, was considerably rusted.

The Bavarian headed the list in the yield from the Canadian varieties. This oat was imported some years since to the state of New York. From there it was

brought into Canada by Mr. Daniel Zavitz, of Coldstream, Ont. Its record has been good during the five or six years which it has been tried in this country. It is a vigorous grower, but was somewhat affected with rust. The straw stands up well. It is white in color and yielded at the rate of 71.2 bushels to the acre.

The three earliest ripening varieties were the early blossom from England, the Siberian from France, and the White from Australia, all of which were harvested on the 6th of August. All three had but little rust. The Siberian had strong straw and yielded at the rate of 66.2 bushels per acre. The one objection to it is that the hull of the grain is thick.

The Flying Scotchman, Rennie's Prize White, Cluster or Triumph and Welcome ripened on the 7th of August, and yielded respectively at the rate of 63.2, 57.4, 60.3 and 63.2 bushels per acre. The former was imported from England and was medium in straw with but slight rust, while the other varieties, all Canadian, were weak in the straw and had some rust.

It is but fair to mention that the yields obtained from these small plots do not fairly represent the yields likely to be obtained from the same varieties when grown in the fields. They give larger proportionate yields than will be reaped when sown in large lots. This is caused, in part at least, by cultivation around the borders of the plots when keeping these borders clean, by a freer circulation of air through the plots and by a larger amount of sunlight reaching the grain. It would not be safe to fix the amount definitely of the increased proportionate return, but probably it should not be put at less than one-sixth or even one-fifth of the whole yield.

Exhibit of Experimental Grains—With the approval of the Minister of Agriculture an exhibit of the experimental grains was made at the Provincial Exhibition held at London and at the Toronto Industrial. They were also shown at Embro at a later period. The press of Ontario paid some high compliments to this institution when speaking of the exhibit.

In reference to the same as shown at London, the following extracts are taken from the notices given at the time :—

"The tastefully arranged and carefully labelled exhibit of grains grown during the present year (1889) on experimental plots at the Ontario Agricultural College Farm, Guelph, is not only one of the most interesting at the fair, but affords good evidence that new life is being infused into that institution from which it came."—*Western Advertiser.*

"The managers of the Experimental Station at Guelph, in order to test the vitality and prolificacy of the several species of grain and small seeds, have obtained specimens from 18 different places in Europe, Africa, North America and Australia. The total collection consists of 300 varieties of the different cereals, both in the straw and also in the threshed state. The whole makes a most attractive appearance, while at the same time the collection and experiments should be of practical benefit to the farmers of Ontario. The specimens of all the cereals were of first-class quality and were the growth of 1889." *London Free Press.*

"One of the most pleasing features of the Exhibition is the display made by the Ontario Agricultural College of grains grown on the experimental plots. The experimental department has been made a feature of late. The farmers seem to be alive to the importance of the work carried on and all day Mr. Zavitz was kept hard at work answering questions."—*Toronto Globe.*

"Upon entering the main door of the Dairy Building our attention is first attracted to a magnificent grain exhibit from the Ontario Agricultural College. Taking this exhibit as a whole, it is the finest we have ever seen in Canada and certainly reflects creditably upon those in authority at the college."—*Farmer's Advocate.*

In reference to the Exhibit at the Toronto Industrial, the Toronto *Mail* says :—

"The Exhibit of grains grown by the Experimental Department of the Model Farm at Guelph is very creditable to that institution."

Salt on four different kinds of soils.—This experiment as stated in the report (p. 136) has been conducted two years in succession. From this we glean that the application of salt has increased the yield of grain both years on four different kinds of soils, viz., loam, marl, clay and muck. In the experiment of 1888, the greatest proportionate increase was in the grain grown in the muck when the salt increased the yield at the rate of 60.7 per cent. This year the test in the muck soil proved a failure, owing to the excessive amount of wet in the early part of the summer. The increase in the barley in 1888 on the salted portion of the clay, was at the rate of 36.7 per cent. and in the oats, in 1889, at the rate of 17.1 per cent. The proportionate increase in the clay loam and marl soils was much less.

From this it is apparent that salt applied at the rate of 400 pounds per acre, materially increases the yield of grain (barley and oats) in a clay soil, in a wet or in a dry year. Is it not a matter very much to be regretted, that the combine in salt has so raised the price, that it is put to a large extent beyond the reach of the farmers to apply to soils?

The increase was caused, apparently, by the action of the salt on the soil, by way of rendering the dormant plant food in the latter more available. No very marked difference was observed in the color or strength of the straw, and the difference as stated above in the yield was very considerable.

Comparative yields from barley sown at different dates.—The particulars relating to this experiment will be found on p. 137 of the report. I wish leave to call attention to the vast importance of early sowing as demonstrated in the table referred to. It will be observed that the common six rowed Ontario barley, sown April 15th, yielded at the rate of 44.3 bushels per acre, that sown May 5th, 20.3 bushels and that sown June 7th, 4.2 bushels, the sample of the first being also very much superior to that of the second, and the second to that of the third. The importance of sowing barley early cannot well be over-estimated, even though it may render the crop liable to injury from frost, as in the above instance the first sown plot was browned on the tops by severe frost when about two inches high, and yet the yield was more than twice that of the plot sown twenty days later. To enable the farmers to sow spring grains at the earliest moment, it is absolutely necessary to have the ground ploughed the previous autumn, a practice which is attended with other important advantages.

A seven years' rotation of crops.—The idea in the conception of this experiment is an excellent one, (see p. 138) as it would enable us to ascertain whether in the succeeding crops, enough more could be obtained to repay the farmer for the loss of a crop during the year of the bare fallow. It is to be regretted that the date regarding the first and third years of this experiment are entirely wanting. This, to a great extent, neutralizes the value of the experiment, which is also further weakened by the lack of similarity in some of the conditions during those years. I mean the sowing of fall wheat on one plot and of spring wheat on the other, which probably also necessitated seeding to grass on different dates and under different conditions, which very likely explains the difference in the amounts of hay obtained in 1886, the fourth year of the rotation.

Experiments with Cereals in Acre Plots.

I have already stated that grains grown in small plots give a larger proportionate yield than when grown in ordinary fields, and have also given my reasons for this belief. In view of this fact a number of grains, including spring wheat, barley, oats and peas, were grown in acre plots. The varieties chosen were those that had already attained some notoriety in this country. We were, however, unfortunate in our choice of location for these tests, as the cutworm, excessive wet and other causes so interfered with the yields as to render them unsafe guides in the farm practice of the future. Some of these will be repeated the present year.

Experiments with Root Crops.

Potatoes.—By reference to p. 139 of the report, it will be noticed that an experiment was carried on with eleven varieties of potatoes. One row of each was planted across the whole width of the field. They were all planted the same day and under precisely similar conditions. Several of the varieties it will be noticed were new.

The three leading kinds were all early. They are named the Early Sunrise, the Early Ohio and the Halton Seedling, and yielded respectively at the rate of 348.8, 314.4 and 306 bushels per acre. The Early Sunrise proved a very thrifty grower, carried a profusion of bloom, and was one of the first to ripen. The stems were short and strong. Altogether it was a very promising variety. The Early Ohio is a strong grower, medium in earliness, and an excellent yielder ; and the same may be said of the Halton Seedling, which produces short, stout and low-lying vines. The best of the late sorts was the Rural Blush, which gave at the rate of 304.1 bus. per acre. This variety produces vines strong and tall. The two well-known varieties, Beauty of Hebron and White Elephant, produced at the rate of 278.8 and 257 bus. respectively per acre. The Early Sunrise therefore gave a return 25 per cent. greater than the Beauty of Hebron, and 35 per cent. more than the White Elephant. Some of these newer varieties are certainly very promising.

Mangolds.—Eight varieties of Mangolds were sown. One row of each was sown across the field and under similar conditions. The date of sowing was May 17th.

Comparing the largest yielding varieties with the Mammoth Red, which in the past has been the standard mangold of the country, the Giant Yellow Globe yielded 49.2 per cent. more, the Carter's Ward Orange Globe 34.3 per cent. more. and the Red Intermediate 28.4 per cent. more. The Giant Yellow Globe mangolds grew largely above ground and were smooth and easily handled, but did not keep so well as some other varieties. The Mammoth Red also did not keep well, but the season may have had something to do with this.

The Central German Sugar Beet did uncommonly well with us, as stated in the report of the farm foreman (p. 118), where also the reasons are assigned for the moderate yield obtained.

Carrots.—Six varieties of carrots were sown on on May 6th (see p. 140).

The White Belgian has long been the standard carrot of the country, but it must certainly give place to the White Vosges, a carrot possessing many excellences. It grows well underground, is large and curves abruptly to a point, which renders it easily handled, nor is it easily broken as the White Belgian and the Long Red Altringham. It also yielded 73.5 per cent. more than the White Belgian, and is an excellent keeper. The Scarlet Intermediate is a heavy cropper, easy to handle, and has also good keeping qualities. The White Belgian grows largely above ground, is crooked and easily broken when being handled. The Long Red Altringham is small, easily broken and does not keep well.

It is to be regretted that we cannot furnish a chemical analysis of the mangolds and carrots, which would have been done had not so much time been required in analysing the corn.

Experiments with Fodder Crops.

Cultivation of Rape.—The experiments in rape culture was of peculiar interest owing to its bearing upon flat and ridged culture, thick and thin seeding in ridges and on the level, the distances between the ridges, and on culture broadcast and in drills.

There were nine drills in each instance except in plot four (where there were eleven drills owing to the less distance between them), and plots five and six which were sown broadcast, but which covered an equal area of gronnd. The plots were also of the same shape and width.

The yield from the plots 1 and 2, cultivated on the level, was at the rate of 18.08 tons per acre as compared with 13.1 tons per acre from that grown on ridges. The drills sown on the level were more vigorous from the first, and this I apprehend is likely to be the case with future tests.

Plots 2 and 3 ridged alike were sown, the first at the rate of four pounds of seed per acre, and the second at the rate of half a pound. The former gave 13.1 tons and the latter 14.2, and the quality of the rape in plot No. 3 was evidently the best, as it was more succulent. From this it is evident that thin seeding in drills is preferable when the season is moist.

Plot No. 2, in which the drills were twenty-two inches apart, was pitted against plot No. 4 with drills 18 inches apart, the amount of seed in both cases being at the rate of four pounds per acre. The yield from plot No. 2 as stated above was at the rate of 13.1 tons per acre, and from plot No. 4 at the rate of 16.68 tons per acre. This return points rather in the direction of closer culture than is generally adopted for rape, as it is usual to make the distance between the drills from twenty-four to twenty-six inches. Another element in this experiment must be borne in mind, viz., that the seeding in plot No. 4 was of necessity not so thick as in plot No. 2, as the same quantity of seed was distributed over a greater number of drills.

The yield of plot No. 3, sown in drills at the rate of one-half pound per acre, as pitted against that of plot No. 5, sown broadcast and of course on the level, was as 14.2 to 14.68 tons per acre. It must not be inferred from this, however, that broadcast culture is superior to that in drills, as rape is generally sown, like roots, to aid in cleaning the land. If, therefore, it were sown broadcast on a field wanting cleaning it would in no way effect this purpose. This experiment, however, tends to show that in clean fields more rape can be obtained when sown broadcast and at a much less cost for labor than when sown in ridges. The element of the effects of the two modes of culture on the succeeding crop must also be considered, in which case that grown in drills would undoubtedly have a decided advantage.

Plot No. 5, described above, gave a less return than plot No. 6. The cultivation in each was broadcast, but the rate of seed per acre sown on the latter was eight pounds. The comparative yields were at the rate of 14.68 and 17.3 tons per acre. The quality of the latter, however, was inferior to that of the former owing to its woody condition.

It is to be regretted that two other plots sown broadcast at the rate of two and four pounds of seed per acre were injured accidentally, so that a comparison from these could not be made.

It should also be borne in mind that the weights given above are for the whole plant, including the root, for which probably twenty-five per cent. should be deducted in computing the yield.

Different Systems of Raising Fodder Corn.—For details of this experiment see p. 148. The value of the experiment is much impaired because of the fact that only about one-half of the seed germinated, owing probably to the cold damp weather at the time of sowing. The real test, therefore was about as follows, viz.: No. 1 plot, one grain per foot in the drill; No. 2 plot, six grains per foot; No 3. plot at the rate of one peck per acre, sown broadcast, and No. 4 plot at the rate of one and a-half bus. per acre.

The respective yields were at the following rates per acre:—

Plot No. 1	11.7	tons.
" " 2	12.1	"
" " 3	11.	"
" " 4	13.4	"

This experiment tends to prove that corn grown broadcast, when one and a half bus. of seed are sown per acre, will give a greater weight than when sown in drills forty-two inches apart, the plants being either two inches or twelve inches apart, and at a less expenditure of labor. But analysis may yet show that the corn in plot No. 1 contained

the greatest feeding value, as it produced ears, while in plot No. 4 there were none. The same objection may also be urged against broadcast corn culture that has been offered against broadcast rape culture. The repetitions of this experiment in future may give entirely different results, as the past was a peculiar season for corn production.

Experiments with Fertilisers.

There were not many experiments with fertilizers conducted during the past season. This was owing in part to the large number of grain plots grown, and in part to the disarrangement of our plans generally in consequence of the fire.

Action of different Fertilisers on successive crops.—No. 1. In 1887, 1888 and 1889, the crops consisting of spring wheat, barley and oats, were grown successively on plots of one-fortieth of an acre each, which had been manured in the spring of 1887 with salt, superphosphate, ground apatite and farmyard manure, one being left without manure (for details see p. 146). The behavior of these plots has been so eccentric that no conclusions of value can be drawn from the experiment. This is caused in part by a difference in the character of the soil, even in these small plots, which lie side by side. This difference was easily apparent to an attentive observer while the grain was growing. It has been determined, therefore, to discontinue the experiment until a suitable location can be secured for commencing it again, when the experimental field is ready.

Action of different fertilisers on successive crops.—No. 2. The experiment commenced in the spring of 1889 (see p. 147). Four plots were set apart containing one-fortieth of an acre each. Mineral superphosphate costing $26.00 per ton was applied at the rate of 400 lbs. per acre to plot No. 1. Sure Growth composed of refuse from pork factories, chemically treated, and costing $40.00 per ton, was applied at the rate of 400 lbs. per acre to plot No. 2. This is considered a complete fertiliser, as it contains nitrogen, phosporic acid and potash. Barnyard manure was applied to plot No. 3 at the rate of 14 tons per acre, and was valued at the rate of $7.00 per load. No fertiliser was put upon plot No. 4. The fertilisers were all applied as a top-dressing just before sowing, and were harrowed in. They were sown with oats April 22nd. There was a difference in the time of the maturing of the grain. That on plot No. 1 matured August 11th; plot No. 2, August 12th; plot No. 4, August 13th, and plot No. 3, August 15th.

The following were the yields per acre :—

Plot No. 1, at the rate of		$69\frac{1}{2}$	bush.
" 2, " "		$69\frac{1}{5}$	"
" 3, " "		$66\frac{1}{5}$	"
" 4, " "		$59\frac{3}{4}$	"

Putting the oats at 30 cents per bushel and not taking labor into account. the comparative returns were for the past year, after deducting the value of the fertilizers :—

Plot No. 1	$15 65
" 2	12 73
" 3	5 86
" 4	17 92

Two cereal crops following, summer-fallow and manure, had been taken from the land during the years immediately preceding the experiment. This experiment will in all probability be continued five years, the crop being changed every year.

The comparative yields of straw differ considerably :—

Plot No. 3 gave at the rate of		4,910 lb.	per acre.
" 2 " "		4,650 "	"
" 1 " "		4,030 "	"
" 4 " "		3,810 "	"

Farmyard manure therefore added 29 per cent. more straw as compared with no manure.

LIVE STOCK EXPERIMENTS.

Feeding Pigs Cold versus Warm Food.—This experiment was conducted for about three months in the winter of 1889. For particulars see page 140. The results showed but little difference. The experiment however will be repeated.

Pasturing Sheep on Permanent Grasses.—On May 15th two plots of 1½ acres each, sown with permanent grasses in the spring of 1881, were set aside for the purpose of ascertaining what amount of pasture they would afford for sheep during the season. The number of sheep put upon the pasture at each successive period was gauged by the luxuriance of the grass. They were furnished with water and shelter in the plots. It was found that from May 15th to August 25th one acre carried an average of 5.5 sheep and 3.8 lambs, equivalent to 7.4 sheep, allowing that one lamb ate one-half as much as a sheep. At the latter date the experiment was closed, although, had not other arrangements required it, the same might have been continued for two months longer, but with a somewhat reduced number of sheep. They were kept one week at a time on each plot, alternating from the one to the other. Farmers who can adopt an alternation of a longer or a shorter period in pasturing will find it an excellent practice, owing to the stimulus that lack of molestation gives to the grass in the field from which the stock has been removed.

A very large amount of pasture was thus afforded by these plots and the sheep did fairly well upon it, but the soil is peuliarly adapted to the production of grass.

It may be mentioned here that on these plots *Meadow Fescue* has proved one of the best of the foreign grasses. It is medium in growth, comes on late and continues to grow during dry weather. It holds well in the ground and grows with a good deal of vigor.

Orchard Grass retains its footing well, but no better than the Meadow Fescue. It grows vigorously during the first half of the summer, and if kept pastured off does not become rank, and produces a large amount of pasture.

Meadow Foxtail, the earliest of all grasses, has held its own well on these plots. It was in blossom about the 1st of May in 1889, and has come out in head on this farm as early as April 27th. It is however only a moderate producer.

Hard Fescue has also retained its footing well but it cannot be praised for furnishing a large amount of food. Unless kept closely eaten off it is apt to become wiry.

The *Oat Grasses*, although they furnish a fair amount of food while they last, hold out only moderately well.

The *Rye Grasses* for the first year give a larger proportionate yield than any other foreign grass, but are scarcely seen at all after the second year.

The *Kentucky Blue Grass* while taking a prominent place occupies much the same position in the pastures as at the commencement.

Most of the *Red Clover* disappeared by the end of the second year. There is a goodly sprinkling of the *Alsike* upon the ground yet. There has been almost none of the *White Dutch* and *Yellow Clover* found on the plots during the past two years. The *Lucerne* has diminished a little but is holding well in the ground, and it gives a good bite during the latter part of the season.

Feeding Lambs on Rape.—Some twelve acres of rape were grown on the farm, eight of which were in drills. The balance was sown broadcast. Owing to the great amount of rain that fell in June this rape was unduly late in being sowed. It grew, however, fairly well. On that sown in drills 48 lambs were pastured from October 10th to December 3rd, when they had to be housed because of the snow, but the rape would have sustained a much larger number had they been in our possession. These lambs were purchased in the latter part of September, were brought home and weighed October 9th, and were put upon the rape the following day. They weighed at that time 96½ lbs. each, and cost for the lot $184.70, or an average of $3.84¾. The price thus paid per pound was 4.04 cts. They were removed from the rape December 3rd and were again weigh

December 10th, or two months from the time when they were brought home. At the weighing of December 10th they averaged 114¼ lbs., a gain of 872 lbs. in the aggregate, or 18⅛ lbs. each, for the two months. When on they were fed about one pint of oats each per day, which was all they would take. They ate more grain proportionately as the season advanced.

These lambs were sold to a local buyer about the middle of December for 5¾ cts. per lb. live weight, with the proviso that we would keep them until an experiment relating to the relative cost of winter feeding and the gains accruing therefrom would be completed, which experiment, however, was not to be prolonged beyond the end of March. This experiment was undertaken because of the wish expressed by many prominent farmers that it should be done in order to give information to the country on the lines indicated above.

Full particulars relating to the whole experiment will be given in a bulletin soon to be published on the subject and also in the next annual report.

Had those lambs been sold at the date of the second weighing for 5½ cents per pound, to be shipped at once or soon after, and I am satisfied they could have been sold for that price, they would then have been worth to us $6.28⅜ each, which would have been a gain of $2.44⅜ on each lamb for the two months' keep. It should be remembered. however, that the selling price was unusually high last autumn, but in any case I am satisfied that good value is to be obtained from growing rape, and feeding lambs upon it, where the soil is suitable. I believe further that good results may be obtained from fattening lambs for the British market, but, as it is results obtained, rather than convictions expressed, that are required of this institution, I forbear saying more on that subject until we can allude to it bye-and-bye in due form.

Live Stock Experiments for 1889-90.

The following experiments in live stock were commenced in the autumn of 1889, as early in the season as they could be taken up properly in the new buildings :—

1. *Experiment in Fattening Steers.*—Ten steers were purchased in the early autumn and, after having been pastured on rape for a time, were divided into two lots for purposes of experiment. The first lot consisting of six head was divided into three pairs. The first pair, Nos. 1 and 2, are each to be fed 12 lbs. of meal per day and all the ensilage they can take. The second pair, Nos. 3 and 4, are each to receive 12 lbs. of meal, 45 lbs. of ensilage, and all the cut hay they can take. The third pair, Nos. 5 and 6, are to be fed 12 lbs. of meal, 45 lbs. of pulped roots, and all the pulped hay they can take. The object here is to test the comparative values for fattening of ensilage and meal ; ensilage, hay and meal ; and of roots, hay and meal ; the meal being the same in quantity and quality in each instance.

The second lot consisting of four animals was divided into two pairs. The first pair, Nos. 7 and 8, are to be fed hay, roots and meal, and a food condiment ; and the second pair, Nos. 9 and 10, are to receive a similar food ration without the condiment.

2. *Experiment in Rearing Grade Calves of the Different Beefing Breeds.*—The design of this experiment is to ascertain the comparative gains that will be made by grade steers of the different beefing breeds up to say 2½ years when fed on a ration the same in quality but varying in quantity to suit the requirements of the different individual animals in the contest, and also to ascertain the comparative cost of rearing them. With this end in view it was determined to purchase grades of the Shorthorn, Hereford, Aberdeen Poll, Galloway, Devon, Holstein, and scrub sorts. The sire in each case was to be pure, except in that of the scrub, and the dam to be a good Canadian cow. The experiment is now well under way.

3. *Experiment in Feeding Young Pigs.*—This experiment comprises three lots of four young pigs in each lot, weighing about 50 pounds apiece. Each lot comprises one pure Berkshire and three Berkshire grades, four distinct litters of our own breeding being

equally represented in each lot. The first lot are to be fed equal parts of whole peas and barley; the second lot the same mixture but ground; and the third lot a mixed meal ration consisting of oats, barley, wheat middlings and peas, in the proportion of 1, 1, 1 and 2 respectively. Each lot is to be fed all that will be eaten clean.

4. *Experiment in Feeding Store Pigs.*—This experiment comprises three lots of store pigs, three in each lot, Berkshire grades, which were about seven months old when they entered the experiment. They also are home-bred. The first lot are to receive a certain amount of meal consisting of barley, oats, wheat middlings and peas, in the proportion of 1, 1, 1 and 2 respectively, and in addition all the corn ensilage that they will take. The second lot are to be fed meal similar in quantity and quality to that fed to the first lot, and all the roots they will take. The third lot are to be fed meal of a similar quality to that given the first and second lots, but they are to get three times the quantity with no additional ration.

A number of other experiments will be taken up in the live stock department as the season advances, and in selecting these experiments it will be our aim to take up those first which it is hoped will be of direct practical value to the farmer.

I have the honor to be, Sir,

Your obedient servant,

THOS. SHAW.

REPORT OF FARM FOREMAN.

Dec. 29, 1889.

To Professor Thomas Shaw:

Sir,—I have the honor to submit to you my third annual report in connection with the respective departments.

The past year has been a very trying one owing to the loss by fire of the farm buildings and crop in the fall of 1888, which upset many of our plans for the year's work and hindered us not a little in the material progress of the farm.

The principal employment of the students last winter was the removing of the debris from the scene of the fire; first, in carting away the roots that had escaped damage and then clearing out the place preparatory to the erection of new buildings. Fixing up buildings for the accommodation of stock and hauling food and bedding for the same also occupied no small amount of time.

Another thing that is to be deeply regretted, was the lack of instruction to the students occasioned by the burning of the buildings and crop. Much of the stock had to be sold after the fire owing to the restricted accommodation. Nor could any instruction be given in the use of the machinery in connection with the barn, such as running farm engine, cutting boxes, cleaners, thresher, chopper, pulper, etc., or in reference to our usual way of preparing and handling the food. The loss of the silo was also keenly felt, especially by the second year students who could not again have an opportunity of becoming familiar while at this institution with the feeding properties of silage. It came through the fire but little the worse and we were able to use the greater part of it, but with our facilities at that time, testing it experimentally was out of the question.

Since the re-opening of the college in October last, we have been able to give the usual instruction in plowing, but I feel that the one team and man set apart for that purpose is quite insufficient to do justice to a class of eighty or more students when we consider the limited time in which instruction can be given.

During the year a great amount of labor has been spent on the making of roads, fences and other permanent improvements outside the regular farm work, which will add materially to the appearance and to the convenience of the farm. Although this work

has been done by our ordinary farm help, I think it a mistake to charge it against the farm proper. I would suggest for your earnest consideration that a special grant be asked from the Government for such labor, as under the present method the work of the farm proper is represented as costing more than it really does. For instance, I find that the farm teams and teamsters have done work to the value of $389 on such improvements, and the labor of the students has amounted to $285.05.

Owing to the great reduction of the stock after the fire, it was deemed expedient by the Advisory Board to dispense with all the farm help, including the herdsman, which threw on me the responsibility of looking after the stock. Very much credit is due to those students who aided me in this work under the very trying circumstances in which we were placed owing chiefly to the poor accommodation provided. This detracted not a little from the well-doing of the stock, particularly the horses and sheep, which did not do as well last winter as in past seasons, and were it not for the deep interest taken in them by some of the students my report of them could not have been so favorable as it is. But I am pleased to say that notwithstanding the hardships of the winter, during the summer they have recruited so that they have come into the stables this fall in fine condition.

I would like to call your attention to a part of field No. 20 (situated in the north corner of the farm and containing about fifteen acres) which, as it is at present, is of no practical benefit to the farm. I would suggest that a division fence be made between Nos. 19 and 20, a well sunk and a windmill procured to pump water for stock, as then the field would make a very valuable pasture, but it cannot be utilised in its present condition.

We have just opened the silo, which contains about one hundred tons of silage, and find it in splendid condition. The cattle seem very fond of it and eat it with great avidity.

Before submitting to you my report of the crops, I must call attention to the fact, that owing to the vast amount of work which requires attention and which we expect to accomplish by means of student labor, and also in order to have suitable work for the students during the winter months, we are obliged to let the greater part of the threshing stand until the college re-opens, which of course prevents me from reporting in many instances the exact yield of the grain crops.

In previous years I have been able to place the most important part of the crop in the barn so that it was threshed before the fall term closed and to submit my report of it. But last spring according to your directions all grains to be tested were first sown, consequently first cut, and had to be placed in that part of the barn where they will be threshed out. Had the barn been finished sufficiently early this would not have been the case. The roofers commenced roofing from the west end of the building and we filled it as fast as the roof was put on. This accounts for my not being able to report on the barley test of No. 13 and the spring wheat test of No. 4.

Field No. 1 contains twenty acres, and was used as pasture up to August 1st, when it was mown and about five tons of hay gathered from it. It was then ploughed at intervals when other work was not so pressing, and on the 17th and 18th of September it was sown with rye, at the rate of two bushels per acre.

Field No. 2 contains seventeen acres, ten of which was meadow yielding a crop of two tons per acre. The balance was sown with Rennie's improved six-rowed barley (not yet threshed) and seeded down with a mixture of four lbs. timothy, one lb. red top, one lb. perrenial rye, one lb. tall oat, 3 lbs. red clover, one lb. mammoth clover, two lbs. lucerne, and one lb. alsike per acre. The clovers and timothy were sown from the grain drill and the light grasses scattered by hand afterwards.

Field No. 3 contains twenty acres, four acres of which are used by the experimenta department, four acres were planted with trees by the horticultural department, and the balance was under root crop as follows:—One and one-half acres carrots of six varieties. The crop was a good one, the White Vosges giving considerably the largest yield. Three acres were sown with mangels, which were not as good a crop as the carrots. They con-

sisted of six varieties, viz., giant yellow globe, Carter's ward orange globe, long yellow, red globe, yellow Tankard and mammoth red intermediate. The exact weight of one row of each kind both of carrots and mangels is in the hands of Mr. Zavitz, who will report on them in connection with other experiments in his department. On the 23rd of May I received a packet of central German sugar beet seed from Hon. Charles Drury, which was not sown for some days, owing to the fact that the ground prepared for such crop was then planted, so that we were obliged to use a piece which required some preparation. I sowed along with them twenty lb of super-phosphate per acre. At the same time, and under precisely the same treatment, I planted one-fourth of an acre of mammoth red mangels to get an idea of the difference per acre. The weights will be reported as above.

In the fall, during your absence, I received a letter from Mr R. Lawder, of Toronto, asking the weight of the sugar beets per acre, and also requesting me to send a sample to Mr. Scaife, of Montreal, who has been so kind as to furnish me with a report of the analysis of sample, and also to say that they were the best sample he had received this year, although tests had been made in several counties in the Province. The balance of this field was sown with Swede turnips of six varieties, which, owing to the very unfavorable season, was a poor crop.

Field No. 4 contains twenty acres, five of which were used by the dairy department as pasture, four acres, known as "the hill side," were sown with spring wheat of three varieties, viz., red fern, defiance and magyar, one acre each, and one acre of oats and peas, mixed, two and one lb. per acre. The latter grew very heavy and lay down before filling. The wheat is not yet threshed. The defiance and magyar filled poorly, but the red fern was a fine crop. The balance of the field is worked with No. 5, and had on it a very fine crop of oats and peas, so far as the yield of straw is concerned—not yet threshed.

Field No. 5 contains twenty acres, ten of which is wood land, and has on it a lot of very valuable timber. The remaining ten acres is worked in with the ten acres on the west side of No. 4, and had on it a crop of oats and peas, of a heavy growth of straw. Six acres of this were cut green and cured for fodder, the balance were allowed to ripen and grew so heavy that it lay down and will not yield well.

Field No. 6. This field contains twenty acres, and was meadow, yielding two and one-half tons per acre. We tried an experiment with wood ashes of different quantities on this field, also of leached ashes *versus* unleached.

Field No. 7. This field contains twenty acres and has been under meadow for the past four years. The crop this year was of splendid quality, being pure timothy, and yielded about one ton per acre. Two acres of it were allowed to ripen, and were cut with the binder, and will be used for seeding next spring. The greater part of this field is now plowed.

Field No. 8. This field contains twenty acres, and was sown with common six-rowed barley and seeded down with a similar mixture of grasses and clovers to that of No. 2. The barley is yet unthreshed, but the yield will be good.

Field No. 9. This field contains twenty acres. In the fall of 1888, it had two plowings, and six acres of it were manured in the spring; four acres of it were manured with well rotted manure hauled from the city during winter. At that time No. 9 was calculated for the root crop of 1889, but afterwards it was given to the experimental dairy department for corn. After the corn was removed, it was plowed by the farm help.

Field No. 10. This field contains twenty acres, ten of which are used by the horticultural department for an orchard; the balance was sown with oats and peas, two to one, and grew a fine clean crop of straw, yielding 48 bushels of grain per acre.

Field No. 11. This field contains twenty-three acres, was broken from sod last spring and sown with peas of two varieties—seven acres of Prussian blue peas and sixteen acres of golden vine. As only a part of the golden vine and none of the Prussian blue

variety is threshed, we cannot give the yield, but would judge from handling that they will yield about twenty bushels per acre. After the pea crop was removed we prepared a portion of No. 11 for winter wheat by cultivating it thoroughly with the Corbin disc harrow, and sowed the following samples of wheat between the 6th and 9th days of September: 5½ bushels Garfield at rate of 1½ bushels per acre, 5½ bushels Bonnell, 5½ bushels Democrat, 5½ bushels Hybrid Mediterranean, 2 bushels Surprise. All are looking remarkably well.

Field No. 12. This field contains twenty acres and was sown with white Egyptian oats During the latter part of May and first week of June it was attacked by cut worms and about one-half of it destroyed, which reduced the yield at least one-third. One-half the crop was stacked and threshed in the field, the balance is yet unthreshed. In October the field was ploughed again.

Field No. 13. This field contains nineteen acres. In the fall of 1888 eight acres of the east end were sown with Manchester wheat, which promised to be a heavy crop till about the 25th of June, when it was suddenly struck with rust, which completely destroyed it. The remainder of the field was sown with barley of four varieties, viz., one acre Duckbill, one acre Chevalier, one acre imported six-rowed, and eight acres of common six-rowed, not yet threshed. With the exception of about four and one-half acres at the east end put down for orchard, this field was seeded to grass with a similar mixture to that of No. 2 and No. 8. We also tried an experiment while seeding, of scattering the grass and clover seeds before *versus* after the drill hoes, but as far as could be seen in the fall no difference was visible, both seemed to have caught well.

Field No. 14. This field contains twenty-four acres, seventeen acres of which are used by the experimental department, and one acre as a nursery by the horticultural department. The balance was meadow, principally clover, and yielded a wonderfully heavy crop.

Field No. 15. This field, containing twenty acres, was laid down to permanent pasture by Prof. Brown some years ago and still retains a luxuriant growth. Eight tons of grass was mown off it this year besides giving pasture to a large herd.

Field No. 16. This field contains twenty-six acres, and was broken from sod in November, 1888. Ten acres were sown with ten different kinds of oats, and six acres with six different kinds of pease, and ten acres with different mixtures of grain and different quanties, which would have been a very valuable experiment but for the ravages of the cut-worm, which so destroyed it as to prevent us reporting on any of them.

Field No. 17. This field contains seventeen acres, seven and one-half of which were planted with potatoes of eleven varieties. One row of each kind was planted on the north-west side of the field, the crop of which Mr. Zavitz will report to you. The balance was planted with two common varieties, and yielded one hundred and sixty-four bushels per acre. The balance was used as a pasture for sheep, being divided from potatoes by a portable fence, and in August was lightly ploughed and afterwards harrowed across with the Corbin disc harrow. About one-half of it was ploughed a second time by the students while receiving instruction.

Field No. 18. This field contains twenty acres, seven acres of which is woodland and natural pasture. The balance was this year sown with oats and pease, one and one-half bushels of each per acre. It grew a heavy crop of straw, but did not yield grain accordingly. It was ploughed this fall by the experimental department.

Field No. 19 contains thirty acres, and was sown with oats of two varieties, viz., New Zealand and early Calder. They were sown the same time and on the same preparation, yet the early Calder rusted considerably, while the New Zealand stood up with a bright stiff straw, but did not ripen for about nine days later than the other. The field was ploughed in October.

Field No. 20 is woodland and natural pasture, but as there is no water on it nor a division fence between it and No. 19, it is not at present of much value to the farm.

Field No. 21 contains twelve acres and is naturally a poor gravelly soil. As opportunity occurred through the winter, manure was procured in the city and piled on

this field, but the supply was insufficient. In the early part of July we carted and spread the manure, plowing it in as quickly as possible, after which it was well harrowed and rolled. We next drilled it into very light drills 23 inches apart and sowed with rape one pound per acre on part of it and two pounds per acre on the other part. The part sown with one pound per acre was the best crop, growing stronger and not having so many dry leaves. According to your directions, I purchased forty-eight spring lambs, Cotswold and Oxford Down grades. These lambs were weighed separately, ear-numbered, and turned into the rape on the tenth day of October. Some rough troughs were made and a little oats put in each evening. For the first three weeks they scarcely ate one-half pint each per day, but as the nights grew cold they gradually grew more fond of them. On the 1st of December, owing to stormy weather, they were taken into the sheep shed and fed hay and roots and a little oats. On the 10th of December they were again weighed, being exactly two months from date of first weighing, when we found an increase in weight of 864 pounds, or an average gain of 18 pounds per lamb. They were purchased at a very small fraction, over $4 per cwt., or an average of $3.84\frac{3}{4}$ per head, and are now sold at $5.75 per cwt. live weight, but may not be taken away till March.

The implements purchased this year for farm use were principally to replace those lost in the fire of 1888, and consisted of the following:

One threshing machine	$280 00
One cutting box	56 00
One grain chopper	30 00
One fanning mill	24 00
One Corbin harrow	25 00
One mowing machine	40 00
One mowing machine	30 00
One root slicer	23 00
	$508 00

The value of implements at present on hand is $1,719 00.

The live stock at present on hand consists of eight breeds of pure bred cattle, two breeds of pigs, five breeds of sheep, working horses, and some grade cattle, grade sheep and grade pigs.

Horses:		
9 working horses	$1,110 00	
1 general purpose horse	60 00	
2 mares for express material and instruction work	450 00	
Total value of horses		$1,620 00
Herefords.		
1 bull, 7 years old	$ 100 00	
1 heifer, 2 years calf	300 00	
		$ 400 00
Galloways:		
1 heifer, 2 years old	$ 50 00	
1 cow, 7 years old	125 00	
1 bull calf	50 00	
		$ 225 00
Aberdeen Angus:		
1 bull, 1 year old	$ 250 00	
1 cow, 8 years old	175 00	
1 bull calf	50 00	
1 heifer, 2 years old	275 00	
		$ 750 00
Ayrshires:		
1 bull, 7 years old	$ 75 00	
1 cow, 4 years old	60 00	
		$ 135 00
Devons:		
1 bull, 7 years old	$ 75 00	
		$ 75 00

Holsteins:		
1 cow, 8 years old	$ 70 00	
1 bull, 1 year old	30 00	
		$ 100 00
Jerseys.		
1 bull, 3 years old	$ 100 00	
1 cow, 5 years old	300 00	
1 cow, 5 years old	180 00	
1 heifer, 2 years old	215 00	
1 heifer calf	60 00	
		$ 85500
Shorthorns:		
1 bull, 2 years old	$ 600 00	
1 cow, 3 years old	120 00	
1 cow, 4 years old	120 00	
1 heifer, 2 years old	100 00	
1 heifer, 1 year old	100 00	
1 heifer, 1 year old	75 00	
1 cow and calf, 3 years old	400 00	
		$1,515 00
Grade Cattle:		
10 steers, fat, @ $57.50	$ 575 50	
2 Shorthorn grade steers @ $15.00 and $20.00	35 00	
1 Shorthorn grade heifer, 1 year	15 00	
1 Gallow grade steer, 2 years	40 00	
1 do do do do	30 00	
1 Angus grade calf	10 00	
11 grade milch cows @ $40	440 00	
1 Gallow grade calf	4 00	
		$1,148 00
Total value of cattle		$5,204 00
Berkshire hogs:		
1 boar, 1 year	$ 20 00	
1 sow, 1½ year	40 00	
1 sow, 9 months	15 00	
1 sow, 2 years	18 00	
1 sow, 14 months, improved	75 00	
1 sow, 14 months	50 00	
4 sows, 3 months	25 00	
		$243 00
Improved Yorkshire hogs:		
1 boar, 5 months	$20 00	
1 sow, 5 months	15 00	
		$35 00
Grade hogs:		
3 sows, 2 years, @ $12.00	$36 00	
3 sows, 10 months, @ $9.00	27 00	
11 young pigs, 6 months, @ $6.00	66 00	
6 young pigs, 1 month, @ $2.00	6 00	
14 young pigs, 3 months, @ $2.50	35 00	
		$170 00
Total value of swine		$448 00
Oxford Down sheep:		
4 ewes, 2 years	$ 100 00	
1 ram lamb	10 00	
4 ewe lambs @ $10	40 00	
		150 00
Shropshire Down sheep:		
7 ewes, 2 years, at $30	$210 00	
1 ram, 2 years, improved	140 00	
3 ewe lambs @ $13.33⅓	40 00	
		390 00

Southdown sheep:		
5 ewes, 2 years, improved, @ $30.00	$ 150 00	
1 ram, 2 years, improved	100 00	
1 ewe lamb	10 00	
2 ram lambs @ $8.00	16 00	
		276 00
Cotswold sheep:		
4 ewes, 2 years, @ $20.00	$ 80 00	
1 ram lamb	40 00	
1 ram lamb	8 00	
		128 00
Dorset sheep:		
1 ram, 2 years	$ 25 00	
2 ewes, 2 years, at $20.00	40 00	
		65 00
Grade sheep:		
48 lambs for market	$ 278 00	
		278 00
Total value of sheep		$1,287 00
Total value of live stock in connection with farm proper		$8,5900 00

I have the honor to be, sir,

Your obedient servant,

J. E. STOCK

EXPERIMENTAL DEPARTMENT.

To Prof. Thomas Shaw:

Sir,—I have the honor of herewith submitting, for your consideration, the report of the work conducted in the Experimental Department during the year 1889. All conclusions to be drawn from the experiments I shall leave for you to report upon as may seem best to your judgment.

The work at which I am directly engaged at this Institution, and upon which I report to the different departments, may be represented under the following heads:

(1) Field plot and live stock experiments, Prof. Shaw's department.

(2) Chemical analyses, soil temperatures, and drainage waters, Prof. James' department.

(3) Meteorological observations, Prof. Panton's department.

The past season has, on the whole, been a fairly favorable one for experimental work upon the field plots, as there was about 44 per cent. more rain during five months of this season than for the five corresponding months of the previous two years, as may be observed from the following statement:

Depths of Rain Fall.

	1887. Inches.	1888. Inches.	1889. Inches.
May	1.58	1.08	3.59
June	2.36	2.92	4.25
July	.61	2.21	2 67
August	2.71	2.16	1.92
September	1.52	1.55	1.04
Total	8.78	9.92	13.47

The seed grains imported by yourself last spring have all been tested upon the field plots during the past summer, with the exception of the fall wheats, which were sown this fall. The greater part of the grains were from Germany, Russia, France, Scotland, England and Sweden, while a few varieties came from Greece, Italy, Sicily, Hungary, Africa, Japan, Switzerland, and the United States.

No less than 237 varieties of cereals were imported, and the testing of these, along with a number of Canadian varieties, has required much very careful work. We have, nevertheless, conducted in addition to these a number of other experiments, the particulars of which will be given in the following pages.

Owing to the loss of the barns by fire in the autumn of 1888, only one experiment with live stock was conducted. There are six in progress during the present winter.

I wish, just here, to ask permission to give a very concise account of the objects, and the rise and development of experimental stations outside of Canada, as gleaned from Bulletin No. 1 of the United States Department of Agriculture, after which I shall endeavour to give an outline of the progress of experimental work in Canada.

Object of Experimental Stations.

"Farming is a perpetual trying of experiments with soils, manures and crops; with cattle and cattle food; with milk, butter and cheese; with plows, harrows and harvesters; with an almost endless list of things. The most successful farmers—those who get the most out of their land, their cattle, their crops, their fertilisers, their implements, and their labor—are those who experiment themselves most industriously, most skilfully, and most intelligently, and who take the fullest advantage of the experiments of others. The best agriculture is that which, in old countries, on worn and intractable soils, has learned by long continued and varied experiment to make the gain of farming sure. Within recent times farmers and men of science interested in farming have seen the advantages of using the resources of science to improve the practice of agriculture, and have established agricultural experiment stations.

"The object of these stations is to experiment and to teach, to make a regular business of discovery for the use of farming, to promote agriculture by scientific investigation and experiment, and to diffuse as well as increase the knowledge, which improves farm practice and elevates farm life.

"Established for the benefit of agriculture, and hence of the community at large, the most of them connected with educational institutions, where experience shows their work is most successfully done, these stations seek answers to the questions which agricultural practice is asking as to the tillage of the soil; the nature and action of manures; the culture of crops; the food and nutrition of domestic animals, and of man; the production of milk, butter and cheese; the diseases of plants and animals; and, in general, whatever the agriculturist needs to know and experimental science can discover."

Rise and Development of the Stations.

"Nearly forty years ago, a company of farmers joined themselves together in the little village of Moechern, near the city, and under the influence of the University of Leipsic, called a chemist to their aid, and with later help from the government, organised the first agricultural experiment station.

"The seed thus sown has brought forth many fold. In 1856 there were five; in 1861, fifteen; in 1866, thirty; and to-day there are more than one hundred experimental stations and kindred institutions in the different countries of Europe. In each of these, from one to ten or more investigators are engaged in the discovery of the laws that underlie the practice of farming, and in finding how they are best applied.

"The first agricultural experiment station in America was established at Middletown, Conn., in the chemical laboratory of Wesleyan University of 1875. The example was speedily followed elsewhere. In 1880 four were in operation, and in 1887 there were

some seventeen of these institutions in fourteen States. In that year Congress made the enterprise national by an appropriation of $15,000 per annum to each of the states and territories which have established agricultural colleges or agricultural departments of colleges. This has led to the establishment of new stations or the increased development of stations previously established under state authority, so that there are to-day forty-six, or, counting branch stations, fifty-seven agricultural experiment stations in the United States. Every state has at least one station, several have two, and one has three.

"These forty-six stations now employ over three hundred and seventy trained men in the prosecution of experimental enquiry. The appropriation by the United States Government for the fiscal year just closing, for them and for the office of experiment stations in the U. S. Department is $595,000; for the coming year it is $600,000. The several states appropriate about $125,000 in addition, making the sum total of about $720,000 given from public funds the present year for the support of agricultural experiment stations in the United States."

Agricultural Experiments in Canada.

One year previous to the first agricultural experiment station in the United States, was established the Ontario Agricultural College at Guelph. It was not, however, until two years after the commencement of the College that actual work was performed in the Experimental Department, this being the year 1876. When the fifth year's work was being conducted at the above institution there were still but four other agricultural stations upon the American continent.

In the year 1886 an Act of Parliament was passed by the Dominion Government, making provision for the establishment of five experimental farms throughout Canada, the principal one to be established at Ottawa, and to serve for both Ontario and Quebec; the other four being located as follows: one in the Maritime Provinces, one in Manitoba, one in the North-west Territories, and one in British Columbia.

The farms have been purchased, and a superintendent engaged for each. Experimental work was commenced on the Central Farm in 1886, and upon the others about two years later. No pains are being spared in making these experimental centres an honour to Canada. There is truly a great work before these institutions, and we wish them every success in their laudable undertakings.

The fourteenth year of work in the Experimental Department of the Ontario Agricultural College has just closed. Did space allow, a review of the many scientific and practical experiments and investigations both in the field plots and with live stock would be interesting and no doubt highly instructive. It must suffice, however, to give herein a very brief review of the development of the work from its commencement.

In 1876 there were 40 field plots; in 1885, 170; and in 1889, 464. In 1885 23 acres were devoted to experiments, and during the present year about 58 acres have been used for similar work. The live-stock tests which have been conducted since 1886 have much increased in both number and complexity, there being five distinct experiments going on at the present time.

Chemical analyses were commenced during the year 1883, and since that date the new laboratory has been erected, and the conveniences greatly increased for this very important branch of the station's work. All the waters, milks, soils, fertilisers, roots, grains and plants have been analysed so far as time could be secured for this.

When the Professor of Dairying was appointed, the dairy experiments were put under his direct supervision; the creamery was continued, a silo erected, and numerous experiments with corn and dairy stock conducted.

Not only has there been a direct line of experimental work carried on at the College for the past fourteen years, but we are proud to say that there is a noble work being performed over this Province by members of the Ontario Agricultural and Experimental Union—an association of O. A. C. ex-students, students, and professors. Grains and fertilisers, with full instructions as to conducting the experiments, have been sent out

from the College for the past four years. In 1886 there were twelve members engaged in the work; in 1887, sixty; and in 1888, about one hundred, besides others, who are conducting experiments in horticulture and in bee-keeping. Results of the tests for 1889 are now being received at the College, and reports on field plots, live-stock, horticulture, dairy and bee-keeping experiments will be presented at the next meeting of the Union, to be held at the College. From the increased enthusiasm by which members of the Union have taken hold of the work, and by the encouraging remarks received from experiment stations of the United States on the reports, we feel that the active part taken by the Experimental Department of the College for the advancement of this field of labour has been work accomplished in the right direction.

Testing of Cereals.

The imported and Canadian cereals tested during the past year may be divided under the following heads:—Barley, 56 varieties; Pease, 16; Spring Wheats, 92; Oats, 92.

There is we consider no better way to present the details of experimental work of this nature than by tables. Our aim has been to so tabulate the results that full information regarding each cereal can be obtained at a glance at the horizontal lines, and the comparative merits obtained easily by examination of the perpendicular columns.

The size of the plot used in all these tests was $\frac{1}{160}$ of an acre, a clean path was left around each plot. The seed was sown broadcast, and the crop all cradled by the same person. The soil on which the grains were grown has received no manure for the past four years. All the barleys and pease were grown in the old experimental field, and the spring wheats and oats in the field which was partly divided off into plots in the fall of 1886.

Besides having a plot of each variety, two hundred grains of each were counted out and planted carefully in a row two rods long, thus making about three hundred rows with two hundred seeds planted in each. This plan allowed us to get the grain all on uniform soil, and hence under better control. The plants were afterwards counted, to find the germination of the seeds from a practical standpoint.

The following tables give in detail the results of the tests with different varieties of cereals.

Station No.	Variety.	Seed from—	Date of— Seeding.	Date of— Maturing.	Germination of seeds in soil.	Straw. Length with head.	Straw. Strength.	Straw. Smut—per cent. of plants.	Head. No. of rows.	Head. Arrangement of grain.	Grain. Size.	Grain. Quality.	Yield. Grain per plot.	Yield. Straw and chaff per plot.	Yield. *Grain per acre.	Remarks.
					%	In.							lb.	lb.	Bush.	
1	Cheyne	Germany.	April 15	Aug. 2	90.	47	Weak ..	1.5	2	Close ..	Medium..	Medium..	46	109	47.9	A good variety.
2	Emperor	"	"	" 3	100	42	" ..	0	2	" ..	" ..	Poor	35	95	36.5	Excellent germination.
3	Golden Drop	"	"	" 2	80.	45	" ..	0	2	Medium..	" ..	Medium..	39	88	40.6	Thrifty grower.
4	Hallett's Pedigree	"	"	" 1	91.	38	Medium	1.	2	Close	" ..	Good.....	33	67.5	34.4	Medium qualities.
5	Oderbrucker	"	"	July 28	96.5	39	"	0	6	Open	Small	"	42.5	51.5	44.3	Early variety.
6	Phœnix or Shielari	"	"	" 30	92.5	43	"	0	2	Close	Large	"	45	79	46.9	One of the best varieties.
7	Diamond	"	"	Aug. 3	97.	45	Strong .	1.	2	"	.....	.....	.....	.....	.....	A good variety, label lost.
8	Scholey's Chevalier	"	"	" 9	87.	36	"	1.	2	"	Large	Good	33	69.5	34.4	A good grower.
9	Victoria	"	"	" 9	89.5	37	"	1.5	2	"	"	"	25	49	26	Small yield of grain.
10	Common	Ontario ..	"	July 26	96.5	37	Medium	1.5	6	Medium..	Small	Medium..	49	56	51	Familiar to Ontario farmers.
11	Probitier	Germany.	"	Aug. 30	89.	38	"	0	2	Close	Medium..	Good	36	72	37.5	Medium qualities.
12	Invel	"	"	" 9	71.	38	Strong .	1.	2	"	" ..	Medium..	22	58.5	22.9	Small yield of grain.
13	Three-rowed	"	"	July 28	89.	39	Medium	0	6	"	" ..	" ..	25	58	26	An early variety.
14	Besthorns	"	"	Aug. 3	96.5	38	"	0.5	2	" ...	Large	" ..	37.5	65.5	29.1	Medium qualities.
15	Italian Rice	"	"	July 31	87.5	30	Strong .	0	2	Very close	Medium..	" ..	44	69	45.8	Head fan-shaped.
16	Golden Melon	"	"	Aug. 2	92.	35	Medium	0	2	Close	Large	" ..	30	52	31.3	Medium qualities.
17	Dutch	"	"	" 3	96.	35	Strong .	0.5	2	"	"	"	22	46	20.8	Light yield.
18	White Australian	"	"	" 2	95.	37	"	0	2	"	.....	.....	.....	.....	.....	Label lost.
19	Improved Imperial	"	"	" 3	85.5	37	Weak ..	0	6	Medium..	Medium..	Poor	27	63.5	28.1	Inferior sample.
20	Common	Ontario ..	"	July 30	92.5	37	Medium	0	6	" ..	Small	Medium..	42.5	51	44.3	Familiar to Ontario farmers.
21	Kalina	Sweden ..	"	Aug. 3	95.5	36	"	0	2	Close ..	Large	" ..	34	58	35.4	Medium qualities.
22	Guymalaya	" ..	"	" 1	84.	35	"	0 5	6	"	"	Good	33	63	34.4	One of the best six-rowed varieties.
23	Pfanen	" ..	"	" 2	91.	42	Strong .	0.5	2	"	"	"	27	64.5	28.1	Strong grower.
24	Kinnakulla	" ..	"	" 3	87.	37	"	1.	2	"	"	Medium..	23.5	66.5	24.5	Medium qualities.
25	Very Early Lapland	Russia ...	"	July 24	45.5	37	Weak ..	0	6	" ...	.....	.....	.....	.....	..	Label lost; one of the earliest.
26	Maudschuri	" ...	"	" 30	90.	43	Strong .	0	6	Medium..	Medium..	Poor	41	84	42.7	A good six-rowed variety.
27	Annats	Scotland .	"	Aug. 3	94.	38	"	3.	2	Close	Large	Good ..	22	52	22.9	Light crop.
28	Chevalier	" .	"	" 3	96.	40	"	0.5	2	"	"	Medium..	23	48	24	Light yield.
29	Peerless White	England .	"	" 3	92.	34	Medium	0	2	"	Medium..	" ..	18	44.5	18.8	One of the poorest this season.

30	Common	Ontario	"	Aug.	2	88.5	36	Medium	0	6	Medium	Small	Medium	42.5	52.5	44.3	Familiar to Ontario farmers.
31	Golden Drop	England	"	"	3	100	34	"	0	2	"	Medium	"	27.5	63	28.6	Medium qualities.
32	Thanet	"	"	"	3	95.5	33	"	0.5	2	Close	"	"	25	54.5	26	Medium qualities.
33	Hertfordshire Hero	"	"	Sept.	1	72.5	...	"	...	6	Medium	"	Very poor	7	....	7.3	Very late and poor.
34	Improved Golden Melon	"	"	Aug.	3	91.5	40	"	1.	2	Close	"	Medium	33	64.5	34.4	Good growth.
35	Early Minting	"	"	"	3	96.	39	"	0	2	"	.....	.....	.....	.....	..	Label lost.
36	Improved Cheyne	"	"	"	3	94.	38	Strong	0	2	Medium	Medium	Medium	28.5	67	29.6	Fairly good variety.
37	Improved Beardless	"	"	"	4	96.5	40	Weak	0	2	Close	Large	"	26.5	....	27.6	Medium qualities.
38	Selected Chevalier	"	"	"	3	84.5	40	"	1.	2	Medium	"	Poor	32	85.5	33.3	Medium qualities.
39	Empress (new variety)	"	"	"	3	91.	41	"	0.5	2	"	Medium	Medium	42	77.5	43.7	Fair yield.
40	Common	Ontario	"	July	30	92.	38	Medium	0	6	"	Small	"	50	57	52.1	Familiar to Ontario farmers.
41	Imperial	France	"	Aug.	2	81.	39	"	2.5	2	"	Medium	"	38	76	39.6	.....
42	Large Skinned	"	"	"	1	59.5	35	Weak	0	2	"	Very large	Good	35	70	36.5	Without hulls.
43	Two-rowed Italian	"	"	"	2	91.	45	Strong	0	2	"	Large	Medium	38	83	39.6	Head fan-like.
44	Chevalier	"	"	"	2	87.	38	"	4.	2	Close	"	"	38	71	39.6	Very bad with smut.
45	Early Black	"	"	July	30	77.5	36	Medium	5.	6	Medium	Medium	"	39	50	40.6	Seeding done too late, badly affected by smut and rust
46	Six-rowed	"	"	Sept.	1	95.	....	Medium	....	6	Open	Small	Very poor	45	...	4.7	Total failure.
47	Chevalier	"	"	Aug.	5	81.5	44	Weak	0	2	Close	Large	.....	.....	.....	.....	Label lost.
48	Spreading or Fan	"	"	July	31	90.5	34	Strong	0	2	Very close	"	Poor	35	60	36 5	Very compact head.
49	Celeste	"	"	Aug.	1	88.5	38	Medium	0 5	6	Medium	"	Good	28.5	53.5	29.6	Medium 6-rowed variety.
50	Common	Ontario	"	July	30	92.5	37	"	0	6	"	Small	Medium	46	51	47.9	Familiar to Ontario farmers.
51	Peerless White	D.C.F., Ottawa.	"	Aug.	5	91.	38	Strong	0	2	Close	Medium	"	28	64	29.6	Fairly good yield.
52	English Malting		"	"	5	93.	35	"	0	2	"	Large	"	24.5	68.5	25.5	Medium qualities.
53	Beardless		"	"	5	93.	35	"	0	2	Medium	"	"	21	55	21 9	"
54	Carter's Prize Prolific		"	"	9	93.5	36	"	0.5	2	Close	"	"	25	63.5	26.6	"
55	.....	.....	"	July	19	100	40	"	0	2	"	.....	.....	.....	.....	.....	Label lost.
56	Skinless	Ontario	"	"	19	89.	30	"	0	6	"	Medium	Medium	21	27	29.9	Grain without hulls.
57	Italian	Italy	May 11	Sept.	9	....	....	.....	....	2	Medium	Large	Poor	5.5	96.5	5.7	One of two varieties which were sown very late.
58	Chevalier	Ontario	April 15	July	29	85.	39	Medium	0	2	"	"	Medium	37.5	69.5	39.1	Earlier than a good many varieties.
59	Improved Scotch	"	" 15	.....		85.5	42	"	0	6	"	Medium	Poor	46	52	47.9	Good six-rowed barley.
60	Common	"	" 15	July	30	90.	38	"	1.5	6	"	Small	Medium	40	47.5	41.7	Familiar to Ontario farmers.
61	White	Hungary	May 11	.....	....	....	.....	....	....	.....	.....	.....	.....	8	....	8.3	One of two varieties which were sown very late.

* Estimate from plot.

Different Varieties of Peas.

Station Number.	Variety.	Seed from.	Date of Seeding.	Germination of seed in soil.	Straw—length.	Pod—average number of peas in each.	Grain.		Yield.				Remarks.
							Color.	No. of grains per oz.	Grain per plot.	Grain per acre.	Straw per plot.	Straw per acre.	
				%					lb.	Bush.	lb.	lb.	
61	Sweet Jessie.....	England ...	April 17	91	Long...	3.5	Yellowish green.	117	38	31.7	47	2350	Grain very uneven.
62	Early Britain.....	"	" 17	99	Long...	3.1	Yellowish green.	114	32	26.7	40.5	2025	Grain very uneven.
63	Perfection White	"	" 17	95.5	Medium	3.6	White	90	29.5	24.6	30.5	1525	Beautiful large pea.
64	Earliest of all Blue.....	"	" 17	91	Medium	4.5	Blue	192	21	17.5	29	1450	Vine bunchy.
65	Glory	"	" 17	92	Short ..	3.4	Pale blue.....	88	44.5	37.1	42	2100	Large and crinkled pea.
66	Early Racehorse..	"	" 17	99	Medium	4.4	Yellowish white.	153	43.5	36.2	58.5	2925	Medium size, slightly crinkled pea.
67	Hero of Reading.... ..	"	" 17	72.5	Short ..	3.3	Greenish white .	93	36.5	30.4	35.5	1775	Large and regular sized pea.
68	Selected Maple.....	"	" 17	92.5	Medium	4.1	Mottled brown..	166	28.5	23.9	36.0	1800	Medium, indented and regular sized pea.
69	Veetches Perfection...	"	" 17	69.0	Short ..	4.7	Greenish white .	76	28.0	23.3	38.5	1925	Large, indented, a good sample.
70	Princess Royal	"	" 17	91.0	Short ..	3.6	White....	77	38.5	32.1	54	2700	Grain large and uniform.
71	Black-eyed Marrowfat.	Ontario	" 17	95	Long...	3.9	Yellowish white.	99	49.0	40.8	68.5	3425	Heavy, coarse straw.
72	White-eyed Marrowfat.	"	" 17	93.5	Long...	3.8	White.....	87	52.5	43.9	47.5	2375	Large and fairly smooth.
73	Grass	"	" 17	78.0	Medium	.. ...	Dirty white	314	41.5	34.6	73	3650	Grain small and angular.
74	Multipliers.....	"	" 17	98.0	Long...	.....	Yellowish white.	223	49.5	41.3	.....	.....	Small and smooth.
75	Golden Vine.	"	" 17	90	Medium	.....	Golden white...	220	46	38.3	.....	....	Small, round and regular.
	Prussian Blue	"	" 17	93	Medium	5.1	Blue	141	54	45.0	79	3950	Grain uniform.

Station No.	Variety.	Seed from	Date of Seeding.	Date of Heading.	Percentage of seeds producing plants.	Straw. Length with head.	Straw. Strength.	Straw. Rust.	Head bearded or bald.	Grain. Color.	Grain. Quality.	Yield. Grain per plot.	Yield. Straw and chaff per plot.	Yield. Grain per acre.	Remarks.
					%	In.						lb.	lb.	Bush.	
77	Spelz	Germany	April 18	July	88	41	Strong	Very little	Bearded	Red	Shrunken considerably.	9	....	15	Enclosed in chaff.
78	Pringle's Champion	"	"	" 13	79½	44	Medium	"	"	"	Small plump berry	9	28½	15	Promising variety.
79	Holben's Improved	"	"	" 14	92½	41	"	Bad	Bald	"	Shrunken	7	10½	11.7	Fair yield but grain shrunken.
80	Chidham	"	"	" 26	85½	38	"	Medium	"	White	"	4	27	6.7	Rather coarse.
81	King Bartigen	"	"	" 16	69½	35	Weak	"	Bearded	Red	"	4½	17	7.5	Poorly germinated.
82	Summer	"	"	" 16	89	37	"	Slight	"	"	Very poor	6	29	10	Miserable sample of grain.
83	Fern or April	"	"	" 26	84	34	"	Bad	Bald	"	Poor	1½	23½	2.6	Just medium.
84	Neuhert	"	"	" 18	85	43	Medium	Medium	"	.....	"	3½	39	5.8	Good shaped head.
85	Spelz Black Beere	"	"	" 19	89	48	Strong	"	Bearded	Red	"	4	30	6.7	Grain enclosed in chaff.
86	Triticum Spelta	"	"	" 17	94	40	Weak	Slight	"	"	.....	.....	.....	.....	Failure.
87	Pringle's Defiance	"	"	" 13	90½	38	"	Bad	Bald	White	Somewhat shrunken.	2	20½	3.3	Medium qualities.
88	Crystal Rock	"	"	.....	89½	9	.....	.....	.....	.....	.....	.....	.....	.....	Failure.
89	Spelz	Russia	"	July 19	97½	38	Medium	Slight	Bald	Red	Poor	3½	30	5.8	Chaff adheres to grain.
90	Saxonka	"	"	" 16	65	37	"	Medium	"	"	Large and plump	7	....	11.7	Good sample of grain.
91	Kubanka	"	"	" 15	77	41	Strong	Very little	Bearded	"	Medium	2	13	3.3	Light yield.
92	Odessa Ghirka	"	"	" 15	80	38	"	Slight	Bald	"	Fair sample	5	27	8.3	Grain, fair sample.
93	Konisburg	"	"	" 16	75½	41	"	Almost none	Bearded	"	"	6½	27	10.9	Promising variety.
94	Azima	"	"	" 17	83	36	"	Very little	"	"	One of best	2	6½	3.3	Medium.
95	Sebastopol Azima	"	"	.....	81½	5	.....	.....	.....	.....	.....	.....	.....	.....	Failure.
96	Danubian Ghirka	"	"	.....	84	35	Strong	.....	Bearded	Red	Fair sample	1	3	1.7	A small quantity of grain of fair quality.
98	Poland	"	"	July 19	82	48	"	Slight	"	"	Medium sample	7	42½	11.7	Very large coarse variety.
99	Danubian	"	"	.....	81	7	.....	.....	.....	.....	.....	.....	.....	.....	Failure.
100	Dantzic White	"	"	.....	86	9	.....	.....	.....	.....	.....	.....	.....	.....	"
101	Dantzic	"	"	July 19	82½	38	Medium	Slight	Bearded	Red	Good sample	5	....	8.3	Promising variety.
102	Red Chaff White	Scotland	"	.....	81	6	.....	.....	.....	.....	.....	.....	.....	.....	Failure.
103	Champion White	England	"	.....	80½	4	.....	.....	.....	.....	.....	.....	.....	.....	"
104	Selected Talavera White	"	"	.....	86½	7	.....	.....	.....	.....	.....	.....	.....	.....	Total failure.
105	Soft White	Australia	"	July 11	28½	27	Strong	.....	Bearded	White	.....	.....	.....	.....	"

DIFFERENT VARIETIES OF SPRING WHEATS.—*Continued.*

Station No.	Variety.	Seed from	Date of Seeding.	Date of Heading.	Percentage of seeds producing plants.	Straw. Length with head.	Straw. Strength.	Straw. Rust.	Head bearded or bald.	Grain. Color.	Grain. Quality.	Yield. Grain per plot.	Yield. Straw and chaff per plot.	Yield. Grain per acre.	Remarks.
					%	In.						lb.	lb.	Bush.	
106	April Bearded Red.	England ...	April 18	July 19	82	46	Medium	Slight	Bearded	Red..	Shrunken	2½	27½	4.2	Medium qualities.
107	Improved Red Nursery	" ...	"	.....	91	7	.....	....	....	.....	.....	....	....	.. ...	Total failure.
108	Malaga White.....	" ...	"	.....	91½	12	.....	.....	.....	.....	.....	.....	.....	.....	"
109	St. Land Red.....	France.....	"	July 28	92	38	Medium	Slight	Bald ...	Red..	....	1	17½	1.7	Filled badly.
110	Noé or Blue	"	"	" 27	87	39	"	Medium....	"	"	Badly shrunken	4/5	17½	1.2	"
111	Victoria March....	"	"	" 30	86½	41	Strong .	Slight	Bearded	"	"	2	24½	3.3	Medium qualities.
112	March Bearded	"	"	" 15	82½	42	"	.....	"	"	Medium sample	8	36	13.3	One of the very best.
113	Richelle White	"	"	" 22	81	41	Medium	Medium....	Bald ...	"	Shrunken	1	16	1.7	Named white, color red.
114	Lonzelle White.....	"	"	" 22	88	43	Strong .	"	"	"	"	1½	27½	2.5	Poor sample.
115	Large Flag... ...	"	"	" 12	84	37	"	....	"	White	Medium	2	17	3.3	Medium qualities.
116	Ordinary March ...	"	"	" 18	93	39	Weak ..	Very little..	"	Red..	"	4	24½	6.7	Promising variety.
118	Heavy Lonzelle	"	"	.....	99	8	*	.....	.....	.....	.....	.....	.....	.....	Failure.
119	French Summer	"	"	July 28	93½	33	Strong .	Slight	Bald ...	Red..	Badly shrunken	2½	19½	4.2	Medium qualities.
120	Sandomisza	"	"	.....	88	5	.....	.....	.....	.....	.....	.....	.....	.....	Failure.
121	Victoria.....	"	"	July 18	86½	48	Strong .	Slight	Bearded	Red..	Fair sample	4½	32	7.5	May do well in some parts.
122	Red Bearded March.	"	"	" 13	85	44	Weak ..	.....	"	"	Above the average..	6	26	10	Promising variety.
123	Hickling March White	"	"	" 28	85	40	Medium	Medium....	Bald ...	"	Badly shrunken	1	19½	1.7	Named white, color red.
124	Ordinary Bearded March	"	"	" 16	90	36	"	.....	Bearded	"	Above the average..	8	25	13 3	One of the best varieties.
125	Herison Bearded....	"	"	" 13	85	42	Strong .	Almost none	"	"	Plump and good....	11	29	18.3	Perhaps the best variety.
126	Bearded Red	"	"	" 16	75	39	Weak ..	....	"	"	Medium.....	4	16⅔	6.7	Promises well.
127	Herison Bearded....	"	"	" 15	76	41	Strong .	Almost none	"	"	Plump and good....	9½	24½	15.8	Perhaps the best of imported varieties.
128	Ohne Bart.....	"	"	" 28	68	36	"	Medium....	Bald ...	"	Badly shrunken	3	19½	5	Good strong grower when young.
129	March de Brie.....	"	"	" 24	90	37	"	Bad	"	"	Shrunken	3	25	5	Above average in yield.
130	Rousselin	"	"	.....	68½	43	"	.....	"	White	Badly shrunken	2	25	3.3	Grain very poor.
131	Defiance	Ontario	"	July 19	67	38	Medium	Bad	"	"	.....	2	23½	3.3	Poorer in germination than most imported varieties,

132	New Magyar	Ontario	April 18	July 21	76	40	Weak	Bad	Bald	Red	Medium	1½	21	2.5	Poor sample.
133	Red Fern	"	"	" 17	78	47	Medium	Very little	Bearded	"	Fair sample	8	35	13.3	Did very well indeed for this season.
134	Purple Straw	Australia	"	" 16	88½	37	Strong		Bald	White	Badly shrunken	1½	12	2.5	Poor sample.
135	White Essex	"	"	" 18	87½	37	"		"	"	Very uneven	1½	11½	2.5	"
136	Purple Tuscan	"	"		86	37	Weak		"	"					Failure.
138	White Tuscan	"	"	July 22	85	38	"		"	"	Shrunken	1½	19½	2.5	Very poor.
139	African Bearded	"	"	" 19	76	40	Strong		Bearded	"	"	1	18½	1.7	"
140	Indian	"	"	June 24	69½	23	"		"	"	"	2½		4.2	Very early variety.
141	Roseworthy Improved Bearded	"	"	July 11	75	41	"		"	"	Medium	3	22	5	Early variety.
142	Soft White	"	"	June 25	74	28	"	Bad	"	"		2½	10½	4.2	Very early variety.
143	Ward's Prolific	"	"	July 23	73	40	Weak		Bald	"					Failure.
144	Wild Goose	Ontario	"	" 20	73	48	Strong	Very little	Bearded	Red	Large and plump	16	40	26.7	Well known, but poor quality.
145	Ladoga	Ottawa	"	" 15	71½	39	Weak		"	"	Medium	5		8.3	Introduced by D.C.F., Ottawa.
146	Triumph	Ontario	"	" 13	79	42	"		Bald	"	Shrunken considerably.	4½	27	7.5	Fair for this season.
147	Campbell	"	"	" 13	84	45	"		Bald	White	Shrunken considerably.	3	24	5	Medium.
148	Donald	"	"	" 16	80½	46	Medium		"	"	Badly shrunken	3	27	5	"
237	Paros	Greece	May 11		86½	32	Strong		Bearded						Very late seeding.
238	Voto	"	"	July 23	86	35	"		"						Failure.
239	Grecian	Russia	"	" 16	82	37	Medium		"						"
240	Bart Trimenia	Greece	"	" 20	84	36	Strong		"	Red	Fair sample	4	20½	6.7	May do well another year.
241	Missogen	"	"	" 20	86	33	"		"						Failure.
242	Atalank	"	"	" 23	72	34	"		"						"
243	Grand Cianco	Italy	"		81	11									"
244	Sorentino	"	"	July 19	81	41	Strong		Bearded	Red	Fair sample	2	14	3.3	Fairly good grain, but small yield.
245	Neapel	"	"	" 24	85.5	38	"		"						Failure.
246	Square Head	Sicily	"	" 27	80.5	33	Weak		Bald						"
247	Red Wheat	"	"	" 28	70.5	33	Medium		"						"
248	White Cluff	Hungary	"		66.5	28	"		Bearded						"
249	Mountain	"	"	July 24	85	30	"		Bald						"
250	Hungarian	"	"		80.5	35									"
251	Banter	"	"		86.5	28	Strong		Bearded						"
252	Square Head	"	"		87	6									"
253	Medeah	Africa	"	July 15	92	48	Strong		Bearded	Red	Large and somewhat shrunken	5½	28½	9.2	The best sample of the late seeding.
254	Algiers	"	"	" 22	86.5	42	"		"	"		1½	19½	2 5	Failure.
255	Cape	"	"	" 27	81.5	33	Medium		Bald						"
256	March	California	"	" 12	81.5	32	Weak		"						"
257	Egyptian	Egypt	"		92	10									"
258	Spelz	Switzerland	"		80	8									"
259	Early Japan	Japan	"		91.5	7									

Different Varieties of Oats.

Station number.	Variety.	Seed from.	Date of Seeding.	Date of Maturing.	Germination of seeds in soil.	Straw. Length—inches.	Straw. Strength.	Straw. Smut—per cent. of plants.	Straw. Rust.	Head shape.	Grain. Color.	Grain. Shape.	Grain. Quality.	Yield of Grain per plot.	Yield of Straw per plot.	Yield of Grain* per acre.	Remarks.
					%									lb.	lb.	Bush	
149	Amer'en Welcome	Germany.	April 22	Aug. 8	82	62	Medium	4.5	Medium	Spreading	White.	Short ..	Somewhat uneven.	17	44	50	Uniform in height.
150	Calfornia White Prolific.....	"	"	" 19	88.5	64	Strong .	0	Slight..	Mane	"	Medium	Plump and uniform	16	61.5	47.1	Recommended by oat-meal millers. Very vigorous grower.
151	Oderbrucker.....	"	"	" 8	78.5	56	Strong .	0	Medium	Spreading	"	Long..	Most of grain good and plump	25.5	52.5	75	Recommended by oat-meal millers.
152	Thuringen.	"	"	" 16	85.5	60	Strong .	.5	Bad....	"	Yellow	Long...	Poorly filled.....	11	78.5	32.1	Recommended by oat-meal millers.
153	Danebrog	"	"	" 12	88	63	Medium	1.5	Bad....	"	White.	Medium	Nice plump berry.	25.5	64	75	Tall and good growth.
154	Hopetown.....	"	"	" 15	75	59	Medium	.5	Medium	"	"	Short ..	Small and uneven.	8	....	23.5	As usual did poorly.
155	Yellow August ..	"	"	" 18	76	60	Strong .	1	Medium	"	Yellow	Medium	Good berry.....	15.5	78.5	45.6	Recommended by oat-meal millers.
156	Longfellow	"	"	" 13	83	66	Medium	0	Bad....	"	White.	Short ..	Only fairly well filled.	8.5	79	25.0	One of the latest varieties.
157	Victoria.....	"	"	" 9	91	59	Medium	6.5	Slight..	"	"	Short ..	Thick berry	16	57	47.1	A very early oat.
158	Probitier	"	"	" 11	83	58	Medium	0	Medium	"	"	Long...	Good quality grain	23.5	57	69.1	Promising well.
159	Waterloo..	"	"	" 11	75	60	Medium	1	Medium	"	"	Long...	Good quality grain	22	62	64.7	Recommended by oat-meal millers.
160	White Canadian.	"	"	" 14	82.5	63	Strong .	1	Medium	"	"	Medium	Rather spindly....	21.5	62.5	63.2	Medium in qualities.
161	Impr'vd Besthorn	"	"	" 13	84	56	Strong .	1 5	Bad....	"	Yellow	Long...	Good plump berry.	24	33	70.6	Recommended by oat-meal millers.
162	Nubian Black ...	"	"	" 15	69.5	62	Strong .	1.0	Medium	Mane	Black .	Medium	Rather poorly filled	16.5	66	48.5	Plot rather low lying.
163	August White...	"	"	" 14	77	57	Medium	.5	Medium	Spreading	White.	Short ..	Small but fairly well filled.	14	75	41.2	Plot rather low lying.
164	Georgien White .	"	"	' 13	53	56	Weak ..	.5	Slight..	"	"	Medium	Small but fairly well filled.	21.5	72	63.2	Plot rather low lying.
165	Providence	Sweden ..	"	" 13	65	62	Medium	0	Medium	"	"	Medium	Medium.....	12.5	65.5	36.8	Affected most by wet weather.
166	Barboo leaved ...	"	"	" 15	70	59	Strong .	0	Bad ...	"	"	Medium	Small and spindly	9	78	26.5	Slow in starting to grow
167	Scotch Potato ...	Russia ...	"	" 16	72	60	Strong .	1	Medium	"	"	Medium	Poorly filled.....	9	63 5	26.5	Slow in starting to grow
168	White Poland ...	"	"	" 12	73	60	Medium	1	Medium	"	"	Long...	Very well filled...	15	68.5	44.1	Vigorous grower.
169	Podolischer.....	"	"	" 8	68.5	61	Weak ..	4	Slight..	.....	"	Short ..	Thick hull but almost empty.	11	58	32.4	Very early variety.

170	Egyptian.....	Ontario ..	April 22	Aug. 9	84	58	Weak...	1	Medium	.....	White.	Medium	Thick hulled very well filled.	19.5	73.5	57.4	Early variety.
171	Legona	Russia ...	"	" 10	77	56	Medium	.5	"	Spreading	"	Long...	Nice berry well filled.	20.5	60	60.3	Recommended by oatmeal millers.
172	Siberian.	" ..	"	" 13	85	57	"	.5	Bad....	"	"	" ..	Nice berry well filled.	25	66	73.5	Recommended by oatmeal millers.
173	White Tartarian.	" ..	"	" 14	81.5	56	"	0	Slight..	Mane	"	" ..	Medium.....	20.5	76	60.3	Recommended by oatmeal millers.
174	Berwick White.	Scotland .	"	" 12	90	58	"	4	"	Spreading	"	Short ..	Rather small, very well filled	15	69	44.1	Plot somewhat low lying.
175	Victoria White..	"	"	" 10	94.5	65	"	0	Medium	"	"	" ..	Very well filled...	19	56	55.9	Early variety.
176	Dun	"	"	" 14	69	63	"	.5	"	"	Dun ..	Medium	Good size hull but rather empty.	11	87	32.4	Plot somewhat low lying.
177	Black Tartarian .	"	"	" 15	79	57	"	0	"	Mane	Black .	Long...	Fairly well filled..	18	77	52.9	Vigorous grower.
178	Sandy.....	"	"	" 16	77.5	60	Weak...	0	"	Spreading	White.	Short ..	Uneven	12	94	35.3	Coarse straw.
179	Hamilton	"	"	" 14	65	57	"	0	Bad ...	"	"	" ..	Small berry, medium in plumpness.	10.5	72.5	30.9	Lodged badly.
180	Bertrum Prolific.	"	"	" 14	93	62	Medium	0	Medium	"	"	" ..	Small berry, medium in plumpness.	13.5	71.5	39.8	Medium qualities.
181	White Tartarian.	"	"	" 16	70.5	60	"	0	Slight .	Mane	"	Medium	Spindling berry...	14.5	89.5	42.6	Recommended by oatmeal millers.
182	Black Poland....	"	"	" 12	75	51	Strong .	0	Medium	"	Black .	Short ..	Pretty uniform sample.	18.5	56	54.4	Fairly good grower.
183	Birlie	"	"	" 12	85	58	Weak...	0	Slight .	Spreading	White.	Medium	Very poor.....	8.5	52	25.0	Part destroyed in harvesting.
184	Angus	"	"	" 13	77	59	Medium	0	Medium	"	"	"	Very poor.....	7.5	46	22.1	Part destroyed in harvesting.
185	Longfellow	"	"	" 13	86.5	54	"	0	"	"	"	Short ..	Just medium	10	70	29.4	Medium qualities.
186	Hopetown.....	"	"	" 13	81	58	Strong .	0	"	"	"	" ..	Very poor.....	7.5	69.5	22.5	Plot rather low lying.
187	Potato	"	"	" 9	90	55	"	.5	Bad ...	"	"	" ..	Very poor.....	7	55	20.6	Plot rather low lying.
188	Flying Scotchman	England .	"	" 7	83.5	54	Medium	0	Slight .	"	"	Long...	Thick berry well filled.	21.5	48.5	63.2	Very early variety.
189	Selected Winter .	"	"	" 11	84	52	Strong .	1	Medium	"	Dun ..	" ..	Long and spindly.	7.5	46.5	22.1	Very slow grower.
190	Improved White Tartarian	"	"	" 11	86.5	54	"	.5	"	Mane	White.	Short ..	Poorly filled	8	61	23.5	Recommended by oatmeal millers.
191	Dutch Bren	"	"	" 7	73	58	Medium	0	Slight .	.....	"	Long...	Thick and plump..	16	44	47.1	Very early variety.
192	Sandy.....	Scotland .	"	" 10	87.5	47	Strong .	0	Bad ...	Spreading	Brown.	Medium	Medium.....	11	....	32.4	Weight of straw mislaid
193	Improved Black Tartarian	England .	"	" 12	84.5	50	Medium	1.5	Medium	Mane	Black .	Medium	Fair size but poorly filled.	12	43.5	35.3	Medium qualities.
194	Early Racehorse.	"	"	" 7	65.5	47	Strong .	0	Slight .	.....	White.	Short .	Fair size but poorly filled.	11	31	32.4	Very early variety.
195	Victoria Prize White..	"	"	" 7	92.5	54	"	2.5	"	.....	"	" ..	Thick berry very well filled.	16	35	47.1	Very early variety.

*Estimated from plot.

DIFFERENT VARIETIES OF OATS.—*Continued.*

Station No.	Variety.	Seed from	Date of Seeding.	Date of Maturing.	Germination of seeds in soil.	Straw. Length—inches.	Straw. Strength.	Straw. Smut—per cent. of plants.	Straw. Rust.	Head—shape.	Grain. Color.	Grain. Shape.	Grain. Quality.	Yield of Grain per plot.	Yield of Straw per plot.	Yield of *Grain per acre.	Remarks.
					%									lb.	lb.	bush.	
196	Improved Waterloo White	England	April 22	Aug. 11	92	53	Strong	2.5	Medium	Spreading	White.	Long	Good sample.	17.5	39.5	51.5	Recommended by oatmeal millers.
197	Early Blossom White	"	"	" 6	91.5	56	Medium	0	Slight	.....	"	Short	Hull well filled	20.5	40.6	60.3	Very early variety.
198	Yellow Flanders.	France	"	" 13	85	58	"	1.5	Bad	Spreading	Yellow	Long	Very Spindly	11.5	64.5	33.8	Vigorous grower.
199	Brie Black	"	"	" 14	75.5	47	"	1.5	Medium	"	Black .	Medium	Medium	12.5	68.5	36 8	Rather small berry.
200	Egyptian	Ontario	"	" 12	86	50	"	2.5	"	Mane	White.	Short	Thick hull fairly well filled.	19	53	55.9	Used for comparison.
201	White Abundance	France	"	" 9	70.5	51	"	2	Bad	Spreading	"	Long	Medium	21	47	61 .8	An early variety recommended by oatmeal millers.
202	Black Red Crown.	"	"	" 13	83.5	46	"	0	"	"	Pale Black.	Medium	Spindly	14	60	41.2	Medium qualities.
203	Georgie White	"	"	" 11	88	48	"	0	Slight	"	White.	"	Good quality	21	52.5	61.8	Fairly early oat.
204	White Hungarian	"	"	" 13	92	56	Strong	0	Medium	Mane	"	"	Fairly well filled	16	53.5	47.1	Uniform in growth.
205	Poland White	"	"	" 9	88	51	Medium	0	"	Spreading	"	"	"	22	37.5	64.7	Recommended by oatmeal millers.
206	Houdan Black	"	"	" 10	80.5	47	"	0	Slight	"	Black .	Long	"	23	47.5	67.6	Good sample.
207	Yellow Gigantic.	"	"	" 15	86.5	52	"	0	Medium	Mane	Yellow	"	Medium	18.5	54	54.4	Recommended by oatmeal millers.
208	Coalommiers	"	"	" 15	80	54	"	0	"	Spreading	Black .	Medium	Fair sample	13	68.5	38.2	Medium qualities.
209	Red Spot	"	"	" 7	84	43	Weak	0	Slight	.....	Dun	Small	Exceptionally small.	12	50	35.3	Exceedingly small grain.
210	Goanette Black	"	"	" 11	83.5	42	Strong	1.5	Slight	Spreading	Pale Black.	Medium	Very superior	27.5	48	80.9	One of the very best yielders.
211	Round or Branching Black	"	"	" 15	83.5	50	"	0	Bad	"	Black .	"	Poor	12	53	35.3	Rather late variety.
212	Flanders' White.	"	"	" 13	80.5	56	"	0	"	"	White.	Long	Uneven	18.5	53.5	51.4	Vigorous growth.
213	Chenailles Black.	"	"	" 11	89.5	45	Weak	.5	Medium	"	Black .	Medium	Excellent quality	27.5	....	80.9	One of the very best yielders.
214	Black Hungarian.	"	"	" 10	83.5	56	"	0	"	Mane	"	"	Medium	15 .5	54.5	45.6	Fine straw.
215	Black Etampes	"	"	" 11	83.5	47	Medium	4.5	"	"	"	"	Excellent quality.	21.5	48.5	63.2	Fine straw.
216	Black Etampes	"	"	" 8	64.5	46	"	.5	"	Spreading	"	"	"	22.5	52.5	66.2	An early oat.
217	Houdan Black	"	"	" 10	93.5	42	"	0	"	"	Pale Black.	"	"	21	36.5	61.8	Fine straw.

218	Siberian	" ..	April 22	Aug. 6	83	43	Strong .	1.5	Slight ..	.....	White.	Medium	Thin hull and well filled.	22.5	42.5	66.2	Very early variety.
219	Triumph	Australia.	"	" 5	52.5	53	"	0	Bad	Spreading	"	"	Very poor.....	7	45.5	20.6	Rather late oat.
220	White	"	"	" 6	95.5	48	Medium	1.5	Slight .	....	"	Short ..	Thick & well filled.	18	46	52.9	Very early variety.
221	Carter's Prize Cluster	Ontario ..	"	" 7	85.5	49	Weak ..	0	Medium	.....	"	Medium	Poorly filled.....	17	43	50	"
222	Hamilton	" ..	"	" 13	90.2	50	Medium	0	"	Spreading	"	"	Very poor.....	8.5	55	25	As usual a poor yielder.
223	Hopetown	" ..	"	" 14	85	44	Strong .	0	Bad ...	"	"	"	"	14.5	66.5	42.6	Slow growth in early season.
224	Black Tartarian.	" ..	"	" 11	86	53	Medium	.5	Medium	.....	Black .	Long...	Medium	19	54	55.9	Medium qualities.
225	Racehorse	" ..	"	" 7	82	53	Weak ..	1.5	"	.....	White.	Medium	Plump hull, but rather empty.	16.5	50.5	48.5	Very early variety.
226	Egyptian	" ..	"	" 9	81	51	"	0	"	.....	"	"	Thick hull fairly well filled.	19.5	60	57.4	An early oat.
227	White Australian	" ..	"	" 13	88	52	"	1	"	.....	White.	Long...	Very thick hull...	22	56.5	64.7	Superior quality of oat.
228	Rennie's Prize White	" ..	"	" 7	89	60	"	2.5	"	Mane	"	Short ..	Medium....	19.5	51	57.4	Very early variety.
229	Acclamatized Bl'k Tartarian	" ..	"	" 12	87.5	46	Stroug .	1	"	Spreading	Black .	Medium	Fairly well filled.	21	50	61.8	Good yielder.
230	Pedigreed Black Tartarian	" ..	"	" 11	89	49	"	0	"	Mane	"	"	Fair	17	50	50	Medium qualities.
231	Black Champion.	" ..	"	" 10	88	48	Medium	5.5	"	"	Pale Black.	"	Nice plump oat...	19	54.5	55.9	Smutted badly.
232	Improved Scotch.	" ..	"	" 11	65.5	50	Strong .	1	"	Spreading	White.	Short ..	Very poor.....	7.5	63	22.1	Poor in germination.
233	Cluster or Triumph	" ..	"	" 7	89	52	Weak .	1.5	"	"	"	"	Thick hull but well filled.	20.5	49.5	60.3	Very early variety.
234	Welcome	" .	"	" 7	98	51	"	4.5	"	"	"	"	Thick hull but fairly well filled.	21.5	48	63.2	"
235	Early Calder	" ..	"	" 10	86.5	47	Medium	11	Bad ...	"	"	Medium	Good quality	21.5	53.5	63.2	Affected by smut more than any other variety.
236	Bavarian	" ..	"	" 10	....	51	Strong .	0	Medium	"	"	.....	Medium.....	24.5	57	72.1	A good variety.
260	Hungarian Black.	Hungary .	May 11	" 23	59	51	"	4	Bad ...	Mane	Black .	Long...	Very poor.....	7	48	20.6	Poorly germinated.
261	Port Adelaide...	Australia.	"	" 16	87	53	Medium	5.5	Medium	Spreading	White.	Short ..	Medium.....	8.5	45.5	25	Badly affected by smut.
262	Australian White	"	"	" 23	78.5	50	Strong .	1	Bad ...	"	"	"	Poor	7	49	20.6	Nice uniform growth.
263	Prolific Black....	California.	"	" 21	80.5	51	"	3.5	"	Mane	Black .	Medium	Poor	8.5	47.5	25	Grain paler than seed.

* Estimated from plot.

Application of Salt with Oats on Four Kinds of Soil.

About six years ago a plot was formed in the central part of the experimental field for the purpose of testing four kinds of soil under as near the same conditions as could be obtained. The whole plot is eight rods long by two rods wide, and is divided into four portions, each being two rods square. The soil is well supplied with tile drains. One end of the plot is a natural muck. The surface soil of the two central plots was removed to a depth of two feet and then one was filled with clay of a rather heavy nature and the other with marl intermixed with loam, while the remaining portion, being naturally a good clay loam, was left untouched.

In the spring of 1888, each portion was divided into two equal parts, and boards placed edgeways in the ground at the division and extended from one end of the plot to the other.

The accompanying diagram will illustrate the position of the soils and the divisions:

SALT.	SALT.	SALT.	SALT.
LOAM.	MARL.	CLAY.	MUCK.
NO SALT.	NO SALT.	NO SALT.	NO SALT.

The treatment of the plot throughout was similar until the spring of 1888, when salt was applied at the rate of 400 lb. per acre on the soils of one side of the division through the centre, while the remaining half of each soil was left without salt. Barley was sown upon the whole plot and results presented in the College Report of 1888. In the spring of the present year salt was again applied at the rate of 400 lb. per acre upon the same portions as last year and oats sown over the whole plot.

The following table shows the yields of the present year and those of 1888:

Yields of Barley and of Oats upon Four Kinds of Soil with and without Salt.

Variety of Soil.		Date of maturity.	1888. Yield of Barley.		1889. Yield of Oats.		Yield of Grain Per Acre.	
			Grain per plot.	Straw per plot.	Grain per plot.	Straw per plot.	Barley. 1888.	Oats. 1889.
		August.	lb.	lb.	lb.	lb.	Bush.	Bush.
Loam	Salt	20	21¼	23¾	23½	58	35½	55⅓
	No salt	20	21	21½	22¼	50	35	52⅓
Marl	Salt	22	11¼	36¼	16¼	68¼	18¾	38¼
	No salt	24	10½	31½	15½	41	17½	36½
Clay	Salt	22	16⅜	15¼	20½	57½	28	48¼
	No salt	23	12¼	17¾	17½	45	20½	41⅛
Muck	Salt	24	11¼	15¼	.....	.....	18¾	.....
	No salt	23	7	20	.....	.....	11⅜	.....

Barley Yields from Different Dates of Seeding.

For this experiment three varieties of barley were sown, at three different periods, upon plots one-fiftieth of an acre in size. The soil was a clay loam and had not received any manure for the past four years. Owing to the exceedingly wet weather during the latter part of May and the commencement of June the last seeding took place at a later date than was intended. The seed of the common six-rowed variety was from Ontario, while that of the other two was imported from England.

Barley Yields at Different Dates of Seeding.

Varieties.	Grain Per Plot.			Yield Per Acre		
	Seeded April 15.	Seeded May 5.	Seeded June 7.	Seeded April 15.	Seeded May 5.	Seeded June 7.
	lb.	lb.	lb.	Bush.	Bush.	Bush.
Common 6-rowed	42.5	19.5	4.0	44.3	20.3	4.2
Peerless White	18.0	5.0	3.5	18.8	5.2	3.6
Golden Drop	27.5	6.0	5.0	28.6	6.3	5.2

Varieties of Potatoes.

Small quantities of nine varieties of potatoes were received by us from Steele Bros., Toronto. It was late when the seed reached us, and could we have planted them earlier the yield would no doubt have been considerably greater, but the test is nevertheless valuable as a comparison of the different varieties. In each hill was planted a section of a potato containing a single eye, and there were forty hills of each variety. The soil in which the potatoes were planted was quite uniform throughout, and the care and cultivation similar for all the varieties. The Late Rose and White Elephant, two well-known varieties, were used as a basis for comparison.

Varieties.	Crop of Potatoes.		Remarks.
	Number.	Weight.	
		lb. oz.	
Rough Diamond	97	5 14½	Small, round, rough skinned.
Lady's Finger	50	2 9½	Very small, long and slender, with deep eyes.
Mrs. Foraker	95	6 11	Some fair size, smooth, and shallow eyes.
Crown Jewel	81	16 13½	Some large size, eyes medium depth, fairly smooth.
Rural, No. 2	56	8 11½	Uniform, roundish, and smooth.
Summit	96	13 4½	Mostly fair size, medium length and good shape.
Sweet St. Vernal	84	11 2½	Fair size, long, smooth, shallow eyes, and good shape.
Minister	108	8 12	Small, round, deep eyes.
Pootaluck	81	9 6½	Medium size, rather uneven, deep eyes and roundish shape.
White Elephant	91	13 11½	Part large, somewhat scabby, good shape.
Late Rose	86	12 11½	Some large, rather uneven, fairly smooth.

Rotation of Crops.

In the year 1883 Prof. Brown commenced an experiment to compare the relative advantages of two rotations of crops, each extending over a period of seven years. The main feature of comparison in the rotations was roots followed by spring grain *versus* bare fallow followed by fall wheat.

There were two plots, each one-tenth of an acre in size and consisting of clay loam. The plots were situated near the centre of Experiment Field No. 1. In commencing the test the root plot received farm-yard manure at the rate of twenty loads per acre, which was plowed under on May 15th, and the fallow plot received the same quantity of manure on the 24th of July.

With the present year the rotation has closed, and I herewith present a concise statement of the resnlts. I am responsible for the correct returns of the last four years of the rotations, previous to which time I did not have charge of the experiments, but have given the results as fully as research could unfold.

Year.	Rotation.	Crops.	Returns. Per Plot.	Returns. Per Acre.	Remarks.
1883.	A	Roots	.....	.....	Nothing in the records except the words "light yield."
	B	Bare fallow	.....	.....	
1884.	A	Spring Wheat and Grass Seed	22.8 lb	3.8 bush.....	
	B	Winter Wheat and Grass Seed	152.4 lb	25.4 bush.....	
1885.	A	Hay	.....	.....	Nothing in back notes to show the yield of hay for 1885.
	B	Hay	.....	.....	
1886.	A	Hay	771 lb	3.86 tons (green)..	The clover was weighed immediately after being cut.
	B	Hay	1071 lb	5.36 tons (green)..	
1887.	A	Pasture	Pasture	Pasture	Put hurdle fence around plots and pastured by sheep ; no difference between the pasture on the plots.
	B	Pasture	Pasture	Pasture	
1888.	A	Pease	Straw 150 lb .. Grain 119 lb .	Straw .75 ton ..... Grain 19.8 bush.....	The pease grown were the common Golden Vine.
	B	Pease	Straw 162 lb .. Grain 154 lb ..	Straw .81 ton .... . Grain 25.8 bush.....	
1889.	A	Oats	Straw 388 lb .. Grain 194 lb ..	Straw 1.94 ton ..... Grain 57.90 bush....	No difference could be observed in the date of maturing.
	B	Oats	Straw 406 lb .. Grain 182 lb ..	Straw 2.03 ton ..... Grain 53.5 bush	

Experiments on the Farm.

Not only were there experiments conducted on the small experimental plots, but a number of larger tests were made in the fields of the farm. Part of the work of these farm experiments, such as harvesting the grain and grass plots, and the seeding, cultivation and harvesting of the mangolds and carrots, was done by Mr. Story, the farm foreman, while the measuring of the land, sowing of the grain, cultivation of the paths, and oversight in weighing came in my department. This line of work has compelled us to secure extra help both for the farm and experimental departments, but we think it very wise on your part for requesting this important line of work to be done. These numerous tests have caused no small amount of anxious thought on the part of Mr. Story, but I wish to make mention just here of the great carefulness used by him in that part of the work under his supervision. He has certainly taken much interest in the work, and it is as these departments work most harmoniously together that the greatest good can be done for the farmers of Ontario.

We have had some failures this year, and there are some experiments on which I cannot yet report owing to the crops not yet being threshed. Ten acre plots containing different varieties of Canadian oats, and nine acre plots with mixtures of grains, were destroyed by the cut-worm as far as the experiment goes, although there was a medium crop taken from the land. Four acre plots with different varieties of barley, and three acre plots with different kinds of spring wheat have not yet been threshed as will be explained no doubt by Mr. Story. An experiment was conducted with different quantities of ashes to the acre upon clover, but the season was somewhat advanced when they were applied and the amount of rainfall made a tremendous growth of clover. The effects of the ashes could not be seen this year, but may have an influence upon next year's yield.

The experiments with potatoes, mangels and carrots gave the following results :—

Varieties of Potatoes.

No. of Variety.	Variety.	Notes taken July 2.			Notes taken August 27.		Yield per row.	Yield per acre.
		Thriftiness.	Blossoming.	Quantity of blossoms.	Condition of tops.	Ripeness of tops.		
							lb.	bush.
1	Dakota Red.....	Poor	Late	Medium....	Thick and spreading.	Green.....	418	271
2	Early Ohio	Medium....	Medium....	Numerous..	Strong but few	Partly dead.	485	314.4
3	Rural Blush.....	Good.....	Late	Medium....	Strong and tall	Green.....	469	304.1
4	Halton's Seedling.	Medium....	Early.....	Numerous..	Short and low lying .	Partly dead.	472	306.0
5	Early Sunrise.....	Good.....	Early.....	Numerous..	Short and low lying.	Partly dead.	538	348.8
6	Crown Jewel	Poor	Early.....	Medium....	Short and low lying..	Partly dead.	401	260.0
7	Empire State.....	Poor	Early.....	Medium....	Strong	Green	388½	259.9
8	Rosy Morn	Medium....	Medium....	Medium....	Medium growth....	Partly dead.	349	226.3
9	Stray Beauty.....	Good.....	Late	Scarce	.....	Earliest of all	401	260.0
10	Beauty of Hebron.	Good.	Late	Medium....	Heavy tops.	Early	430	278.8
11	White Elephant ..	Good.....	Medium....	Medium....	Heavy tops.	Turning slightly .	396½	257.0

Varieties of Mangels.

Variety.	Weight per row.	Yield per acre.
	lb.	Bush.
Giant Yellow Globe	904	644.3
Carter's Ward Orange Globe	814	580.1
Long Yellow	754	537.4
Red Globe	714	508.8
Central German Sugar Beet	411	294.1
Red Mangolds	854	431.9
Red Tankard	422	301.4
Mammoth Red Intermediate	778	554.5

VARIETIES OF CARROTS.

Variety.	Weight per row.	Yield per acre.
	lb.	Bush.
White Belgian	532.0	403.6
Long Red Surrey	583.5	450.3
Orange Belgian	562.5	434.1
Scarlet Intermediate	635.0	490.0
Long Red Altringham	400.0	308.7
Large White Vosges	908.0	700.7

CULTIVATION OF RAPE.

Of the cultivation of rape for pasturing off by lambs is becoming a feature of no mean importance in Ontario farming. To obtain, if possible, some accurate information regarding the cultivation of this crop, an experiment was conducted during the past season. The results are given in the following table :—

ts.	Manner of seeding.	Condition of soil.	Distance apart of rows.	Rate of seed per acre.	Weight of crop per plot.	Weight of crop per acre.
					lb.	Tons.
No. 1.	Drills	Level	22 inches	4 lbs	1,808	18.08
No. II.	Drills	Ridges	22 inches	4 lbs	1,310	13.10
No. III.	Drills	Ridges	22 inches	½ lb	1,420	14.20
No. IV	Drills	Ridges	18 inches	4 lbs	1,668	16.68
No. V.	Broadcast	Level	Not in rows	½ lb	1,468	14.68
No. VI.	Broadcast	Level	Not in rows	8 lbs	1,730	17.30

Numbers I and II plots were under as near the same conditions as was possible to have them, except that No. II was ridged up to a medium height with a plow, No. 1, being left entirely level. Of the rape on the two plots, that on No. I was taller, larger, and a more thrifty growth throughout. The plants on No. III plot were thinly scattered over the ground but grew to a very large size, the leaves, over nearly the whole plot touching their edges. On No. IV plot, the ridges were smaller and closer together. There was a very great difference between the size and nature of the plant on Nos. V and VI plots ; those on the former being large and very succulent and tender, and consequently well adapted for pasturing by lambs, while those on the other plot were small, and of woody nature.

The cultivation of the drilled plots was precisely the same throughout. Much care was taken at the time of sowing to have the seed evenly distributed over each plot, and no thinning of plants took place. The crop was all pulled by hand, and weighed immediately afterwards.

EXPERIMENT IN PIG-FEEDING.

During the earlier part of the present year an experiment in pig-feeding was conducted to determine whether or not, there was any advantage in heating food for pigs during the cold winter weather. The test extended over the time from January 14th to April 14th. There were two sets of pigs in the same experiment, and each set was divided into two lots. There were two animals in the first set, and the test lasted for three periods of thirty days each. In number two set there were six animals—three in each lot—and these were fed for two periods of thirty days each. The pigs of set one were Berkshire grades, about five months old at commencement of experiment ; those of set two were from a Berkshire sow and Suffolk boar, and had reached the age of about six months.

The feed consisted of swill (apple peelings, potato peelings, etc., from College) and wheat middlings. Part of the feed at each meal was warmed to a temperature of about 80° F., and part was given the animals when cold at a temperature of about 40° F. At the end of each period the feed was changed, the pigs receiving cold feed for one period would have the warm during the following period and *vice versa*.

The following shows the details of each part of the experiment :—

PIG-FEEDING EXPERIMENT—SET I.

Period.	Date.	Name of animal.	Conditon of feed.	Quantity of swill fed.	Quantity of wheat middlings fed.	Weight of Pig on entering each period.	Weight of Pig on closing each period.	Increase in live weight.
						lb.	lb.	lb.
I.	January 14 to February 13.	Spot	Warm	150	73	181	220	39
		Black	Cold	150	73	183	212	29
II.	February 13 to March 15.	Spot	Cold	126	90	220	271	51
		Black	Warm	150	90	212	243	31
III.	March 15 to April 14.	Spot	Warm	150	90	271	299	28
		Black	Cold	150	90	243	264	21

PIG-FEEDING EXPERIMENT—SET II.

Period.	Date.	Number of animals.	Condition of feed.	Quantity of swill fed.	Quantity of wheat middlings fed.	Name of Animal.	Weight of pig on entering each period.	Weight of pig at close of each period.	Increase in live weight of each animal.	Increase in live weight of each group.
				lb.	lb.		lb.	lb.	lb.	lb.
I.	Feb. 13 to March 15.	3	Warm	324	168	A sow	114	150	36	109
						B barrow	122	163	41	
						C sow.....	114	146	32	
		3	Cold	324	168	X sow	105	140	35	110
						Y barrow	132	171	39	
						Z sow.....	104	140	36	
II.	March 15 to April 14.	3	Cold	324	168	A sow	150	176	26	107
						B barrow	163	217	54	
						C sow	146	173	27	
		3	Warm	324	168	X sow	140	190	50	126
						Y barrow.	171	201	30	
						Z sow.....	140	186	46	

The pig experiment may be thus summarised:

Set I.—Warm feed gave live weight increase of 98 pounds; cold feed gave live weight increase of 101 pounds.

Set II.—Warm feed gave live weight increase of 235 pounds; cold feed gave live weight increase of 217 pounds.

From both of these taken together we find that there was an increase of 15 pounds in favor of the warm feed.

The animals had a sleeker coat and looked more thrifty when fed upon warm d

It is expected that the experiment will be conducted again during the winter of 1889-90.

Ontario Agricultural and Experimental Union.

The experimental work here at the College is most intimately connected with the work carried on over the province by members of the Ontario Agricultural and Experimental Union. The formation and work of this association was spoken of at some length in the earlier part of my report. The instructions and material for the plot experiments are all sent from here, and the reports, after being completed, are again returned to the College; but some do not reach here until after the College Report has been completed for the year.

The full number of the Union experiments with grains and fertilisers have been conducted at this institution, and I shall now give, first, the instructions sent out to experimenters, and a summary of those grain tests as reported at the Union meeting of 1889, and which are near enough alike in character to allow an average to be taken, and second, the results of the Union tests of 1889, as conducted at this institution.

Summary of the Experimental Union Tests for 1888.

Instructions for Experiments with Fertilisers.

1st. Select a piece of ground of same nature throughout, under same conditions, and representative, as far as possible, of the land of the neighborhood. Avoid naturally wet spots, and keep clear of trees, fences and buildings. Give cultivation to experimental plots similar to that of your larger fields. If you can choose your plots in such a position as to allow them to remain for experiment another year, so much the better.

2nd. Mark off six plots of one-fortieth of an acre each, having clean path of two feet wide between the plots. Two rods square is a convenient shape.

3rd. Submit all plots to same treatment, and sow one-sixth of grain sent on each. Aim at seeding one inch deep.

4th. Apply the salt sent to plot No. I, the superphosphate to No. II, the ground apatite to No. III, wood ashes to No. IV, farmyard manure to No. V, and no manure to No. VI. The fertilisers to be sown at time of seeding.

5th. Keep plots at all times clear from trespassing by poultry, etc.

6th. Each experimenter is allowed to use his own judgment in reference to the quantity of barnyard manure applied.

7th. It is requested that No. V. plot be sown with 10 lb. fresh wood ashes, used same as the other fertilisers, as no Kainit can be obtained in Canada.

We have sent by express to those experimenting, expressage prepaid, one of the following lots of grain for six plots:—18lb. White Russian wheat; 18 lb. Red Fife wheat; 11¼ lb. Egyptian oats; 11¼ lb. White Cluster oats, or 12¾ lb. common six-rowed barley. Also 10 lb. salt for plot No. I., 10 lb. superphosphate for plot No. II., and 10 lb. apatite for plot No. III. The produce from the plots becomes the property of the experimenter.

Make out reports of experimental plots and meteorological observations as full and careful as you can, and forward to Mr. C. A. Zavitz, O. A. C., Guelph, not later than 1st November.

NOTE.—To those who carried on somewhat similar experiments last season, on five plots, and two years ago on four plots, we send additional grain to be sown on the same plots. The object is to test the influence of the fertilisers over two and three seasons. Report in the same manner as for the new plots.

OPTIONAL EXPERIMENTS.

If you can furnish us any accurate information as to the results obtained by any others in your neighborhood with the same fertilisers, we shall be glad to receive it. As for your own work, the success of the experiment and your own reputation demand carefulness, accuracy, and a little sacrifice.

In addition to, or entirely independent of the above general experiments, we are looking for some individual work. We wish every experimenter to send in an accurate statement in regard to some one or more of the following experiments:—

(1) Testing some imported cereals.
(2) Testing if chess sown will mature to seed.
(3) Testing whether plowing under barnyard manure or leaving as top-dressing is the best
(4) Testing a mixture of grass seeds for use as a permanent pasture.
(5) Any experiment you are in a position to carry out, but which is not mentioned in the above.

The price of the superphosphate used was $26 per ton, and that of the ground apatite or phosphate $12 per ton. Both were obtained from Smith's Falls. The same class of fertilisers was used in 1888 as during 1887, the latter giving the following analyses:

	I. Apatite.	II. Superphosphate.
Water	.016 per cent.	5.885 per cent.
Soluble phosphoric acid	.... "	10.489 "
Reverted " "	.... "	5.808 "
Insoluble " "	27.848 "	1.318 "
	27.848 per cent.	17.615 per cent.

The analysis of salt showed the following:

Sodium chloride, pure salt	89.42 per cent.
Calcium sulphate—gypsum	1.45 "
Calcium chloride	0.11 "
Magnesium chloride	2.01 "
Insoluble matter	0.18 "
Water	6.75 "
	99.92 per cent.

An analysis of an average sample of fresh wood ashes gave the following:

Water	2.07 per cent.
Insoluble matter	7.68 "
Potash	7.15 "
Phosphoric acid	1.89 "
Lime	37.33 "
Magnesia	3.02 "
Iron and alumina	1.53 "
	60.67 per cent.

From the returns received by the committee for 1888, forty-five valuable reports are obtained. Owing to various circumstances, such as the dry season and misfortunes of various kinds, a number of those who undertook the work were unable to send satisfactory reports. The reports forwarded to the committee were carefully read, and only those retained which were considered to be reliable and valuable.

AVERAGE Results of "Union" Experiments with Grains and Fertilisers during 1888.

	Fertilisers per acre.	Weight per acre in lb.		Weight of grain per bush.
		Straw.	Grain.	
Egyptian Oats, 10 Experiments.	Salt.....400 lb.	2,557	1,427	39.6
	Superphosphate.....400 "	2,481	1,487	39.6
	Ground apatite.....400 "	2,410	1,428	39.6
	Fresh wood ashes.....400 "	2,300	1,298	39.1
	Farmyard manure..... *	2,706	1,576	38.7
	No manure.....	2,480	1,294	38.7
White Cluster Oats, 12 Experiments.	Salt.....400 lb.	2,064	1,168	37.0
	Superphosphate.....400 "	1,979	1,204	37.3
	Ground apatite.....400 "	1,711	1,013	36.8
	Fresh wood ashes.....400 "	1,912	1,076	37.4
	Farmyard manure..... *	1,946	1,119	37.7
	No manure.....	1,806	983	37.1
Common-rowed Barley, 12 Experiments.	Salt.....400 lb.	2,394	1,758	49.3
	Superphosphate.....400 "	2,377	1,769	50.0
	Ground apatite.....400 "	2,220	1,656	49.1
	Fresh wood ashes.....400 "	2,221	1,588	48.5
	Farmyard manure..... *	2,406	1,698	49.2
	No manure.....	2,087	1,512	48.5
Red Fife Wheat, 5 Experiments.	Salt.....400 lb.	1,371	916	61.1
	Superphosphate.....400 "	1,565	992	60.3
	Ground apatite.....400 "	1,495	868	62.0
	Fresh wood ashes.....400 "	1,580	952	59.1
	Farmyard manure..... *	1,755	1,108	58.9
	No manure.....	1,580	896	58.5
Average of Total, 40 Experiments.	Salt.....400 lb.	2,221	1,393.2	44.9
	Superphosphate.....400 "	2,189	1,432.0	45.0
	Ground apatite.....400 "	2,032	1,307.6	44.9
	Fresh wood ashes.....400 "	2,073	1,274.4	43.9
	Farmyard manure..... *	2,272	1,412.8	44.2
	No manure.....	2,053	1,221.6	44.0

HORTICULTURAL EXPERIMENTS.

A synopsis is presented below of the reports upon experiments in potato culture showing in a concise way the results obtained by the different persons who undertook the work. These experiments will be continued for a series of years, until sufficient data is obtained from which a fair conclusion may be deducted. The following circular was sent to experimenters; together with a blank form for report:

DEAR SIR,—It has been decided by the Horticultural Committee of the Ontario Agricultural and Experimental Union to carry on the following experiments with potatoes. We shall be pleased if you will conduct these experiments and report results.

No. 1. Planting large whole potatoes.
" 2. " small uncut potatoes.
" 3. " small potatoes, all eyes cut out except one.
" 4. " medium potatoes cut in two.
" 5. " " " fresh cut two eyes.
" 6. " " " old cut (five days) two eyes.
" 7. " " " cut, with one eye.
" 8. " " " seed ends.

Nos. 1 and 2 to be planted 12 inches apart in rows. Nos. 3, 4, 5, 6, 7, 8, planted eight inches apart in rows. Plant that variety which does best with you. Potatoes, to be planted on eight adjoining rows. Where land is uniform, give same manure and cultivation as rest of field. Each row to be seven rods long. In digging, be careful to weigh accurately and forward results to N. J. Clinton, Windsor, Ont.

RESULT OF EXPERIMENTS IN POTATO CULTURE.

Experimenters.	Variety of Potato.	Large, whole.	Small, uncut.	Small; all eyes cut out but one.	Medium, cut in two.	Fresh cut, two eyes.	Old cut (5 days) two eyes.	Cut, with one eye.	Seed ends.	Average of eight kinds.
		1	2	3	4	5	6	7	8	
		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
E. Lick	White Elephant	111	99½	96	103	103	103	90	88	99.2
E. M. Zavitz	do	150½	95	99	127	130	124	91¼	106½	115.4
J. Kitchen	do	125	89	73	123	112	78	97	73	96.3
G. B. Boyce	do	111	115	120	135	140	114	105	153	124.1
N. J. Clinton	Early Rose	153	110	101	121	82	78	99	85	103.6
G. F. Marsh	do	97	95	94	80	70	68	66	65	79.4
A. G. McKenzie	do	138	72	96	113	116	95	84	105	102.4
Wm. Ratcliffe	White Star	120	120	109	123	100	77	79	88	102.0
R. Harcourt	do	128	54	74	63	54	55	50	67	68.1
J. McMillan	Beauty of Hebron	86	47	46	44	45	40	44	37	48.6
Jas. Forsyth	do	95	86	100	95	81	81	86	78	87 8
J. Soule	Late Hebron	163	166	162	185	140	175	144	182	164.6
J. French	Grangers	186	220	183	175	138	140	145	139	165.8
J. F. Peacock	...	113½	107	113	113	120	123	120	100	113 7
.....	.....	155	105	112½	112	90	115	103	109	112.7
Average yield, one row (7 rods		128.8	105.4	105.2	114.1	101.4	97.7	93.5	98.3	105.6
		Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
Average seed used per acre		55.5	14.4	13.3	24.5	14.4	14.4	8.2	8.2	19.1
Average yield per acre		263.9	216.0	216.1	240.8	213.9	209.1	197.3	207.4	220.6
Net yield per acre (less seed)		208.4	201.6	202.8	216.3	199.5	194.7	189.1	199.2	201.5

No. 1 gave the largest yield ten times, No. 4 twice and Nos. 2, 3 and 5 once each. In point of quality No. 5 stood first, No. 7 second, No. 6 third, No. 4 fourth, No. 2 fifth, No. 1 sixth, No. 3 seventh, and No. 8 eighth. In point of yield per acre, after deducting the quantity required for seed, No. 4 ranked first, No. 1 second, No. 3 third, No. 2 fourth, No. 5 fifth, No. 8 sixth, No. 6 seventh, and No. 7 eighth. A majority of the experimenters cut the potatoes for planting with two eyes to the piece, and nearly all of them plowed in every third furrow, dragging the ground just as the tops peeped through, then cultivated well and hilled up with a hiller or cultivator.

UNION EXPERIMENTS OF 1889.

I. A continuation of the experiments of 1888 (salt, superphosphate, ground apatite, fresh wood ashes, farmyard manure and no manure), with grain on the same plots without further application of fertilisers.

II. A test of superphosphate, dried blood and scrap, farmyard manure and no manure, with oats.

III. A comparison of different systems of raising fodder corn.

IV. A trial of Kaffir corn growing in Ontario.

Experiment No. I.

Instructions same as those given for 1888, the fertilisers being applied in the spring of 1887.

Plot. No.	Fertilisers.	Application per plot.	Date of maturing.			Yield of grain.			Yield of straw.	
			Spring Wheat.	Barley.	Oats.	Spring Wheat.	Barley.	Oats.	Barley.	Oats.
		lb.	July.	July.	Aug.	lb.	lb.	lb.	lb.	lb.
I.	Salt.....	10	27	28	11	14.4	58.5	56.8	53.5	42.8
II.	Superphosphate..	10	27	28	13	13.9	43.5	76.2	43.0	37.8
III.	Ground Apatite..	10	26	28 Aug.	11	13.1	55.5	70.2	52.0	39.3
IV.	Farmyard manure	700	26	3	15	16.5	54.7	100.7	61.3	49.3
V.	No. manure.....	.....	26	3	14	16.5	52.2	74.2	56.8	45.8

Note.—Size of plot in each place was one-fortieth of an acre. The date of seeding on each plot was for spring wheat, April 22, 1887, for barley, April 26, 1888, and for oats, April 22, 1889.

EXPERIMENT No. II.

Instructions.

(1) Select a piece of ground of same nature throughout, under same conditions and representative as far as possible of the land of the neighborhood. Avoid naturally wet spots, and keep clear of trees, fences and buildings. Give cultivation to experimental plots similar to that of your larger fields. An advantage would be gained if the plots could be chosen in such a position that they could remain for experiments another year.

(2) Mark off four plots of one-fortieth of an acre each, leaving a clean path two feet wide between the plots. Two rods square is a convenient shape.

(3) Submit all plots to same treatment, and sow one-fourth of grain sent on each. Aim at seeding one inch deep.

(4) Apply the superphosphate sent to plot No. I; the dried blood and scrap sent to No. II; farmyard manure to No. III, and leave No. IV without any manure. The fertilizers to be sown at the time of seeding.

(5) Keep plots at all times clear from trespassing by poultry, etc.

(6) Aim at applying 700 lb. farmyard manure on No. 3 plot (14 tons per acre).

(7) If it is your wish to carry on this experiment, please inform the Secretary, naming your nearest express office, and there will be sent to you, expressage prepaid, 7½ lb.....oats; 10 lb. superphosphate for plot No. I, and 10 lb. of dried blood and scrap for plot No. II.

Note.—The superphosphate was obtained at Smith's Falls and cost $26 per ton, and the dried blood and scrap (manufactured from pork factory refuse) was procured from Hamilton and sells for $40 per ton.

No. of Plot.	Fertilisers.	When		Weight of		Remarks.
		Sown	Matur'd	Straw	Grain	
		April	Aug.	lb.	lb.	
I.	Superphosphate, 10 lbs. per plot (400 lbs. per acre).	22	11	100¾	59¼	About ⅛ of plot lodged.
II.	Dried blood or scrap, 10 lbs. per plot (400 lbs. per acre).	22	12	116¼	58¾	About ⅛ of plot lodged.
III.	Farmyard manure, 700 lbs. per plot (14 tons per acre).	22	15	122¾	56¼	About ⅛ of plot lodged.
IV.	No manure.	22	13	95¼	50¾	About ⅛ of plot lodged.

Remarks on nature of soil, previous cropping, etc.—The plots were situated on experimental field No. 2, the soil consisting of a clay loam. The previous cropping was: 1886, fallow, with manure in autumn; 1887, spring wheat, and 1888, oats. The farmyard manure was applied as a top dressing after seeding in the spring of 1889, and the superphosphate and dried blood and scrap were sown upon their respective plots at the same time.

EXPERIMENT No. III.

Instructions.

(1) Select a piece of ground of same nature throughout, under same conditions, and representative as far as possible of the land of the neighborhood. Avoid naturally wet spots, and keep clear of trees, fences and buildings. Prepare the ground as you would a large field for the same crop.

(2) Mark out four plots of one-tenth of an acre each, allowing a clean path between the plots. Four rods square is a convenient shape for each plot.

(3) Sow the same kind of corn (M. S. S. Corn) on each plot as follows:—

No. I plot—Drills of equal distance apart (as near 3½ feet as possible) with seed averaging two grains to the foot.

No. II plot—Drills of same distance apart as No. 1, with seed averaging twelve grains to the foot.

No. III plot—Broadcast or close drills with seed averaging one-half bushel per acre (2.8 lb. per plot).

No. IV plot—Same as No. III with seed averaging three bushels per acre (16.8 lb. per plot).

(4) Aim at having the seeding all done in one day, and not later than 15th day of June. Note—Shallow planting for early seeding, and deeper planting if late enough for soil to be warm.

(5) Give plots I and II the same amount of after cultivation, as often as you think they need it, but avoid mounding the rows; shallow cultivation is preferred.

(6) Purchase 40 lbs. of M. S. S. Corn from your seedsman and send the account to the Secretary, C. A. Zavitz, as early as possible, and the money will be sent you until the limited funds of the Committee are exhausted. This will save much unnecessary expense of expressage. If you cannot obtain the corn apply to the Secretary, mentioning your express office, and it will be forwarded to you.

(7) Cut each crop at the time when its condition corresponds to the roasting condition of field corn, or when in the glazed state.

(8) Weigh produce from the plots when under as equal conditions as possible. Note—If you can observe the comparative results from the feeding of the different lots please send information under the head of "Remarks" in blank form.

(9) Fill out the accompanying blank form and return.

TABLE OF RESULTS No. 3.

No. of Plot.	Seeding and Cultivation of Crops.	Distance apart of rows.	Average depth of planting.	Dates of Cultivation or Hoeing.	No. of stalks grown per 100 ft.	Depth of cultivation.	Weight of Produce.	Percentage of stalks having ears.	Previous Cropping.
		In.				In.	Lb.		
I.	Drills, 2 grains per foot.	42	1 inch.	Horse cultivation July 2, 23 and August 15. Hand hoeings July 16 and August 15.	592.5	2	2,344	5	1884, Roots.
II.	Drills, 12 grains per foot.	42	1 inch.	Same as No. I.	97.9	2	2,413	0	1885, Barley.
III.	Broadcast or close drill, 2.8 lb. per plot.	....	1 inch.	Cut weeds July 16.	....	0	2,201	11	1886, Clover. 1887, Oats.
IV.	Broadcast or close drill, 16.8 lb. per plot.	....	1 inch.	Cut weeds July 16.	....	0	2,677	0	1888, Green fodder.

Remarks.—The ground (clay loam) received well-rotted manure at the rate of ten loads per acre, which was plowed under a short time before planting. Each plot was planted on May 18. The corn was not up until just after the severe frosts were over, but owing to the cold wet weather the growth was very slow for a long time. At the time of cutting many of the leaves on No. IV plot had turned yellow, a smaller proportion on No. II, while the leaves on Nos. I and III were yet green and thrifty looking.

Conclusions.—Owing to only about one-half of the seed grain germinating, the character of this experiment is considerably modified.

The plots being small (2 x 8 rods), the outside of the thick plots received an undue advantage.

GRAIN EXHIBIT.

At your request an exhibit of the grains grown upon the experimental plots during the present year, was shown at both the "Provincial" exhibition at London and the "Industrial" exhibition at Toronto. The samples of grain for this exhibit were taken from single rows, put in for that purpose, so as not to destroy in any way the exact record of the plot yields. We were much pushed for time when collecting and preparing the samples, it being the period of the year in which we were cutting and threshing our plot experiments; but we firmly believe that much good resulted from making this exhibit and we would further suggest that an exhibit be taken another year to many of the other leading exhibitions in Ontario.

At the "Provincial" in London, our exhibit extended for a distance of forty-five feet along one side of the building, and reached from the floor to the ceiling. It consisted of six rows of glass jars along the front, containing different varieties of imported cereals, and upon the wall was arranged the grain in the head as grown by the Experimental Department during the present year from the imported seed. At one end was arranged a number of varieties of ensilage corn from the dairy department. At your request and at the wish of many others, a photograph of the display was taken.

At the "Industrial" in Toronto we had not as good a place in which to arrange the materials, the glass jars all being on shelves at one end, and the whole exhibit extending sixty feet in length. We were unable to get all the grains upon the limited wall space, but on the whole, the exhibit looked fairly well.

At both the "Provincial" and "Industrial" exhibitions we had large notices up containing the following: "*Information given here regarding the course of study given at the Ontario Agricultural College, Guelph.*" I was usually kept busy answering questions about the different varieties of grains, and giving information regarding the advantages of the college course for a farmer's son.

CONCLUSION.

The experimental work is rapidly increasing, there being at present eight times as many plots as there were when I took charge in 1886; and my duties during the past year have certainly been heavy. It is only as a person becomes actively engaged in the details of experimental work that he realises the immense amount of care and watchfulness needed in the seeding, labelling, note-taking, harvesting, threshing, weighing, etc. of more than 300 plots of grain; in the planting, cultivation, and harvesting of such crops as potatoes, fodder corn, rape, etc., in the collecting, preparing, and arranging of some 250 varieties of grain in the head for the Ontario exhibitions; and in all the many requirements of experimental work.

I think we can look upon the year 1889 as a fairly successful one in bringing forth valuable information for the Ontario farmer for whose interest we are laboring.

Respectfully submitted,

C. A. ZAVITZ.

EXPERIMENT NO. IV.

Instructions and also Description of the Kaffir Corn.

From the Southern States, where this corn is extensively grown, we obtain the following information :

It stands dry weather well. Where corn will suffer from drouth this plant will simply stop and wait for rain, and then go on and make its full yield. In the way of dry fodder it makes enormous returns. It will grow on any land suitable for corn and even on land too poor for that crop. Its seed weighs 50 lb. to the bushel.

This one (Kaffir corn) is the earliest of the five varieties of non-saccharine sorghums It grows from four to five feet high, making a straight upright growth, having a stocky stem with numerous wide leaves. The stalks keep green and are brittle and juicy, not hardening like other samples of the sorghum, making excellent fodder either green or dried, which is highly relished by cattle and horses. The seed heads form at the top of each stalk and as soon as these show the grain well the joints next below the top send up shoots which yield the second seed heads. If the crop is wanted mainly for fodder it is recommended to cut down the whole stock when the first seed heads come into bloom, at which stage it cures admirably and makes most excellent forage.

The pound of seed sent to you is sufficient to plant one quarter of an acre of ground. The first week in June is recommended as the best time for planting. The land need not be very rich, but should receive similar cultivation to that for an ordinary corn crop. The rows should be three feet apart with from three to four seeds per foot. The cultivatings or hoeings between the rows should be the same as for common corn. The proper time to cut the fodder is when the first seed heads come into bloom.

Name of fodder.	When planted.	Distance apart of rows.	Average depth of planting.	Dates of cultivatings or Hoeings.
Kaffir Corn.	June 11.	3 feet.	1 inch.	Horse cultivatings July 9, 23, August 15. Hand hoeings July 9, 23.

Depth of cultivation.	Weight of produce.	Percentage of stalks having ears.	Nature of soil.	Previous cropping.
2½ ins.	1,379 lbs.	2	Clay loam.	1886, Bare fallow. 1887, Oats. 1888, Fall wheat.

Area planted, one-fifth acre.

Remarks.—The ground had not received manure for three years. The early part of summer was apparently too cold and wet for the rapid growth of the Kaffir corn. The few stalks which headed out stood about four feet in height. This corn may do much better another season than it has during the past one, especially with a little earlier seeding, but at present it certainly appears to be unprofitable to grow in Ontario.

PART VIII.

REPORT OF

THE PROFESSOR OF DAIRY HUSBANDRY.

GUELPH, Ont., 23rd Jan., 1890.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to report upon the work of the department under my charge for 1889. Following the style adopted in my reports of previous years, I have gathered into chapters some information bearing on the different branches of dairy practice which has been gleaned from experience during the past and previous years. For the sake of clearness, as well as for the better service of those who may seek guidance, from its pages, it is written under the following heads:

1. Dairy husbandry in Ontario.
2. Farmers' Institute work.
3. Creamery management.
4. Extension of the creamery system into the winter season.
5. Buttermaking.
6. Experimental cheese-making.
7. The cheese factory business of Ontario.
8. The hog as an adjunct to the dairy.
9. Fodder corn and the silo.

1.—DAIRY HUSBANDRY IN ONTARIO.

A common opinion, among even those who usually think clearly and correctly, is that *Dairy Farming* has only to do with milk and its sale or its manufacture into dairy products. The handling of milk is really a minor part of the dairy farmer's business. Its economical production involves thorough cultivation of the soil, the selection and breeding of the animals best adapted for the dairy, the growth of crops that make it possible to obtain the largest net value in dairy products per acre, the rearing and feeding of cattle and hogs upon the by-products (such as skim milk, buttermilk and whey), and the breeding of horses to do the work of the farm as well as to sell. After these come the business and work connected with the handling of milk and its manipulation for the production of such nourishing and appetising articles of diet as butter and cheese. When the principles are well understood, the technical details of practice will be comparatively easy of acquirement and application by the farmers.

While *Dairy Farming* is perhaps the most profitable branch of agriculture in our province, it has only lately received the same relative notice and recognition that have been given to the other departments of animal husbandry and soil cultivation. Until quite recently there has been no general, syetematic or comprehensive effort put forth for the improvement of the methods or the investigation of the principles that underlie those practices that invariably lead to success and profit. This is all the more remarkable when the value of *Dairy Farming*, as a source of the nation's supply of food, as well as a means for the conservation of the fertility of the land, is thoughtfully considered. The true aim of all farm operations that are wisely planned is directed to the attainment of a threefold object: (1) the production from the resources of nature of an abundant supply of wholesome, appetising, nutritious food in such a way as to leave a satisfactory

profit to the owners and tillers of the land; (2) the preservation, and where practicable, the augmentation of the available fertility of the soil; and (3) the providing of remunerative occupation for a large population upon the area that is cultivated. In the following up of that aim the intelligent farmer will call to his aid the service of domesticated animals that are able to change into food suitable for his use those parts of most crops which in their natural state are unsuited for his table. During the early stages of human experience upon this continent many tribes subsisted mainly upon roots and the fruits of the forest. These were meagrely supplemented in some cases by the game from the hunter's traps, arrows and spears. But as man emerged into a higher state of civilisation the powers of both mind and body naturally turned to the production of a more varied diet, as well as the establishment of a more controllable and dependable source of supply. Nowadays the nations in the front rank of civilisation and influence subsist upon the most varied and substantial articles of diet procurable. Bread without butter does not satisfy. Flesh-meat of some sort accompanies the dinner vegetables, and throughout the whole of the extensive bill of fare, in even the plainest homes of Canadian and European people, animal products are spread upon the table with the purely vegetable foods. To provide those animal products in the most economical way is the purpose and place of *Dairy Farming*. The more particular and direct products of the dairy, such as milk, cheese and butter, are not the only foods that are provided for human consumption by this kind of husbandry. Since experience has demonstrated that animals of the cow kind must be kept to consume the coarser crops of the farm and elaborate them into such substantial delicacies as milk, butter, cheese and beef, it follows that all these are the special, but not necessarily the only kinds of food from the production of which profits should arise from this branch of agriculture.

Milk is universally recognised as the perfect food, containing all the elements of nutrition required for maintaining life and supplying energy requisite for the demands upon human strength, and all in proportions best suited for assimilation by the organs of the system. As an article of diet for furnishing life-sustaining energy one gallon of ordinary milk may be reckoned as equal to three pounds of flesh meat from well-fed steers. The gallon of milk can be produced at less cost to the farmer, and therefore during the coming years will prevail in the keen competition for popular favor between the different articles obtainable as food by the great masses of wage-earners. One pound of cheese and half a pound of bread will furnish more strength to the eater than two pounds of flesh meat. The cost of the former to the producer is lower than the latter, as also the price at present required from the consumer. It should be the aim of the *dairy farmer* to so cheapen or lessen the cost of production of fancy butter and fine cheese that they will be within the purse-reach of the millions of so-called poor people to whom luxuries, while such, are inaccessible. As an evidence of the trend of popular preference for foods, the fact may be cited that the city and town consumption of milk in both Ontario and Great Britain is now almost five-fold as great per head of the population as it was twenty years ago. The consumption of cheese on this continent has increased almost five-fold per head of the population within the same period. There will be no danger of a lack of market or a lack of consumers for fine articles of dairy products for all time to come. Then the by-products of the dairy, such as buttermilk, skim milk and whey, can be elaborated by pigs into another article of diet highly relished by most people. These by-products may be cheaply supplemented by parts of the same forage crops as are grown for the feeding of cows, and by the cheaper coarse grains that can always be successfully raised upon a dairy farm whose land is enriched by the plentiful supply of barnyard manure.

As farmers produce an increased quantity of superior food per acre they make it possible to support a larger population. Population is the element which gives value to property. Hence successful *Dairy Farming* means an increase of value in all the property in a country or section where it is followed. Many parts of plants cultivated by farmers in a rotation of crops are entirely unsuitable for direct consumption by man. By making animals consume such plants or parts of them as are indigestible by the human family there may be obtained from the animals appetising and nourishing products quite suitable for his table. That is the true place of dairy animals in farm economy.

In order that animals may be kept with advantage and consequent profit, the farmer's skill and judgment should provide plants suitable for their maintenance. The sun is the working power that elaborates soil-food, commonly spoken of as manure, into plants—the fit food of animals. The sun is the source of the energy that does the work of the world. It is the veritable working power on all the farms, though too often its value and usefulness are unknown and neglected. Plants are contrivances of nature whereby and wherein the sun stores up his strength and warmth for man's service and comfort. He should be kept at work all day long. When enough suitable material for the sustenance and increase of plants by their growth is present in the soil the sun never fails to exert his energy for the service of man. When the soil is devoid of or deficient in the supply of these substances, simply for the want of the raw material, upon which alone he can work, the sun is kept "loafing" over the fields day after day. A farmer cannot afford to have the hired man "loaf" around the kitchen stove, while he himself toils outside. Much less can he afford to keep the sun idle upon his fields. Hence it is the farmer's duty to see that the soil contains all that is needed for the upbuilding of plants; and then by proper management of the soil and selection of the seed he may in fact harness the sun every morning and make it do his will. His occupation demands a brain, a judgment, a will to rule, in order that he may justify his birthright in being given dominion over the earth and its plant and animal life. The air is the source of a large per cent. of the substances that go to form the structure of plants. From it the sun is able to transpropriate to the plant the very elements wherein he can best accumulate and store his strength for man's benefit. The corn plant is one of the best aids and means whereby this can be done. By the growth of fodder corn and the use of the silo the farmers of Ontario will find it comparatively easy and profitable to attain the second object of skilful agricultural effort, viz., (2) "The preservation and, where practicable, the augmentation of the available fertility of the soil." The matter in its details will be discussed under its proper head in the report.

In order that the plants grown may yield the best return of which they are capable, the husbandman's skill should be exercised to provide animals which can return to him the most in products or service for the food which they consume. It is possible to keep animals which yield so much less in product than they eat, that they are veritable burdens upon the man whose they are. Instead of being his servants, living and laboring for him, he sometimes becomes theirs, and apparently lives to keep and feed cows, hogs and horses. The cow, in all civilised countries, is always a boarder upon some person. She should be made to pay for her board at such remunerative rates as will leave a profit for the boarding-house keeper. If she fails in that, she should be made to render a service which she will not willingly contribute. Her carcass should be made into beef, and her hide into leather. She should not be slyly sent to board upon some other unfortunate man. A cow with the business habit of keeping all her accounts with the world paid up, through the man who owns and feeds her, is a good business cow. That is the kind of cow I recommend. Her powers I will briefly discuss elsewhere in this report.

In the further endeavor to produce large supplies of food without exhausting the fertility of the soil the farmer can best attain this end by the selling of such products as remove from his premises the least amount of valuable plant food. At this stage of discussing the subject a single illustration will suffice to indicate the adaptation of *Dairy Farming* to conserve the fertility of the soil. When 1,000,000 bushels of wheat are exported from any district they carry away in the substance of the grain plant-food to the value of $240,000. In other words, the elements or the substances of fertility removed in the wheat, if replaced by the use of commercial fertilizers, would cost the previously mentioned sum. Whereas, when butter to the value of $1,000,000 is exported it carries away from the place where it was produced less than $850 worth of the substances required in the soil by crops for their growth. It is evident that the production of $1,000,000 worth of butter will give occupation to a larger number of persons than the production of a quantity of wheat equal in value. The difference between the two amounts, which severally represent the value of the fertility removed, can be applied to the payment of the extra labor employed. A larger rural population may certainly be occupied in remunerative work by *Dairy Farming* than by any kind of exclusive grain

growing. The culture of fruit and market gardening alone offer equal facilities and opportunities for the profitable employment of labor in the production of food from nature's storehouse and resources.

These facts have been recognised by many of our leading farmers for the past quarter of a century. A knowledge of the underlying principles upon which they rest is now being systematised and made widely available by means of co-operation and organisation among farmers for this purpose. The Farmers' Institutes, so popular among those living in the most progressive and prosperous districts on the continent, are largely the outgrowth of successful co-operation among dairymen. The cheese factories were the agencies through which this co-operative principle was first made practically useful in a widespread degree for the profit and the improvement of the ordinary farmers. The first one on this continent was erected near Rome, N.Y., in 1851, by Mr. Jesse Williams. The late and deeply lamented H. Farrington, of Norwich, Ont., had the honor of introducing co-operative cheese-making into this province. His factory, which was erected near his home, began operations in 1864. Three years later the Ontario Dairymen's Association was organised. It held an annual convention, and was subsidised by the Provincial Government. Its efforts were directed towards the extension of co-operative dairying, and the giving of information and encouragement to beginners in the erection and equipment of suitable factory buildings. Instructions were given at its conventions by competent persons on the best methods of feeding and rearing stock suitable for dairy purposes. It promoted the organisation of Dairy Boards of Trade, at which the products of the factories could be sold to the best advantage. In 1877 the first Association, by mutual agreement among its members, became divided into the Dairymen's Association of Western Ontario and the Dairymen's Association of Eastern Ontario. Each of these then received an annual grant of $1,000 from the Provincial Government. In 1886 the Ontario Creameries' Association was organised to promote the creamery interests of the province. At first it received a grant of $500. During the past year the Government appropriations to these associations were $2,500 each to the Dairymen's Association of Western Ontario and the Dairymen's Association of Eastern Ontario and $1,500 to the Ontario Creameries' Association. The need for the enlargement of the grants made by the Government arose from the employment of inspectors and instructors by these organisations. Now eight competent and experienced men spend their whole time during the summer months visiting the cheese factories, inspecting the milk, and advising with the cheese-makers as to the best methods for the manufacture of cheese and the management of the factories. The Creameries' Association employ two men to render similar service to the creameries of the province. The work of these inspectors has been extremely valuable to the farmers interested in dairying. The quality of our cheese has been generally improved to such an extent that during this past season market reports reveal the gratifying fact that the cheese of Ontario on the average has sold for more than three-quarters of a cent per pound higher than the cheese of the adjoining States of the same month's make and at the same time. Three-quarters of a cent per pound on the total season's make will represent over $475,000 of increased revenue to the patrons of the cheese factories in this province. The value of the educational work that is being done through this means should not be lost sight of, even in presence of such large and substantial increase to the receipts of the province through its farmers.

Ontario's make of creamery butter has hardly yet found its way into the channels of commerce in sufficient quantity to cause its importance to the farmers and the merchants to be recognised. There is all the more reason why the extension of that industry in every reasonable and prudent way should be encouraged and fostered. But the other day there was sold in the city of Toronto a carload of dairy butter at 10 cents per pound; on the same day, in the same city, creamery butter was sold at 26 cents per pound. When it is considered that, by reason of unsuitable care and ill-adapted utensils and conveniences, more milk is taken on the average to produce a pound of butter from private dairies than in creameries, the enormity of the loss sustained by *somebody* or *somebodies*—citizens of Ontario—through the manufacture of inferior butter becomes more apparent. Of course some dairy butter is as fine as any creamery butter, but the

difference between the market value of that one carload of dairy butter at the price at which it was, with difficulty, sold, and the amount that would have been easily realized for fine creamery butter was over $3,000. That sum might be multiplied five hundred times before it would represent the diminished value of the present butter product of Ontario from the want of co-operative creameries. The Government cannot spend any money that will more quickly and certainly redound to the advantage of every citizen of the province than the amount which may be spent discreetly on behalf of the ever-growing and ever-to-grow dairy interests, which the financial, educational and fostering assistance which it has rendered in the past has done so much to develop and establish upon a basis of substantial prosperity.

2.—FARMERS' INSTITUTE WORK.

The part of my time which was devoted to attending Farmers' Institutes and special meetings held in the interests of the dairy industry of the province was spent, I think, with more immediate and direct advantage to the farmers than that portion given to experimental investigations and educational lectures in the College. Since January 1st, 1889, I had the honor to attend, on behalf of the Dairy Department of the College: conventions of Dairymen's Associations, 7; Farmers' Institute meetings, 62; special meetings, 12; total, 81.

Besides these 81 gatherings of farmers in Ontario, I took the opportunity during the five weeks absence for holidays, which the Minister of Agriculture was good enough to allow me, to accept invitations to be present at three conventions of Dairymen's Associations outside of this province, and ten Farmers' Institutes. I have introduced mention of this to point out that it would be of advantage to the Farmers Institutes of Ontario and of benefit to the Professors that an opportunity should be afforded them of being present occasionally at meetings and conventions held in the interests of agriculture elsewhere.

3.—CREAMERY MANAGEMENT.

The Ontario creamery has now been in operation for parts of six seasons. Passing mention may be made of the purposes for which it was erected and equipped upon the Experimental Farm here. It was intended that it should have educational value for the service of the whole farming community of the province, and especially for those living in districts where no creameries have been established and where the cheese factory system has not been introduced. The farmers may learn from our reports what to expect in the way of cash returns from supporting a co-operative creamery in their own neighborhood. By reason of the area required for supplying milk to the city of Guelph, our patronage is almost wholly from farmers at a distance of from two to seven miles from the college. The important thoroughbred stock interests of the country surrounding Guelph; have prevented a large number of the best farmers in the vicinity from sparing any cream for butter-making. Consequently long roads must be travelled to obtain a load. The collection of the whole milk has been rendered impracticable by the small supply and the scattered nature of the patronage already referred to. The system adopted by the farmer has been that of deep cans, setting in tanks of cold water. Most of the patrons have adopted the use of the shot-gun can, which is a cylinderical pail, 20 inches deep by 8½ inches in diameter, without any tap or faucet. Skimming is done by the use of a cone-shaped skimmer by which the cream is dipped from off the top of the milk. The tanks are usually made in two compartments, each measuring 26 in. x 18 in. x 23 in. deep. The treatment of the milk required for the successful use of these utensils and conveniences is: (1) The straining of the milk immediately after it is drawn, and the setting of the milk at a temperature above 90 degrees; (2) The use of sufficient water or water and ice to gradually cool the milk to between 48 and 44 degrees; and (3) The protection of the milk from contamination by foul air. The patrons are allowed to do the skimming at any time that best suits their own convenience. The cream collector measures the cream in a cylinderical

pail 12 inches in diameter, and credits each person with the number of inches in depth. After the whole quantity of cream from each patron is thoroughly mixed, the collector takes a sample and puts it into one of a number of glass tubes, which he carries for that purpose. These tubes are all numbered, and the number of the tube used is placed opposite the name of the patron in the collector's book. The cream from each patron is collected every second day, and a sample is put each time into one of these test tubes. The test tubes form part of the equipment of an oil-test churn, which is used for the discovery of the *butter-making value* of each sample of cream. A description of the use will be given in a subsequent part of this report. It is thus made possible to pay each patron equitably according to the quantity and quality of the cream furnished. The skim milk is left on the farm for use in the raising of calves or the feeding of pigs.

The creamery has been in a limited sense a school for the practical instruction of students who desire practice in butter making. Butter-makers, and those interested in other creameries, have always been welcome to visit it and to study the modes and details of the practice followed there.

Though entirely under the management and control of the Government, through the Professor of Dairy Husbandry, the creamery affords its patrons no special money returns beyond what may be realised from any joint stock or private concern in any part of Ontario. The patrons who supply the cream are paid for it at the price realised from the sales of the butter manufactured, after all expenses from cream collecting, labor and furnishings, such as tubs, fuel, ice, cloth, salt etc., have been deducted. While these expenses are kept as low as is compatible with obtaining the best qualities of the articles used, the rate of expenses per pound of butter is high. The cost of collecting the cream depends so largely upon the distance to be travelled for the quantity that may be collected, that the number of patrons and cows within a given area determine the cost per pound to a very large degree. In our case the number of patrons and the quantity of cream supplied are still unnecessarily small for the area covered by the creamery waggons. The rate of this expense is correspondingly high. The agreement with the patrons at the beginning of the season was to the effect that they were each to receive, after the end of each month, a cash advance on cream supplied at the following rates per lb of butter :—June, 14 cents ; July, 14 cents ; August, 15 cents ; September, 15 cents. After providing for these prices and paying all expenses out of receipts from the sale of butter and butter-milk, there was a balance of $254.69. That amount was partially accounted for to the patrons by paying 2 cents per lb. above the promised advance on July butter, and one cent per lb on August and September butter, while a balance of $117.91 still remains on hand for distribution among them.

A summary of the season's business is presented herewith.

Receipts.		Disbursements.	
Sales of butter	$2,862 57	Patrons for cream	$2,035 99
" butter-milk	221 66	Labor	223 55
		Cream gathering	367 75
		Salt, tubs, fuel, ice, repairs and sundries	339 03
		Balance on hand	117 91
	$3,084 23		$3,084 23

Butter manufactured	13,104 lb.
Average price of butter per lb.	21.84 cents.
Number of patrons	42
Number of days in operation	103
Routes travelled by cream wagons	2

Cost of cream gathering	2.80	cents per lb. of butter.
" labor, including delivery of butter-milk	1.70	" " "
" furnishing, etc	2.58	" " "

As already stated the cream only was gathered to the creamery, the skim milk being left on the farms.

In my last annual report I recommended that the number of creamery routes be reduced. This was done and 42 patrons furnished cream to make almost half as much butter as was manufactured the previous year from the cream supplied by 137 patrons. The butter was mostly packed in tin-lined tubs and was sold for consumption in Ontario. The home markets are yearly becoming more active and discriminating in their demand for creamery butter. Salt of Canadian make was used at the rate of from three-quarters of an ounce to one ounce per pound of butter.

The oil-test churn was used to determine the per cent. of churnable fat in each supply of every patron's cream. The requirements for its successful use are :—

(1) Careful sampling of the cream ; it should be poured at least twice from one pail into another before the sample is taken for the test tube.

(2) Accurate measuring ;

(3) Souring of the cream ;—to ensure that all the samples of cream are equally sour, they should be warmed up to 70 degrees and kept at that temperature for 24 hours before being churned ;

(4) Heating after the first churning to a temperature of 135° Fahr.

(5) Subsequent cooling to 65° or 70° ;

(6) Churning and reheating ;

In a case where the butter-oil of any sample does not separate to show a clear line of demarcation between itself and the other constituents of the cream, the cooling to 70° churning and heating should be repeated.

I have taken the liberty to discuss the question of winter dairying in another part of this report. If farmers generally would venture to adopt it gradually, the quickened interest thus directed to dairying would result in cows being more suitably and economically fed ; more milk would be produced at less cost ; the coarse grains would be profitably consumed on the farms, and increased fertility and consequent prosperity would follow.

4.—EXTENSION OF THE CREAMERY SYSTEM INTO THE WINTER SEASON.

As a nation progresses in skilful agricultural methods, so it advances in all the attainments of civilisation. Farmers are called clodhoppers, hayseeds and nobodies, but if one will gauge the progress of farmers in most nations, he will have gauged the progress of that nation itself in most that appertains to good living. As the farm resources are developed, and as farmers are prosperous, so will the whole nation be strong and wealthy. The progress of agricultural operations and their success run parallel with all other kinds of prosperity and desirable achievement in our nation.

The dairy cow is essentially an artificial product of human judgment. The common cow is a creature that comes to us as do other animals—a product of the operation of nature's laws ; but those qualities which make her valuable as a dairy cow are a development of her original inherent functions and the result of the exercise of human intelligence and judgment, founded upon accurate observation and careful study. Then, after man has developed to its utmost the power or capacity of an animal, he must continue to apply skill and judgment in order to preserve that power and prevent its deterioration. A cow has not naturally the power of producing more than two thousand pounds of milk per year, but man, by an enlightened and intelligent management, can so develop that power as to increase the yield of milk to eight or even ten thousand pounds per year. If that

augmented capacity be not carefully preserved the cow will lose her acquired talent, and, if altogether neglected, will lapse into the original state. There are now in this province cows by the score, nay, hundreds, which would produce annually, if their inherent powers were rightly treated and sustained, eight thousand pounds of milk. It is not that we need so many different breeds of cows in our dairies to make them successful and profitable, as that we need a great many different men with directive capacity to enable the cows to apply their powers to advantage. If a farmer will develop, increase and protect the productive powers of the cow he owns, he will have taken one long step towards making his farm more profitable and himself a more intelligent man.

The creameries are in a large measure unsatisfactory and unprofitable because the men who attempt to support them neglect these two points—the proper development and care of their cows and the due preparation and growth of crops suitable to their support. The growth of suitable and adaptable crops is one of the most important factors in the beginning of an extension of the creamery business. The largest returns with the smallest expenditure of labor, money and fertility, are only to be obtained from the best animals, fed on the best food by the best men. That is a rather short way of expressing it, but when rightly applied it covers the whole of successful dairy husbandry as applied to creameries. These two essential preparations of the cow and the plant, of which I have spoken, open the way for the production of milk, and the creamery provides for the manufacture of milk into one of the most wholesome articles of food, which every one wants and likes, and which can be sent from the farm with the largest profit to the man selling it. From the milk yielded by the cows of this province we make in large quantities cheese, a product which is a concentrated and very nourishing food—perhaps more so than butter is. I wish here to show the weakness of our butter-making system. Of the milk yielded by the cows of this province nearly as much is converted into butter as into cheese. Our cheese has won for Canada the reputation of being one of the finest cheese producing countries in the world, while our butter has earned for us the unenviable notoriety of sending to England the strongest butter received there from any part of the world. There must be something wrong in the way we do things when we have not earned as good a reputation for producing butter as we have established in connection with our exports of cheese. There was a time when we had no reputation as a cheese-making people,—when the cheese was made at home in the dairies of the farmers. Now, of all the cheese made in this province 99 4-5 per cent is made in cheese factories, and only one-fifth of one per cent. in home dairies. In my opinion, in that short set of figures is revealed the real reason why our cheese-making business has established such a high reputation, while on the other hand our butter-making operations have secured for us, in market reputation, only that which too frequently characterises the product itself—a bad odor. Of all the butter made in the province from the milk production of nearly as many cows as we used in cheese-making operations, less than three per cent. is made in creameries—less than three per cent. in one case as against 99 4-5 per cent. in the other. If we had this position in regard to butter-making reversed, and only three per cent. of our butter were made at the farm dairies, we should get higher figures for our total product.

Let me examine still further this making of 97 per cent. of our butter product in the farm dairies—mostly small. Is that an economical and profitable way of producing butter? To a man who gives the matter any serious consideration it at once becomes evident that it is not. The total make of butter in the farm dairies of the province is estimated at over 30,000,000 lbs. annually. I have taken some pains to discover what amount of labor is employed in making that quantity of butter, by finding out how long it takes to make ten pounds of butter in the home dairy, and I find that it takes on the average six times as much labor to make a pound of butter in a small dairy as is required to make a pound in the creamery. The amount of labor required to make 30,000,000 pounds of butter in home dairies is equal to 750,000 single days labor, whereas if made in creameries it would take less than 130,000 single days of labor. There would be 620,000 days of ten hours each of labor to spare in the homes of Ontario by having this butter made in creameries. Now, in this province we should be proud above all things of the virtue,

industry, intelligence and beauty of our women; and yet our farmers are crushing the spirit out of their wives and daughters by letting them milk cows, set pans, churn butter, and all the work incidental to that process. This seems to be a small factor in our national prosperity, but it is really a very important one, that the women on our farms should have more leisure for true womanly work, and should spend less of their time in producing butter which sells for twelve or fourteen cents per pound. I haven't a word to say against the butter these ladies make, but I think there is a waste of labor. We must make our methods economical. The difference between the amount of butter produced from a given quantity of milk when handled in creameries, and the product of the same quantity of milk when handled in private dairies, would, if applied to the total milk product of the province, show a loss of a million and a-half pounds of butter by reason of the existing state of affairs. To show how I arrive at that conclusion I may say that I made investigations to ascertain the amount of butter-fat left in the buttermilk after being churned in the way that is all too common, and after being handled in the proper manner at creameries. By the creamery process—the cream being thoroughly ripened by souring—I found buttermilk so poor that it contained less than three per cent. of the total fat of the milk, while buttermilk produced by the too common method of churning practised in home dairies—sometimes sweet, sometimes sour, sometimes these two qualities of cream mixed just before churning—contained upwards of twenty-three per cent. of the total fat of the milk—a difference of twenty per cent. of the total butter-fat. I put the loss accruing from imperfect knowledge and unsuitable practice in farm dairies at five per cent., which is an inside estimate, and that gives a million and a-half pounds of butter run off and fed to pigs or wasted in some other way—a million and a-half pounds of butter that should have been sold at from twenty cents to twenty-five cents per pound, annually fed to animals which could have been better fed with coarse meal at one-sixth the cost. That is one serious loss. The other is that we have not recived from the butter we have made in the province the return per pound that we would have received had the butter been made in creameries. Creamery butter, at the very lowest estimate, will bring on the average four cents per pound more than dairy butter made and marketed at the same time. We have lost because the butter made has not been sufficiently fine, and has thus lowered the price in the market for all butter, of both creamery and dairy makes. In this way men have been deterred from keeping cows and have turned their attention to grain growing and grain selling. The whole thing depends upon this creating for what we have to sell, a demand at profitable prices; in other words getting a good market. We have the people to make that market if we can only supply the kind of butter they need and want. Therefore, by the making of butter of that quality, not only may a higher price be realised for it, but a demand may be created; because the man who gets fine butter will eat twice as much, and want butter three times every day. Then the foreign market is open for an unlimited quantity of fancy butter at a high price. England imports a good deal of cheese from us; we send her about one-third of all the cheese she gets from all foreign countries; but we send her only about one and a-half per cent. of the butter she imports from abroad. We send her about thirty-three pounds of cheese in every hundred pounds she imports, and less than two pounds in every hundred pounds of butter she buys, and yet she buys two and a-half times as many dollars worth of butter abroad as she buys of cheese. If we have been able to capture the cheese market, I do not see any reason why we should not secure a large share of the butter market, which is much more extensive, and so gain a larger income to ourselves. I think England is patriotic and motherly enough in regard to her colonies to be just as anxious to send her money this way for butter as to send it to Denmark, Sweden, Norway or Holland, or even to our friend Uncle Sam, as long as she gets fair value for it.

While I have been recommending improvements in our methods and the adoption of creameries instead of home dairying, and suggesting England as an insatiable market for our butter, I do not think that ours is a country which can go successfully into producing butter in the summer time. I have been considering this question for some years and endeavoring to see into it as far as possible, and it is my opinion that no nation can successfully contend against the natural conditions which adapt it for a certain line of life or production. The natural conditions of Canada are not of such a character as to

adapt it for the profitable production of butter for export in the summer time. We should work in harmony with our natural conditions, and not contend against them. We cannot successfully compete with Sweden, Denmark or Ireland, in producing butter in the summer time for the English market. The butter we produce in the summer time should be for our own home trade. If we produce a fancy quality our home market will be doubled in its extent, and if we can double that market it will be found that it is just as large a market as it will pay us to supply. I have no desire to foster the making of butter in summer time for export; I do not think it will pay us. Our country, I think, is adapted for the production of cheese in summer time; it is essentially a country for the production of cheese during those months, and it is admirably adapted for the growth of calves and the manufacture of butter during the winter months. If we will make our cows come in at the proper time, and make butter from their milk, the most profitable part of the dairying season will be from October until April, and not, as now, from April until October. This plan will be found to have many advantages—(some of which I will now try to enumerate)—over the system at present followed in this province. There will be a longer working season. No man can afford to go idle for six months in the year. He should also give his dairy and his cows employment twelve months of the year that they also may produce. Thus he will give himself employment for a long season in a manner which will be highly remunerative to him. Another advantage is, that by making their cows calve in October, the farmers of this province will have better stock than by having them calve in April. An April calf is expensive to rear, and a June calf is often a burden and expense upon the man who owns it. It is usually hard to winter the first year.

A dairyman keeps cows, first to give milk, then to give stock, and then to make beef—milk, stock and beef; and a man who has them in that order will make more money from them all three, than if he had begun the other way about it. Another advantage is that the winter is the period when high prices rule for the product of cows. Butter will bring on the average one-half more per pound from October until April than it will from April until October. A farmer could afford to sell a pound of butter for less between October and April than between April and October. That, then, is the time when he ought to be in the business. In addition to being the period of high prices and cheap production, winter is the period for safe transportation. Butter can be sent to England during the winter without the risk of its being spoiled on the way. Another advantage is that the elements of fertility which exist in the plant food remain on the farm.

Our fathers kept cows that milked in the summer time, and we have been doing the same, and have condemned anything new as a "new-fangled notion," just because it is not something that has been practised from time immemorial. However this is not a new-fangled notion. The people of Denmark, years ago, were a sad, discontented people, against the Government, against the wealthy, against everything in fact but themselves —a poor, unfortunate poverty-stricken people. The Agricultural Society of the Kingdom, and the Dairymen's Association formed afterwards, tried to stir up the farmers of that country to keep cows and make butter during the winter, and to grow the right kind of plant food for animals, and thus work out their own salvation. These men thought it was all moonshine, I am told; but bye-and-bye some thought they would try, and the result was, that when I was in Denmark three years ago I heard no talk of hard times, for the dairy business had completely revolutionised the condition of agriculture. They now send butter to England when it is dear and when transportation is safe, and grow steers and send beef over there to such an extent that, although the kingdom of Denmark is only about one-sixteenth the size of Ontario, they send about as much in value of fat cattle as we do from the whole Dominion of Canada. In the same manner, by keeping abreast of the times and adopting whatever is good, though new, we can increase our export of fat cattle, and at the same time receive larger returns from our dairy products. Some stock breeders think or say that if we go into butter-making in winter we must have a cow that is worth nothing for making beef. The Danes have superior butter-making cows, generally lean when milking. More than half of the beef they send to England in the year is in the shape of fattened cows, and by the actual

returns of the Board of Trade I find that these fattened cows bring only eleven shillings a head less than our magnificent steers. That is about the kind of cow we want.

We need, in regard to this matter of creameries, a little more co-operation than we have had in the past, a little more sympathy between the the farmers and the creamery men. If the farmers would co-operate to support their creamery through the winter they would find these advantages, which I have merely hinted at, more than realised. There are one or two points on which I desire to make myself clear. In all I have written I have not uttered a word antagonistic to cheese factories. I recoginise the work they have done and the value they are to this province. Now, I would like to make them even more valuable; I would like to see them made more valuable by being worked all the year round. Good returns are got from the summer work now, but if the equipment were changed during the winter months, which would not take a very great outlay, they might during that season of the year be operated as creameries, and the butter could be made in the best and most approved style without incurring the expense of new buildings, and the returns from them would be greatly enhanced. The cost of a creamery, even if built entirely new, is not a very heavy expenditure. A creamery capable of handling the milk of at least five hundred cows can be built at a cost of $1,300. A cheese factory can be converted into a creamery at an expense of not more than $250. Every farmer has an interest in this subject; every man who wishes his country well has an interest in it, because as the farmers produce more food they have more to spare, and consequently more money to spend or invest, which means more money for the merchant and better times for everyone. It just revolves itself into this, that the man who will study so that he will understand the cow and her requirements, the best methods of producing a large yield of milk, and the most advanced methods of converting that milk into the best butter and cheese, is a man who is doing everything in his power to advance his own interests as a dairyman, and through those interests the interests of the whole nation. I have therefore to say that the creameries of this province are one of the greatest factors in furthering our national growth, a factor which it should be our desire and object to preserve, develop and heartily support.

5.—BUTTER MAKING.

The following is transcribed as the substance of part of an address which I had the honor to deliver before the convention of the Creameries' Association of Ontario:

. . . "While her milk is being elaborated by a cow, the ends of the cells, which line the inside of the milk-ducts and vesicles in her udder, seem to enlarge. Each one forms a small globule, and when that is perfected it drops off into the serum of the milk. Each bud or globule, so formed, is a globule of fat; from them is made all the butter from cow's milk. These tiny buds of fat seem to grow on the surface of the cells, partly by the destruction of the cells, and partly by the conversion of some of the substance of the cow's blood into fat. They trickle down in and with the milk, and are held in suspension in it, not in solution as are the other solids in it. They mostly come during the latter part of the milking, probably because they do not move so quickly or easily as the liquid part of the cow's milk. The fore milk is thinner than the strippings, because the globules of fat do not free themselves from the internal linings of the milk-ducts so quickly as the liquid of the milk. If one finds sending milk to a cheese factory, a man who is of so modest and retiring a disposition that he will not keep at home for table use a quantity of the average milk given by the cow, but always and only the last quart, his modesty should not be respected or trusted too far; such modesty and honesty may not be found compatible. The condition of the cow's blood and her nervous system very largely affect the quality of the milk she gives. Bad feeding, foul water or the absence of salt will induce in the cow a condition in which she will not yield good milk; a similar condition, with its consequent effects, may be caused by neglect, exposure, abuse or excite-

ment. A cow has a peculiarly delicate organization, and must be handled with kindness, and any man who abuses a cow beats out the profit; for she will pay him back by giving less milk, and that of a poorer quality. The globules of fat, before-mentioned, are so numerous that in a thimbleful of milk there will be found millions of them. It is estimated that there are at least one thousand millions of them in every cubic inch of milk. From these specks of fat the butter is made. To get them out of the milk is the task of the butter maker, they are too small to be strained out with the finest sieve; fifteen hundred of the largest of them placed side by side, like a row of marbles, would not measure more than one inch. If milk be left at rest they will rise to the top because they are lighter than the liquid in which they float. The heavier parts of the milk are drawn down by the force of gravitation, and as the serum of the milk, composed of water, casein, sugar, albumen, etc., moves downward, it displaces the cream globules and forces them towards the top. There are two methods of separating these fat globules from the milk; a natural method and a mechanical method. In the natural method, the power of gravitation is used to pull the heavier portion of the milk down, with the effect that the lighter part, the fat globules, are pushed upward. In the mechanical method, centrifugal force is applied to attain a like result. When a quantity of milk is put into a rapidly revolving vessel or cylinder, the heavier parts will be forced outwards against its resisting side or inner surface with sufficient pressure to push the lighter particles, the globules of fat, towards the centre of revolution. In that way the water, casein, sugar, albumen and the other heavier constituents of milk, find their way to the outside of the quantity being treated in a revolving cylinder, while the globules of fat are collected in concentric form on the inside surface of the quantity being treated. This is the law, that the cream, mainly composed of fat-globules, travels in a direction opposite to that of the force exerted upon the milk, whether the force be centrifugal or centripetal.

If ordinary milk be set in a deep-setting pail and be left at a temperature of 60 degrees Fahr., it would take these small specks from three to six days to get to the top at the rate at which they would move. They can be helped to move faster. The milk at a temperature between 90 and 98 degrees is slightly enlarged in bulk, and by putting it into the deep-setting pails at the higher temperature, (90° to 98°), the advantage of a falling temperature from above 90° to 40° or 45° may be gained. That treatment will expedite and facilitate the upward movement of the globule of fat. The rapid cooling of the milk is also believed to prevent the formation of a delicate mesh of lacto-fibrin, which would hinder the globules from rising freely.

The cream itself is only that part of the milk into which the globules of fat have been gathered in large numbers. Cream has no regular or constant per cent. of fat; the range is from 8 per cent. to 75 per cent of fat. In one hundred pounds of cream there may be only eight pounds of butter, or there may be seventy-five pounds according to its quality of richness. The globules of fat have no skins or organic coverings distinct in constitution from their own substance. Like drops of quicksilver that have separated from each other, they have no pellicle. But sometimes the serum of the milk becomes so viscous that a quantity of it will adhere to the surface of the globules and like a coating of gum will prevent their movement upwards when the milk is set, or their movement inwards when the milk is treated in a centrifugal machine. If a quart of warm water be stirrred into every pailful of milk when it reaches the dairy room from the stable, the separation of the cream will be facilitated. The water may be at a temperature anywhere between 150 and 180 degrees Fahr., and should be warm enough to raise the temperature of the milk to above 90 degrees. In the winter season especially, difficulty is experienced sometimes in churning the cream. The addition of water at a temperature of 70 degrees to the cream, while it is still sweet, to the extent of 25 per cent. of its bulk, will cause it to yield its butter in less time and more completely. The water should be added before the cream is sour and at least 20 hours before the churning is commenced. The next treatment required is the development of lactic acid. If a quantity of sweet cream be churned and an equal quantity of sour cream of the same quality as to composition be also churned, there will be obtained from the sweet cream

only 77 pounds of butter out of every possible 100 pounds, while there may be obtained from the sour cream 97 pounds of every possible 100 pounds. That is to say, by the churning of cream thoroughly soured, one obtains butter in the proportion of 97 pounds, to 77 pounds from the churning of cream in a sweet condition. There are thousands of pounds of butter lost in the province annually from the churning of two qualities of cream in the same churn at one churning. The only safe plan is to have all the cream for each churning thoroughly mixed from twelve to twenty hours before the operation begins. It should be kept at a temperature of from 60 to 70 degees according to the season of the year, to permit it to become sour. The higher temperature is required during the winter season and also for cream from centrifugal separators during the summer season. The churning is performed for the purpose of causing the globules of fat to strike on to each other and by impaction to unite. If two globules strike each other at a suitable temperature they will stick together; when large numbers of them unite in that way, it is said that the butter has 'come,' and the particles may be washed and removed. All that is required in the churning of cream is that the serum or medium shall be properly treated (by the addition of water if required, as already described) by the development of acid, and by the temperature being kept at from 57 to 59 in the summer time or from 62 to 66 in winter. It is imperative that a thermometer should be used to reveal the temperature. After the butter particles are half as large as wheat grains, the churning may be stopped. The butter-milk may be removed and replaced by pure water at a temperature of from 50 to 55 degrees. It may thus be washed in the granular state. When the water runs off free from a milky appearance, the granular butter should be left in the churn for half an hour to drain. It may then be salted in the churn or removed to the butter worker for that purpose. Pure salt of fine velvety grain only should be used. The rate of salting should be regulated to suit the taste and requirements of the customers. From three-quarters of an ounce to one ounce per pound will be found acceptable to most of those who purchase Canadian butter. The preparation for the market should be made with a view to giving the butter an attractive appearance, whether it be packed in tubs or firkins, or finished in prints or rolls. I advise the making of fine butter on the farms in winter time; then as soon as a number of farmers in any section do that, I recommend the starting of a creamery for operation during the winter and the raising of the best stock."

6.—EXPERIMENTAL CHEESE-MAKING.

During the course of the convention of the Dairyman's Association of Western Ontario, held in London on January 16th and 17th, 1889, the following resolution was unanimously carried.

"Moved by Mr. J. W. Scott, seconded by Jas. Carmichael, and resolved, That this Association express its approval of the suggestion of Mr. Thos. Ballantyne, for the carrying on of experimental work in cheese-making in two factories in the province during the coming season. Resolved further, that we recommend to the Minister of Agriculture the desirability of instructing Professor Robertson to make such provision as he may deem necessary for the proper prosecution of experimental investigations."

In consequence of this recommendation and my own representations to the Minister of Agriculture, he was good enough to make all necessary financial provisions for the undertaking of experiments. A sufficient supply of milk is not available in the vicinity of the College and we have no equipment for cheese-making work. The time at my disposal for beginning and conducting experiments in the manufacture of cheese, was limited to parts of two weeks. One of the factories of the President of the Dairymen's Association of Eastern Ontario, was selected as the place for the work. The preliminary preparations were made at a very small expenditure of money. The ordinary equipment of the factory was deemed sufficient for all practical purposes. One milk vat was divided into three compartments of almost equal capacity, by the soldering of two partitions of

strong tin across it. It was so constructed that three equal quantities, from a vat full of milk which had been previously well stirred, might be treated in similar or different ways. Owing to the short time available for the work, the experimental examinations were confined to four lines :—

1st. The influence and noticeable effects of the use of different quantities of rennet extract in the same milk, when handled under similar conditions of temperature, time, acid and salt.

2nd. The noticeable effects of the use of different rates of salting upon curd that in other respects was treated alike.

3rd. The effect of continuous stirring of the curd after the removal of the whey, compared with the effects resulting from matting of the curd with partial packing, and close packing, piling and covering.

4th. The effect of different setting temperatures upon the same milk when made up under similar conditions of treatment in every other respect.

The experiments were commenced on the 27th day of August, at the factory, as already intimated, of Mr. M. K. Everetts, at Merrickville, Ont. The following I find among my notes made at the time. "The weather during the last week of August has been the warmest of the summer. Most of the milk when heated had a gassy odor similar to what has been much complained of by cheese makers during the summer. With the exception of the milk received on August 31st, it all showed an over-ripe or acidy condition. The presence of acid could be discerned by the hot iron test immediately after or before the cooking temperature was reached. The factory and utensils were creditably clean ; the whey was returned to the patrons in the milk cans, and a bad odor arising from the whey tank and surroundings was the only objectionable feature of the premises."

The cheese were shipped to Guelph within a week after they were made, and were all cured in the same room at an average temperature of about 65°, until Nov. 9th, when they were put in a dry, cool cellar. The result of examinations made by myself, Messrs. R. M. Ballantyne, and A. F. McLaren, as well as by a large number of experts, who examined them during the progress of the dairymen's conventions at Belleville and Stratford in Jan. 1889, are given in the following tables.

1st. On August 28th, 4,000 lbs. of milk were used to test the effect of different quantities of extract of rennet. The milk was thoroughly mixed in one vat and then 1,333 lbs. of it were put into each of the three compartments of the experimental vat. Hansen's extract of rennet was used. The milk in the different compartments was designated as Lots 1, 2 and 3. The following table will show the treatment :

—	Lot 1.	Lot 2.	Lot 3.
Quantity of milk	1,333 lbs.	1,333 lbs.	1,333 lbs.
Quantity of rennet-extract used per 1,000 lbs. of milk.	9 oz.	6 oz.	3 oz.
Set at a temperature of 86° at	10.02 a.m.	9.58 a.m.	9.53 a.m.
Thick at	10.06 "	10.05 "	10.04 "
Cut at	10.18 "	10.20 "	10.16 "
Commenced stirring at	10.40 "	10.40 "	10.40 "
Turned on steam at	11.00 "	11.00 "	11.00 "
Heated to 98° at	11.35 "	11.35 "	11.35 "
Acid discernible by hot iron test	12.05 p.m.	12.05 p.m.	12.05 p.m.
Whey started to run off at	12.05 "	12.05 "	12.05 "
Whey off and curd on strainer on a rack	12.40 "	12.35 "	12.30 "
Temperature of 94° at	2.30 "	2.30 "	2.30 "
Run through curd cutter	2.50 "	2.45 "	2.40 "
Hand-stirred until	3.10 "	3.10 "	3.10 "
Salted at	3.10 "	3.10 "	3.10 "
Curd put to press at temperature of	85°	85°	85°

	Lot 1.			Lot 2.			Lot 3.		
Three cheese from each lot numbered.....	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.
Rate of salt applied per 1,000 lb. of milk.	2½ lb.	2¾ lb.	3¼ lb.	2½ lb.	2¾ lb.	3¼ lb.	2½ lb.	2¾ lb.	3¼ lb.
Weight of curd put in each hoop	48 "	48 "	48 "	48 "	48 "	48 "	48 "	48 "	48 "
Weight of cheese on August 30th	45½ "	45 "	43 "	45 "	44½ "	44 "	45 "	44½ "	44 "
Weight of cheese on October 18th.....	43 "	42¼ "	40½ "	42½ "	42 "	41¾ "	42½ "	42 "	41½ "
Weight of cheese on January 3rd	41¾ "	41¼ "	39½ "	41¼ "	40¾ "	40½ "	40¾ "	41 "	40¾ "
Order of merit as judged by myself to discover effects of different rates of salting, Oct. 22nd .	Third.	Second.	First.	Third.	Second.	First.	Second.	Second.	First.
By Messrs. Ballantyne and Maclaren, Nov. 1st.	Third.	Second.	First.	Second.	Third.	First.	Third.	Second.	First.
By myself, Jan. 2nd ...	Third.	Second.	First.	Equal.	Equal.	Equal.	Third.	First.	First.
Order of merit as judged by myself to discover the effects of different quantities of rennet extract, Oct. 22nd.....		Third.			Second.			First.	
By Messrs. Ballantyne and Maclaren, Nov. 1st.		Third.			Second.			First.	
By myself, Jan. 2nd		Third.			First.			First.	
By experts at Belleville Convention who compared only Nos. 2, 5 and 8		Third. First.			First. Third.			Second. Second.	
By experts at Stratford Convention who compared only Nos. 1, 3, with 4, 6, and 7, 9.....		Third.			Second.			First.	
Average lb. of milk required per lb. of cheese calculated from weight at Jan. 3rd.		10.88 lbs.			10.88 lbs.			10.88 lbs.	

The average shrinkage of weight by the curing from August 30th to October 18th was from 5.4 to 5.8 per cent.

The average shrinkage of weight by the curing from October 18th to January 2nd was 2.7 per cent.

As far as I was able to discern by close examination there was no difference in the progress of curing ; the cheese made by the use of 3 oz. of rennet extract per 1,000 lbs. of milk, cured as quickly as those from 9 oz. Evidently the rennet is not the curing agent. I think the rapidity or the slowness of curing depends upon the proportion of moisture left in the cheese, the quantity of salt added and the temperature at which they are kept. The function of rennet in cheese-making seems to be coagulation. To effect that perfectly, a larger quantity is required in the making of cheese from fodder-milk and milk shortly after the cows have come in, than during the summer and autumn. A cheese of "heavier body" results from the use of a larger quantity of rennet and a larger quantity of salt than from the use of a less quntity of these.

2nd. During the progress of the tests, three cheese in each of eighteen different lots of curd were salted at different rates, to discover the "noticeable effects of the use of different rates of salting upon curd that in other respects was treated alike."

In each lot, one cheese was salted at the rate of 2½ lb. of salt per 1,000 lbs. of milk; another at the rate of 2¾ lb., and a third at the rate of 3 lb. of salt per 1,000 lb. of milk. I do not think that it would serve any good purpose to specify all the details of the manufacture and treatment ; hence I state only the results of the examinations by experts and my own conclusions.

In the comparisons as to the order of merit in market value, on November 1st and January 2nd, the following presents a summary of the judging:

Cheese with 3 lb. of salt per 1,000 lb. milk.	Cheese with $2\frac{3}{4}$ lb. of salt per 1,000 lb. milk.	Cheese with $2\frac{1}{2}$ lb. of salt per 1,000 lb. of milk.
1st.—Fifteen times.	1st.—Once.	1st.—Once.
2nd.—Once.	2nd.—Fourteen times.	2nd.—Three times.
3rd.—Once.	3rd.—Twice.	3rd.—Thirteen times.
Equal—Once.	Equal—Once.	Equal -Once.

The cheese with the highest rate of salting had invariably the "heaviest" and "firmest body." The flavor on January 2nd was better in the cheese with 3 lb. of salt than in the others. These conclusions apply mainly to cheese made during the latter half of August and during September and October. The larger the amount of salt used, the drier the curd becomes, and the longer is the time required for curing.

3rd. "The effect of (1) continuous stirring of the curd, after the removal of the whey" was compared with the effects resulting from (2) matting of the curd with partial packing and from (3) close packing, piling and covering."

A series of five tests was instituted. Two of the lots were made up "white" or without coloring, and three were made "colored." 3 oz. of extract of rennet per 1,000 lbs. of milk were used in every lot. The method of procedure was to fill each of the three compartments of the experimental vat with an equal quantity of milk from a vat where it had been previously mixed. The treatment of all was similar, until the whey was drawn off, which was done when the hot-iron-test would show "acid hairs" to the length of from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch.

After the removal of the whey, the curd of Lot 1 was stirred on a rack with a strainer until it was "dry and firm." The condition of being "dry and firm" is reached when no free whey will collect in the curd when it is allowed to mat. The curd was then allowed to mat, was turned frequently, was packed close and ultimately piled seven or eight layers deep.

Meanwhile the curd of Lot 2 was also stirred on a rack with a strainer, until it was "dry and firm." It was then allowed to mat, was frequently turned, but was not packed more than two layers deep.

At the same time the curd of Lot 3 was also stirred on a rack with a strainer until it was "dry and firm." It was afterwards stirred occasionally and not allowed to mat; no piece of it was at any time larger than the size of a hen's egg; most of it was kept in a condition of a separation of the particles, the same as before the removal of the whey.

One cheese of *each lot* was salted at the rate of $2\frac{1}{2}$ lb. of salt per 1,000 lbs. of milk; one at the rate of $2\frac{3}{4}$ lbs., and another at the rate of 3 lb. per 1,000 lbs. of milk.

Another method of procedure was to divide the curd of one large vat into three nearly equal lots immediately after the removal of the whey as before mentioned. The three lots were then treated differently as described above; viz, Lot 1 was stirred until "dry and firm," and afterwards matted, turned frequently, packed and piled seven or eight layers deep; Lot 2 was stirred until "dry and firm," and afterwards matted, turned, and laid two layers deep; Lot 3 was stirred until "dry and firm" and afterwards stirred occasionally and kept from matting.

I will in this case also give only a summary of the judging as I do not think that any good end would be served by a publication of all the little details.

Summary of FIVE examinations of the cheese of each of the five tests by other experts and myself as mentioned in the table of the extract of rennet test:

—	Lot 1. (Matted, packed, piled.)	Lot 2. (Matted only).	Lot 3. (Stirred).
First 9 cheese examined.			
By myself, October 22nd	Equal.	Equal.	Equal.
By Messrs. Ballantyne and Maclaren, November 1st	Equal.	Equal.	Equal.
By myself, January 2nd	Equal.	Equal.	Equal.
By experts at Belleville, January 9th	Equal.	Equal.	Equal.
By experts at Stratford, January 16th	First.	Second.	Third.
Second 9 cheese.			
By myself, October 22nd	First.	Second.	Third.
By Messrs. Ballantyne and Maclaren, November 1st	Third.	Second.	First.
By myself, January 2nd	First.	Second.	Third.
By experts at Belleville, January 9th	First.	Second.	Third.
By experts at Stratford, January 16th	Third.	Second.	First.
Third 9 cheese.			
By myself, October 22nd	First.	Second.	Third.
By Messrs. Ballantyne and Maclaren, November 1st	First.	Third.	Second.
By myself, January 2nd	First.	Second.	Third.
By experts at Belleville, January 9th	First.	Second.	Second.
By experts at Stratford, January 16th	First.	Second.	Third.
Fourth 9 cheese.			
By myself, October 22nd	Third.	First.	Second.
By Messrs. Ballantyne and Maclaren, November 1st	Third.	Second.	First.
By myself, January 2nd	First.	Second.	Third.
By experts at Belleville, January 9th	Second.	First.	Third.
By experts at Stratford, January 16th	First.	Second.	Second.
Fifth 9 cheese.			
By myself, October 22nd	First.	Second.	Third.
By Messrs. Ballantyne and Maclaren, November 1st	Third.	Second.	First.
By myself, January 2nd	Equal.	Equal.	Equal.
Summary of the five tests of 9 cheese each	1st—Twelve times. 2nd—Once. 3rd—Five times. Equal—Five times.	1st—Twice. 2nd—Fifteen times. 3rd—Once. Equal—Five times.	1st—Four times. 2nd—Four times. 3rd—Ten times. Equal—Five times.
Average quantity of milk required to make a pound of cheese calculated from the weight of cheese, January 3rd	10.53 lb.	10.60 lb.	10.74 lb.

As between Lots 1, 2 and 3 in each series of 9 cheese, there was no appreciable difference in market value.

4th. The effect of different setting temperatures upon the same milk when made up under similar conditions of treatment in every other respect, was examined by one test only; time was not available for continuing it further.

Each compartment of the experimental vat was filled with an equal quantity of milk which had been previously mixed. The milk in one compartment was set at a temperature of 84° ; in another compartment at 90°, and in the third compartment at 96° Fahr. The treatment and conditions were made and kept as nearly alike as possible throughout the whole process. There was no appreciable difference in the quality of the cheese.

Shrinkage.—The average shrinkage in weight on the cheese from August 30th—(one and two days after the cheese were made)—to October 18th, was 5.08 per cent. ; the shrinkage from October 18th to January 3rd was 1.70 per cent.

General Conclusions.—The quantity of rennet used in cheese-making does not hasten or retard the curing process except as a larger or less proportion of water (or moisture) is retained in the cheese by its use.

For long-keeping cheese the *smallest quantity of rennet* that will perfectly coagulate the milk, fit for cutting, in from 45 to 50 minutes at 86° Fahr. will give the best results.

A proportionately larger quantity of rennet should be used when the milk is over-ripe or acidy.

For "spring" and early summer-made cheese the quantity of salt should not exceed 2¼ lb. per 1,000 lb. of milk ; for midsummer and autumn-made cheese the rate should be increased to 2½, then to 2¾, then to 3 lb. of salt per 1,000 lb. of milk.

The tests with matting and close packing, *versus* matting, *versus* loose stirring, indicate that no one of these treatments is essential to the making of finest cheese ; the main point is that the whey shall be stirred out of the curd until it becomes "dry and firm" before the acid is developed to cause the curd to "draw out" on the hot iron test as far as half an inch. *When that is provided for*, the matting and packing result in giving to the cheese a more flakey and silky texture.

The setting temperature does not seem to exercise any important influence on the quality of the cheese ; in ordinary practice 86° is the most serviceable temperature ; when the milk is acidy or over-ripe a higher temperature will be more conducive to the certain manufacture of cheese of fine texture and body.

BULLETINS FOR CHEESEMAKERS AND PATRONS.

Notes for Cheese-Makers for May.

Factories and their Surroundings.

1. *The present*, not next week, will be fitting time to see that all the drainage facilties are adequate and in good working order.

2. Whey runs, spouts and tanks should be put into such order that leaking will be prevented.

3. If there be a leakage anywhere from floors, spouts or tanks, which is not immediately preventible, provision should be made at once for drainage, if only by shallow open trenches. A liberal supply of lime and gypsum should be spread around such places. Don't fail to secure a barrel or two of each *some time this month* for use during the hot weather.

4. If the factory buildings are not painted and will not be painted, get them whitewashed this month. If you cannot get that done by the proprietors or managers, get permission and do the rest yourself. A whitewashed curing room of imperfect construction can be kept 10 degrees cooler in summer than one not whitewashed. If the cheese become injured, through excess of heat, neither the buyers nor the patrons will whitewash your reputation then.

5. Make the surroundings of the factory neat and tidy. Plant a few trees and a great many flowers.

6. While keeping the outside of the premises as creditable to your taste and neat habits as possible, make the inside to reflect still more your aversion to everything untidy and dirty. Give every part of the factory a thorough cleaning and keep it in a sweet state all summer.

7. Before the curing-room contains any cheese, fumigate it by burning some sulphur in alcohol. That will prevent the growth of mould on the outside of the cheese.

8. The leisure hours of May, before the large flow of milk is received, should be employed putting all the apparatus, appliances, utensils and machinery in the best of working order.

9. Be sure that the making room floor is so well constructed and supported that it will not shake or vibrate *during* the coagulation of the milk.

Milk and Making.

1. Procure a copy of "Milk for Cheese Factories" for each of your patrons by applying to the Dairy Department, Ontario Agricultural College, Guelph, stating the number required and the addresses to which they are to be sent.

2. Look out for "leeky" flavors in the milk. Don't put such milk into the vat with that of the other patrons. If you have time, make it up by itself and send the cheese from it to the patron for his private use.

3. Make provisions for keeping a short record of each day's work, of the exceptional treatment of every vat and of the comparative quality of the cheese from the same before they are shipped.

4. Milk sours readily and rapidly for a number of weeks after the period of lactation begins. Hence milk seldom requires to be ripened for setting during May.

5. Use enough rennet to coagulate the curd into a state fit for cutting in form 17 to 20 minutes, at from 82° to 88° Fahr.

6. Cut it rather early, slowly and very carefully.

7. Use the horizontal knife first.

8. Afterwards allow the curd to settle until whey comes over nearly the whole surface.

9. Then begin to cut with the perpendicular knife.

10. Immediately after the cutting is completed, begin to stir the mass slowly and and continuously, until the curd is cooked.

11. Heat should not be applied until 10 minutes after the stirring is begun.

12. The heating should be effected gradually, at the rate of about 1 degree for every 4 or 5 minutes until 98° Fahr. is reached.

13. Draw most of the whey early, and so guard against being caught unprepared for the rapid development of acid.

14. Don't dip the curd until the presence of acid is discernible by the hot iron test. Sweety flavors result from too early dipping in May.

15. After dipping the curd, stir it gently and keep it at a temperature above 94°.

16. Don't attempt close matting, high piling or packing of the curd. See that the whey is separated from it.

17. When it begins to feel "slippy" and smells like fresh made butter, it should be put through the cutter or grinder.

18. Acid develops so rapidly that care must be taken to keep the treatment well in advance of the change in the curd.

19. After grinding or cutting, stir for 10 or 15 minutes before salting.

20. Apply salt at a rate of about 1½ lb., early in the month, to 2 lb. per 1,000 lb. of milk during the last ten days, varying the quantity slightly according to the condition of the curd as to its moisture.

21. Begin to put the curd in the hoops within 20 minutes after the salt is stirred in.

22. Use only pure water in bandaging.

23. Guard against the formation of edges or shoulders from the hoop-followers being too small. Apply the pressure gradually until the whole power through the long lever is used, after four hours.

24. Leave the press-cloths on, and turn the cheese in the hoops every morning. Let no cheese leave the press-room until the shape is symmetrical and the finish neat.

25. Don't press the scaleboards on the ends of the cheese.

26. When the press-cloths are removed, use hot clean whey-oil or butter, into which has been dissolved a teaspoonful of soda per cupful of oil.

27. Try to keep the temperature of the press-room above 60° Fahr.

28. The curing-room should be kept at a temperature constantly between 65° and 70° Fahr.

29. Provide strong, smooth boxes of the exact size.

30. Stencil the weight of the cheese in neat figures on the side of every box.

Patrons.

1. Try to get each patron to take a personal interest in the care of the milk.

2. Encourage every farmer in your neighborhood to sow a small area of oats and pease or oats and vetches for summer supplementary feed.

3. Persistently endeavor to induce every patron to plant at least 5 acres of fodder corn in rows three feet apart.

4. Send to the Dairy Department, O. A. C., Guelph, for a bulletin of instruction on the planting of fodder corn and the curing of silage.

Milk for Cheese Factories.

Feed.—The milk of cows being a direct elaboration from their blood, whatever interferes with a healthy condition of that fluid will also effect the quality and quantity of the milk secreted. Too much care cannot be exercised in providing feed suitable, succulent, easily digestible, wholesome and nutritious. The grass of early summer is too watery and weak in nutriment for its bulk to be fed alone to the greatest advantage. A judicious allowance of bran, pease and oats, oil-cake or cotton-seed meal will increase the milk supply and fortifythe cow's system for the larger production of milk during mid-summer, fall and winter. Fodder corn, sown broadcast, does not meet the needs of milking cows. Such a fodder is mainly a device of a thoughtless farmer to fool his cows into believing that they have been fed when they have been only filled up. The same plant when grown under conditions favorable to its attainment of mature size and quality—in rows or hills 3 feet apart with from 2 to 6 seeds per foot in the row—yields a fodder by means of which cows are enabled to produce the largest amount of milk, butter or cheese per acre area of the land required for their support. Fodder corn is not a complete ration for the most economical production of the best milk. When supplemented by feed rich in albuminoids, such as these already mentioned, better returns for the feed consumed are realised. Last summer one of our leading Canadian dairymen, feeding 18 cows upon fodder corn to supplement scant pasture, furnished milk to a cheese factory. In course of time he provided a supply of bran, and by the end of the first week thereafter he found by an examination of the factory books that he was credited with enough extra milk to pay for the bran consumed ($2\frac{1}{2}$ lb. per cow per day) and to leave him a balance of $2.43 of extra profit for that week.

Water.—Water is nature's vehicle for carrying about most of the matter which she requires to move from place to place. The great boulders were quietly clasped in her arms and without apparent effort brought from the northern ridges to the southern parts of our province. The tiniest specks of nourishing

matter needed to replace the worn-out tissues of the body are likewise carried to their proper places in this wonderful omnibus. The identical water swallowed by a cow to serve as a carrying medium in her blood for the equable distribution of the elements of nutrition throughout her whole body is made to serve a like function in the milk which she yields. If that water be impure in the first place, it is liable to continue so throughout its whole mission, from the drinking by the cow until after its consumption by the creature consuming the cow's product. Water which has been contaminated by decaying animal matter is specially likely to retain its impurities. The milk from cows drinking such water is a menace and danger to the public health, and interferes greatly with the commercial value of all dairy products. There should be an abundant supply of pure water, easily accessible by the cows during hot weather. It should be furnished at a comfortable temperature during the cold weather of winter. I have not found that cows which are denied access to abundance of water will give as much milk or milk of as good quality as when plenty of water is provided with wholesome satisfying feed.

Salt.—Dairy cattle should have access to salt every day, and salt should be added to all their stable feed daily. A series of experiments has convinced me that when cows are denied salt for a period of even one week they will yield from 14½ to 17½ per cent. less milk, and that of an inferior quality. Such milk will on the average turn sour in 24 hours less time than milk drawn from the same or similar cows receiving salt, all other conditions of treatment being equal.

Shelter.—Comfortable quarters are indispensable to the health and well-being of cows. Stables during the winter should have a temperature constantly within the range of from 40° to 55° Fahr. In summer-time a shade should be provided in the pasture fields, or adjacent thereto, to protect against the bristle-making influence of July and August suns. In all the management of cows such conditions should be provided and such care given as will insure excellent health and apparent contentment.

Milking.—When practicable, milking should be done by the same person, and with regularity as to time. He only that hath clean hands should be allowed to milk a cow. I say "he" because I think the men of the farm should do all the milking, at least during the winter months. I have exercised the right of changing my mind on that subject since I left the farm. It is no more difficult to milk with dry hands than with them wet. It is certainly more cleanly, and leaves the milk in a much more desirable condition for table use or manufacture. Pure stable atmosphere is indispensable to prevent contamination from that source. Immediate straining will remove impurities which otherwise might be dissolved to the permanent injury of the whole product.

Aëration.—After the straining is attended to, the milk should be aërated. Too often it is poured into one large can and left there just as the cows have given it. That neglect implies three things that are very injurious to its quality for cheese-making. (1) The peculiar odor which the cow imparts to the milk will be left in it until it becomes fixed in its flavor. (2) The germs of fermentation that come in the milk and from the air have the best conditions for growth and action when the milk is left undisturbed. (3) Then the milk will become almost unfit for thorough coagulation by rennet. Hence it is needful and advantageous to aërate it for three reasons. First, because by pouring, stirring, dipping or by trickling it over an exposed surface there is eliminated from the milk by evaporation any objectionable volatile element that may be in it. Secondly, because as has already been stated the milk contains germs of fermentation Some of these are called vibriones. A strange peculiarity about these microbes is that they become active only in the absence of free oxygen. When warm new milk is left undisturbed carbonic gas is generated, and that furnishes the best condition for the commencement of action by these almost invisible creatures. After they get started they can keep up their decomposing work even in the presence of oxygen. It is impossible to coagulate such milk so as to yield a fine quality of keeping cheese. Coagulation by rennet of milk that is ripe can never be perfect unless it has been thoroughly aërated immediately after it is taken from the cow. *Neglect of aëration will increase the quantity of milk required to make a pound of fine cheese.* Thirdly, because the airing seems to

give vigor to the germs of fermentation that bring about an acid condition of the milk, without producing the acid. So much is this so that *it has been found impracticable to make strictly first-class Cheddar cheese from milk that has not been aërated.*

Cooling—The subsequent cooling of milk retards the process by which it is turned sour. Certain germs of fermentation exist in milk which in the act of multiplication split one molecule of sugar-of-milk into four molecules of lactic acid. By delaying the operation of these germs the milk is kept sweet for a longer period. The cooling of the milk should never precede the aëration. A temperature of from 65° to 70° Fahr. will be found cold enough for the keeping of milk over night, when it has been previously aired.

Protection.—Milk is a liquid of absorbent proclivities. It should be protected against injury that would result from exposure to impure air. A general purpose milk-standis a device specially adapted for the spoiling of milk in that way. Such a stand serves as a milk-stand and also a carriage stand, both of which are legitimate uses. Sometimes it is also occupied as a hog bivouac for the convenience of these animals, the end of whose whey trough furnishes one step for the stand. Both of these latter extensions of its uses and hospitalities are all wrong.

Honest Milk.—The employment of inspectors promises to improve the quality of the milk furnished by some patrons, whose highest moral aspiration is limited by an effort to keep the self appointed commandment, "Thou shalt not be found out." The adulteration of milk by the addition of water, the removal of any portion of the cream or the keeping back of any part of the strippings is forbidden by both Dominion and Ontario statutes. Any person who is found out so doing will not escape lightly. The inspectors appointed by the Dairymen's Associations have been equipped with suitable and competent testing instruments and have been instructed to render every assistance to cheese-makers, looking towards the prevention of adulteration and the conviction and punishment of those who may be found guilty of the practice.

Matters most needful of Care.—In the following short paragraphs I have ventured to gather helpful advice on the matters most needful of care.

1. Milk from cows in excellent health and apparent contentment only should be used.

2. Until after the eighth milking, the milk should not be offered to a cheese factory.

3. An abundant supply of suitable succulent, easily digestible, wholesome nutritious feed should be provided.

4. Pure cold water should be allowed in quantities limited only by the cow's capacity and desire to drink.

5. A box or trough containing salt to which the cows have access every day is a requisite indispensable in the profitable keeping of cows.

6. Stagnant impure water should be prohibited. The responsibility for the efficacy of that beneficial prohibition rests wholly with the individual farmer.

7. Wild leeks and other weeds common in bush pastures give an offensive odor and flavor to the milk of animals consuming them.

8. All vessels used in handling of milk should be thoroughly cleansed immediately after their use. Washing first in tepid or cold water to which has been added a little soda, and subsequent scalding with boiling water, will prepare them for *airing*, that they may remain perfectly sweet.

9. Cows should be milked *with dry hands*, and only after the udders have been washed or thoroughly brushed.

10. Tin pails only should be used.

11. All milk should be properly strained *immediately* after it is drawn.

12. Milking should be done and milk should be kept only in a place where the surrounding air is pure. Otherwise the presence of the tainting odors will not be neglected by the milk.

13. All milk should be *thoroughly aired* immediately after it has been strained. The treatment is equally beneficial to the evening's and the morning's milk.

14. In warm weather all milk should be cooled to the temperature of the atmosphere after it has been aired, but not before

15. Milk is better for being kept over night in small quantities, rather than in a large quantity in one vessel.

16. Milk-stands should be constructed to shade the cans or vessels containing milk from the sun, as well as to shelter them from rains.

17. Only pure, clean, honest milk should be offered. Any deviation from that will not always go unpunished.

Notes for Cheese-Makers for July.

July cheese, like July butter, has a reputation for being the poorest of the summer. This year it should be exceptionally fine. The abundance of grass in June, with a too plentiful rainfall, will leave the pastures with richer herbage than usual. Suitable conditions for the production, preparation and preservation of the milk in a fit state for the manufacture of fine cheese can be continued by the patrons giving effect to these simple requirements :

1. Cows need the owner's providential care in the following matters, viz.:—

(*a*) An abundant allowance of succulent or other feed ;

(*b*) Opportunity to drink pure water at least twice a day ;

(*c*) Access to salt every day ;

(*d*) Shade in the pasture fields from the "bristly" influence of July suns ;

(*e*) Regularity in milking ;

(*f*) Management and handling with continuous kindness, having an eye to profits.

2. Cows should be prevented from drinking impure water and should be protected against the attentions of all dogs.

3. (*a*) Milk should be strained immediately after milking.

(*b*) It should be aired by the use of an aërator or by dipping, pouring or stirring.

(*c*) It should be cooled to the temperature of the atmosphere.

(*d*) It should be protected from contamination by the foulness of impure air.

It will be of quick and durable advantage to direct the attention of all patrons to these matters by sending to each a concise, clear and courteous reminder of duty in connection therewith.

When the yield of milk by the cows begins to shrink, the temptation to make up the quantity in some other way is increased. The Act passed by the Dominion Parliament during last session, to provide against frauds in the supplying of milk to cheese, butter and condensed milk manufactories is a piece of wholesome legislation.

It forbids the sending to any such factory milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as skimmed milk, or milk from which any portion of that part of the milk known as strippings has been kept back, or any milk that is tainted or partly sour. The penalty for each offence against the provisions of the Act, upon conviction thereof before any justice or justices of the peace, is a fine not exceeding fifty dollars and not less than five dollars, together with the costs of prosecution.

The fine when recovered shall be payable, one-half to the informant or complainant and the other half to the representative of the factory to which the milk was sent, to be distributed among the patrons in proportion to their respective interests in the product thereof.

Let every cheese-maker get a copy of this Bulletin published in the local newspaper, and further, let him see that every patron is furnished with a copy of that issue.

Some of the qualities that are expected and desirable in the cheese of July are :—

1. Rich, clean, creamy flavor ;
2. Solid, firm, buttery body ;
3. Fine, silky, flaky texture ;
4. Bright, uniform color ;
5. Attractive, neat, symmetrical, stylish appearance.

In order that cheese having just these qualities may be manufactured regularly, I make the following notes for guidance.

1. Thorough distribution of the rennet in the milk must be effected by diluting the rennet extract and by vigorous stirring.

2. Sufficient rennet to coagulate the curd into a state fit for cutting in from 35 to 40 minutes at from 86° to 90° should be used. When an extra quantity of rennet is used, a corresponding increase in the weight of salt should be added to the curd.

3. The contents of the vat should be perfectly still when coagulation commences. Vibration of the floor and of the vat during the thickening of the milk causes waste.

4. The horizontal knife should be used first in cutting ; and active stirring should not commence until the cubes of curd becomes slightly healed.

5. The temperature should be raised gradually to 96° or 98° Fahr.

6. The stirring should be continued until the curd particles are so well "cooked" or "dried" that when a handful has been pressed for a few moments they will fall apart again as the result of any slight disturbance.

7. As soon as the presence of acid is discernible by the hot iron test the whey should be removed. In the case of gassy curds, a further development of acid before the drawing of the whey will be beneficial.

8. Hand stirring will be of advantage *until the curd is firm.*

9. The temperature should be maintained at or above 94°.

10. The curd should be allowed to mat into one mass.

11. It should be turned so frequently that whey will not collect or stand in small pools in or on it.

12. If it becomes gassy it should be aired (if need be by grinding and stirring) and afterwards kept at a temperature above 94°.

13. The gas formed in gassy curbs hinders the developement of acid and the presence of acid prevents the formation of gas. The treatment should provide for the removal of the gas by aëration and the maintenance of temperature by the application of hot water to the curd or steam to the vat or sink in which it is.

14. Close matting and packing of the curd are beneficial only after the curd is sufficiently dry and when aëration is provided for.

15. When the texture of the curd becomes stringy in its nature, it should be put through the cutter or grinder.

16. Aëration should be effected by stirring before the addition of salt. Usually 15 minutes of such treatment will suffice.

17. Salt should be added at the rate of from $2\frac{1}{2}$ to $2\frac{3}{4}$ lb. per 1,000 lb. of milk, according to the dry or wet condition of the curd. A judicious variation in the quantity of salt should be made in proportion to the moist or dry state of each curd.

18. The "hooping" of the curd should begin when the harsh surface, produced on each piece of curd by the salt, commences to give place to a slippy, mellow quality.

19. Shoulders or projecting edges on cheese are unsightly evidences of careless workmanship, and lessen their value from 2 to 3 shillings per cwt. in the English markets. Careful pressing and bandaging and the turning of the cheese in the hoops in the morning will prevent their formation. The pressure should be continued for at least 20 hours In that way cheese can be finished having an attractive, neat, symmetrical and stylish appearance.

20. The sprinkling of cold water in the curing rooms in the morning and just after noon will reduce the temperature.

21. The curing room should be thoroughly ventilated and should be kept clean. The inspectors report that a good many factories need a general cleaning up.

Notes for Cheese-Makers for August.

A cheese factory's reputation is largely determined by the quality of its August, September and October output. The beginning of August is a fit time for every cheese-maker who has had only partial success during the hot weather to redeem his reputation and that of his factory. A comparison of the prices realised for the summer cheese of Ontario with the figures reported from the United States markets shows that Canadian cheese are in demand at higher rates than American cheese will sell for. That we have gained in reputation and in market favor with British importers and consumers is evident. That this advance and advantage are the result of the applied skill of less than half of our cheese-makers is well known to those who visit the factories and handle their products. To reach and to speedily help those who work in cheese factories without any ambition or aspiration for improvement is well-nigh impracticable.

However, we desire to make helpful information not only attainable but unavoidable to such.

In a short time there will be numerous cable orders from England, calling for "cool August cheese.' That brief description implies a mild, rich flavor that may be preserved for the winter trade, a firm, solid body "full of meatiness," a fine outside finish, with clean, bright rinds, free from cracks, and bandages fresh-looking and not likely to appear mouldy.

To help the cheese-makers in manufacturing a class of goods that may be satisfactorily shipped on such orders, I call attention to some things, both outside and inside of the factories which need their immediate and special personal care.

Around the Premises.—Insufficient or inefficient drainage facilities, unless enlarged or remedied, will show their worst effects during this month. At the cost of only a few hours of labor and a few dollars of expense, the immediate vicinity of every factory can be kept free from the noxious odors that arise from stagnant slop pools. The frequency and foulness of these about the factories in some sections is not only a menace to the permanent prosperity of our cheese manufacturing industry, but a disgrace to the men in charge of the factories.

At factories from which whey is drawn back to the patron's farms in waggons, the leaking and spilling near the whey tank too often leave its vicinity in an almost impassable condition. A few loads of gravel will abate the nuisance and leave the place fit for approach during the succeeding months when the roads become bad.

The shrinkage in the milk supply will leave a shortage in the whey tank. In order that the whey may have more feeding value, the tank should be thoroughly cleaned and washed at least once a week.

At factories where hogs are fed, provision should be made for supplying them with one feed a day of some green fodder, such as clover, oats and vetches, oats and pease, or cornstalks. Salt should be fed liberally during this month.

In the Making-room.—This month seems the one when flies become most numerous and troublesome. Some afternoon after the cheese are in the hoops, it will be a good plan to close up the making-room windows and doors, and to burn a small quantity of sulphur

for the purpose of fumigating the place. If a tablespoonful of alcohol be mixed with the sulphur, it will burn more freely. Care must be taken to prevent the fumes from getting into the curing room. The tins of the milk vats and the insides of the sinks should also be washed afterwards before they are used. All vats, presses and utensils should get a thorough quarterly-cleaning-up early this month. Every cheese-maker should persistently fight untidiness and filth in every form, and he ought to have a woman's passion for cleanliness and a similar antagonism to dirt.

In the Curing-room.—There will be difficulty in curing the cheese made during July at a sufficiently low temperature. Ventilation of the room during the early mornings, as well as during the evenings and nights, will be of benefit. Floors should be sprinkled with cold water morning, noon and evening. While the cheese are being turned on the shelves there should be an abundant admission of light. August is the month when the "skippers" are apt to do damage. A plentiful shaking of fly powder in the room before it is shut up for the day will destroy the cheese flies.

Cheese boxes should not be stored in the curing-room. The odor from the elm wood penetrates the cheese and affects their flavor.

Patrons.—Since the milk is richer and less in quantity, there will be an increased temptation to "even up" by the addition of water, or to "even down" by the removal of cream. You will be doing the community moral service, as well as the cheese trade some good, by reminding the patrons that the Dominion Act of last session is in force and will be enforced against all discovered delinquents.

Patrons are more likely during this month than at other times to forget to provide salt for their cows, and to neglect to supply an abundance of pure cold water. Cool evenings are no excuse for the neglect of aeration. All milk should be most thoroughly aired immediately after it is strained.

The making of cheese for exhibitions is usually undertaken during the first two weeks in this month. Send a circular to every patron, making mention of those matters that are referred to in this bulletin, and inviting their co-operation, in order to aid you in the manufacture of cheese fine enough for exhibition and prize-taking. If some patrons pay no heed, and no improvement results, don't get discouraged. Keep right on insisting on a better state of things in their practice.

Making the Cheese.—When the evenings are cool and the milk needs ripening, don't fail to leave it in the vat until it reaches the proper state of maturity before the rennet is added. Use enough rennet to coagulate mature milk to a state fit for cutting in forty minutes when set at 88° Fahr. Dilute the extract to the extent of one pailful of water for every vatful of milk, and then mix it thoroughly by vigorous, rapid stirring.

When you are troubled with gassy curds, allow a development of acid, such as will be indicated by threads from the hot iron test a quarter of an inch long, before the removal of the whey. It is a good plan to run most of the whey off at an earlier stage, and to leave only enough whey on the curd to permit a free stirring of it. After the whey is drawn, air the curd thoroughly and make provision for keeping it warm. When a curd sink is used, if need be to retain the heat, put the curd back into the vat, but let the temperature be kept above 94°. Frequent turning and aëration will facilitate the development of acid, providing the temperature is maintained. After the curd cutter has been used, the curd should be stirred and aired for fifteen or twenty minutes before the application of salt. From $2\frac{1}{2}$ to $2\frac{3}{4}$ pounds of salt per thousand pounds of milk should be added to curds that are fairly well dried by the previous stirring. They should be put in the hoops within twenty minutes after the salt has been mixed in.

Pressure should be applied very gradually. The cheese should be bandaged neatly when they are turned in the hoops within two hours after they are put in the presses. They should again be turned in the hoops some time in the following morning. Where practicable, cheese should be pressed for at least twenty hours.

Endeavor to get everyone who sends milk to your factory, or who is concerned in its management, to try to bring it to the very front in point of reputation for the excel-

lent quality of its product. Work conscientiously for that end, then talk your factory up always and wherever you go, and get your patrons to do likewise. In short, think and work to make your factory and its product worthy of a higher reputation, especially for August cheese.

Notes for Cheese-Makers for October.

A few years ago "October cheese" of Canadian make were deservedly in bad repute in the English markets. Their soft, porous body made them liable to go off in flavor quickly; they did not possess the keeping qualities, combined with richness of body and flavor, which are so much desired by English importers and merchants. During the last two years a decided improvement in the quality has been effected, and with the finer quality has come a better name in the markets. By the exercise of due care on the part of the cheese-makers throughout the remainder of this season the reputation of our "October cheese" may be so well established that hereafter they will be counted equal to "September's." Cheese can be made as *firm* and *fine* during October as at any time of the year. Conveniences for controlling the temperature of the curd from the milk vat until the cheese is ripe are required.

Milk.—The milk delivered at factories during October has a higher per cent. of fat and other solids than during the summer months; its flavor will be equally rich and nice, when the cows are stabled during the cold nights and fed liberally on fodder corn or any other suitable succulent nutritious feed. Turnip tops and rape should not be fed to cows whose milk is furnished to a cheese factory. After it is drawn the milk should be strained immediately and forthwith aired as thoroughly as during the hot weather of July. The aëration will improve its flavor and prepare it for the manufacture of a finer quality of cheese than it will be possible to obtain if that treatment is neglected. The milk should not be cooled below 60° Fah. A milk-house or the farm kitchen will be a more suitable place for keeping it over night than the milk-stand when the temperature of the outside air goes below 50°.

The milk inspectors will continue their work until the close of the season; their services, to assist in the detection of adulterated milk, can be secured by application to this Department.

Cheese-making.—The construction and equipment of the making-rooms of some factories are still very defective; but at the cost of a little labor and building paper almost any room can be made so close in its walls that the inside temperature may be regulated at will by the use of a stove. Thorough ventilation once every day should be secured. The following paragraphs will be of service in the refreshment of the experienced cheese-maker's knowledge and in instructing the others in the best practice to follow:

1. Let the milk be ripened by the application of heat before the rennet is put into it; the ripening should be allowed to proceed to such a degree that not more than three hours will be required between the addition of the rennet and the development of acid, perceptible to the taste or discernible by the hot iron test, and sufficient for the removal of the whey.

2. The use of sour whey to hasten the ripening should never be resorted to. Old milk which has become nearly sour to the taste may be added, but loppered or thick milk should never be used.

3. Rennet should be added in quantity sufficient to coagulate the curd into a state firm enough for cutting in from 45 to 35 minutes at temperature of 86° or 88° Fah. It should be diluted with water to the volume of at least one gallon of liquid for every vat.

4. After coagulation is perfect, the curd should be cut finer than during the summer; the application of heat should be delayed for 15 minutes after the stirring is commenced; and the temperature should be raised to 98° and maintained at that point until the whey be drawn off. After the middle of the month a temperatute of 100° will be preferable.

5. Care should be taken to so apply the heat and perform the stirring that the curd particles will be so dry, before the development of acid is perceptible, that after being pressed in the hand they will fall apart by being slightly disturbed.

6. The curd should be stirred before and after the removal of the whey until the whey is so well separated out of combination with its particles that they produce a squeaky sound when bruised between the teeth or otherwise.

7. After the whey is drawn off the curd should be kept at a temperature above 94° Fah. If it becomes colder than 94° the development of acid will be hindered and excessive moisture will be retained in it during the souring process. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak or pasty and tallowy body, according to the degree of acid development permitted.

8. A cover over the vat or a curd sink with steam pipes seems a simple and effective provision for keeping the curd warm; where no rack is used, the putting of a few pails of hot water in the lowered end of the vat will maintain the temperature.

9. Just after the removal of the whey the curd should be hand-stirred until after the whey that will run has been drained off; *after the curd is dry and firm* it may be allowed to mat into one mass, *but not before that condition is reached.* All stirring should be performed so as to avoid bruising the grain of the curd.

10. It may then be frequently turned and packed close, till the layers of curd are four or five deep. Whey should never be allowed to collect in small pools on it at this stage. The close packing in layers four or five deep, with frequent turning, prevents the outside of the matted pieces from becoming chilled or more deeply colored by the action of the air than is the rest of the curd.

11. The hot iron test is almost indispensable for determining with certainty, from day to day, the exact stage of acid development at which all the whey should be drawn off; the filaments—thread-like processes—should be about one-quarter of an inch long. The proper degree of change for the cutting and salting of the curd has taken place when it feels mellow, velvety and "slippy," and shows a texture passing from the flaky or leafy into the stringy and fibrous. If it be too moist or soft it should be cut or ground at a rather earlier stage and hand-stirred until dry enough before the addition of salt. The most of the hand-stirring should precede the salting.

12. Not less than 3lb. of salt per 1,000 lb. of milk should be used, and when the curd is on the soft or moist side 3¼ lb. per 1,000 lb. of milk should be added; the 3¼ lb. rate is also preferable during the latter part of the month when cold weather prevails.

13. Immediately after the application of salt the pieces of curd become harsh and gritty on the surface; then in from 15 to 25 minutes the harshness gives place to mellowness. At the second stage—and the temperature should not be under 88°—the curd should be hooped and pressure applied. Delay at this point or coldness of the curd destroys the desirable rosy flavor, and imparts to the cheese the bitter taste of the salty white whey.

14. Particular care should be taken to use only pure warm water when turning the cheese for bandaging, before the rinds are fully formed.

15. Especially in a cold press room, pains should be taken in the applying of pressure to the cheese before they are left for the night.

16. All cheese should be finished in symmetrical shape and kept in the hoops until the rinds are smooth and the edges free from any projecting "shoulders."

Curing the Cheese.—The temperature of the curing room should be kept as nearly regular at 65° as possible. Where the September cheese are kept in the same room with those of October make, the latter should be kept on the warmer shelves. A slight chilling, after a cheese has been curing at 65° for two weeks, does little damage; but a steady temperature and constant curing give the best results. Bitter-flavored cheese are usually the result of chilling in either the making-room, press-room or curing-room. If the cause be prevented the consequence will be unknown.

To Factory Managers.—As this is the last bulletin of notes for cheese-makers for this season, I desire to counsel the managers of factories to guard against three tendencies that appear to menace the permanent success of our cheese industry :

1. The employment of inexperienced, incompetent men to manage the inside work of the factories.

2. The conscienceless cutting down of the remuneration of the makers, until the able men are leaving the occupation.

3. The inevitably penny-wise and pound-foolish policy of using factory furnishings of poor quality, simply because they happen to be a little lower in price.

So much additional trouble, loss, worry and disappointment result from the putting of men without aptitude or experience in charge of large factories that I strongly urge the proprietors to exercise the utmost care and caution, and invariably to inform themselves as to the fitness of an applicant by enquiry from a reliable expert or cheese buyer. No factory should incur needless risk of a loss of reputation, of patronage, of prestige, of price or of profit.

7.—THE CHEESE-FACTORY BUSINESS OF ONTARIO.

The future of our dairying trade must essentially be an outgrowth of our present conditions—the child of our own judgment and skill. Touching first upon the past, I shall not go back further than the time when the cheese manufacturing industry was first introduced into this province, some twenty-four years ago. It will be observed from the fact I have just stated that our co-operative system of dairying has attained its majority, but like many of ourselves it has grown a long time without gathering very much sense, if we are to judge of that from its present state. Its progress both in the improvement of methods and the occupation of area in our province, was very slow until it was taken in hand by the Dairymen's Association of Ontario ; but as soon as that Association was called into existence and began to guide and foster the industry it received a new impulse. The Association not only deepened and extended the interest manifested by our farmers, but was the means of leading them to increase their profits by engaging in the dairy business. The Dairy Associations of Ontario have been of much more service to the province than even we often give them credit for. The idea has prevailed that in the Dairymen's Associations of Ontario we have organisations the sole duty of which has been to augment the output of our cheese and to increase the number of our cows. In thinking so, a great injustice is done both to the parent association and those which have sprung from it. The first main uses of the Dairymen's Associations to the farmers of this province have been to demonstrate to them the possibility and great value of co-operation ; the necessity of being more self-reliant ; the advantages to be gained by applying intelligence in their own business; and the desirability of that earnest and continuous effort for improvement without which no class of our population can take their true rank among their fellows. To the Dairymen's Associations more than to any other agency we are indebted for our present condition as regards co-operation among farmers. Our Farmers' Institutes, which are accomplishing such admirable work among the agricultural communities, are a direct outgrowth of Dairymen's Associations, and many of their best workers are indebted to these Associations for early training. In reaching the ends I have spoken of I claim for the Associations that they have not merely made it possible for the farmer to make more money, but have made it necessary that he should be a broader-minded and better man before he could be a successful dairyman. In this way they have been a civilising and enlivening agency in our midst. The function of the farmer in society is to produce food and the raw material for clothing for the rest of the race ; and the dairyman is merely a farmer calling to his aid more resources than if he had no dairy. When he produces food from the soil of his fields he is aided by the energy and elements of the sun, air and water. From the action of these in accord with nature's law he is enabled to raise plants as the reward of his labor ; but he is still far from having drawn from his fields by the

aid of these agencies all the good it is possible to get by making animals serve to elaborate food for men's use. To place cattle upon a farm is not to place a tax upon the labor of the farm, but to call into requisition a factor which will increase the available food supply from the whole property ; that is the place of cows and all cattle. The cow fills her place as an economical factor when she lives upon those parts of the crops not adapted for human consumption : and living upon them produces food which makes it possible for a larger number of men to be fed from a given number of acres. All the best of our dairymen understand this, and due understanding and appreciation of the fact has resulted in an increase of the available food supply in this province ; an increase which has rendered it possible for us to support economically a larger population than we could otherwise sustain, and which at the same time has afforded ample remuneration to the men whose labor has been expended in producing this extra food supply. The farmer who sells direct everything he raises on his land is selling off plant food—the substance of fertility—in large quantities, and if he returns nothing to the soil is in the same course of action as a storekeeper with a limited stock who clears his shelves and counts all his returns as profits. Such a storekeeper would soon be under the necessity of putting up his shutters, and in the same way a man who uses his farm in the way I have mentioned will soon have a poor farm, and being a poor farmer will soon be a poor man. Unless a man will conserve the elements of fertility, his land will not be able to stand the drain incident to producing food. I want to say further that the co-operative system of dairying carried on in cheese factories is restoring fertility to land that has been exhausted, and is repairing the financial health of the farming populations in those sections of the country where it has been carried on with good judgment. I heard this statement made lately by a man of large experience in one of the counties of Ontario. He was a tax collector, and although that functionary is not a gentleman whom we are always delighted to honor, he has excellent opportunities of forming just opinions in regard to a matter of this kind. He said that his experience had always been that when he came into the vicinity of a cheese factory he found the taxpayers ready with their money, whereas when he was in other sections where there was no cheese factory he was constantly being asked to wait till threshing time, or Christmas time, or till the grain was sold, or some other time. That is a proof that dairying on the co-operative plan has had the effect of so increasing the earning power of the farmer that he is in possession of more readily available cash. Then it has saved in other parts large sections of the country from becoming non-productive. We sometime think that, after all, the whole value of dairying to the province is that it has brought back farms from a state of barrenness to a state of high productiveness. I think the farms need never have been exhausted, and we find that in those sections where dairying is most extensively carried on they have the best and most productive farms. I do not think there is any need at all for a man to exhaust his farm and to work it so bare that it will grow nothing but thistles and weeds in order to prove that dairying will restore its fertility. I would not think as much of a man who did that as of one who had the good sense to engage in dairying work, and whose farm was never exhausted. I have no sympathy to waste on the farmer who has so little foresight, intelligence and thrift as to take from his farm its fertility. Ignorance and neglect will entail the penalty which he must pay. I claim that dairying has preserved the fertility of the fields, and increased it beyond their virgin productiveness. Then it has put a capitalized market value into the farms of the province. If a farm, by reason of having more cows and a cheese factory close by, will bring in a larger annual income, it is of correspondingly greater value. Then it has added to the income of the farmer without lessening the production of any saleable crop. If we had merely found a new way of getting money, and in applying and putting it into operation had abandoned the means of getting money from other sources, it might have been no gain or improvement. If the farmers of this province in receiving $6,000,000 a year for their export dairy products, had in that merely taken the money from one pocket and put it into another, and had lessened their receipts from grain growing or any other source, they would not have made themselves any wealthier, but it is capable of proof that no farmer who has increased his income from the sales of milk to a cheese factory has lessened his production of grain by a single bushel. On the other hand, he has so much increased the productive-

ness of his farm that it will grow twenty-five per cent more on the average than it would otherwise. Where a cheese factory is supported, we find that it is an addional source of income which does not operate detrimentally to or in any way lessen the realisation of income from other sources from which we have in the past been accustomed to derive it. So much have I put together by way of referring to the past of our dairying. We all like to be successful and respected at home, but at the same time we also like to be well esteemed abroad, and there is no department of our agricultural, industrial or manufacturing enterprises that has won for us abroad such a splendid reputation as has our immense export of dairy produce. No man in England will ever try to disparage this province as one in which the finest dairy products cannot be manufactured, although many of them think we cannot keep go on growing wheat or beef and pork as has been done in the past. We have given indisputable proof that we can and will continue the production of cheese of the finest quality, which proves that we have a climate and country suitable for calling into advantageous use the best energies of man, suitable for the maintenance of the best kinds of dairy stock and the economical production of food of this kind of the very best quality. In this way our dairy business has advertised us abroad as a solid, substantial, progressive and prosperous people, and beyond this our cheese business has done more than anything else to correct erroneous ideas prevalent among the English in regard to our climate. In a brief three weeks time, four years ago, at the Colonial and Indian Exhibition, it was not difficult to give this province and its resources advertising to the extent of six hundred miles of single columns of newspapers, and that without any expense for advertising bills, but simply by writing about cheese and butter. In that way we have got a most desirable reputation and the most extended information about our province spread abroad through our dairy business. Having said so much in regard to the record of the past, there are some things to be learned from it which we cannot afford to ignore, and in writing of the present I wish to write of it with its weaknesses and defects, and to review them in the light of our past history. I would like to examine the present status of dairying, especially as regard co-operative cheese factory work, in relation to the profits that are and may be derived from it. We have in the province over 780 co-operative cheese factories, supported by over 42,000 patrons, receiving the milk of over 260,000 cows. Now, if these 42,000 patrons were all men of enthusiasm, intelligence and good judgment they could raise our cheese industry to a much higher plane, from which they could realisé *twice as much profit* inside of a year and keep up the improvement at the same ratio for the next five years to come. I find in the first place that there are many men halting between two opinions, as to whether it pays to support a factory or not. By sending out circulars and getting returns as far as possible I find that over five thousand, of the forty-two thousand supplying milk, do so for less than three months in the year to the factories of this province. They are the men who are never quite sure whether they will send milk more than one week or not. While attending a dairy convention held in the State of New York I heard a man in a position of authority state that it would pay the farmers of that State to shoot and bury one-half of the dairy cows there. I also heard another gentleman of equal prominence there, and a man occupying an official position, say that not more than one-third of the dairy cows in the State were actually yielding a profit to their owners. I do believe that one-third of our dairy cows are not yielding their owners a profit. The first means of improvement in this respect, I would suggest, would be to eradicate the thoughtless indifference of these men who have never made up their minds as to what a cow is for, and improve them into keeping better cows in a better way. The average yield per cow has often been cited at three thousand pounds of milk per year. I would leave myself upon record as saying that the average yield of the cows of Ontario is over three thousand pounds per annum each, but is under three thousand ponnds per annum when measured by the cheese factory season. I got a large number of returns, which were made by cheese-makers who took some pains to verify their correctness from which I find that the largest yields per head of the best herds supplying milk to eighty factories, through the whole cheese factory season of six months and one day, was 3,500 pounds, and the average of the poorest herds going to the same factories during the same time was 2,235 pounds. What is the matter with our cows? If the cow is a con-

trivance of nature to aid the farmer in producing more food from his fields, it is a very clumsy and inefficacious contrivance that consumes the keep of six months and gives back only that amount of milk—a contrivance which, instead of being a source of profit, is only a burden and expense to the man who has to keep it in running order. I think these cows are made the wrong way. The man makes the cow. The dairy cow has been the product of man's skill, and reflects that. She is an artificial product, and the main operative agency in improvement is the brain of man. The man who refuses to use his brain simply lets nature and the cow do the worst they can for him—that is, the best they can for themselves, but the worst for him. To succeed in moulding the cow we must go back and get a proper male. The man who wants to make a China tea-cup does not go to a brickyard and get his clay, nor does the man who intends building a steam engine go the bush for his piston-rod. We must have the proper material, and the only material that is at our hand which can be worked into the best possible form for the use of man in the dairy cow is the material inherited from cows and bulls that have had milking power and milking records. If we do not begin there we have to refine the material, which is unnecessary labour when we may have our raw material of the right quality to begin with. A man should no more think of using a bull in his dairy herd that has been kept fat from its calfhood up than he would think of using brick clay to make a China tea-cup. Such an animal is not the bull for a dairyman. Let it have a record of eight or ten thousand pounds of milk per year behind it in dams back for two and more generations. Again, a man who wants to buy a bull to head a dairy herd, will go to a stable and find a bull calf that suits his notions as to its points. He will then go into the cow stable of the stock breeder and ask to see the dam of that bull, and find perhaps a lean cow, a large cow, a large milking cow with an angular frame, not rounded and padded with flesh below her skin. "But," he says, "have you got a calf from this other big fat cow?" "Yes." "What do you want for it?" "Fifty dollars more than for the other one." He goes back and buys the calf from the fat cow, and still expects that he is going to succeed in improving his dairy herd. I do not care whether the cow be a Jersey, Holstein, Ayrshire or Shorthorn, the dairyman who buys a bull from a fat cow usually makes a mistake, and if he keeps that bull fat afterwards he destroys what probability there was of getting improved blood into his herd. The man who does not know what kind of a cow he wants will never make a heifer shapen that way; but the man who has the ideal of the cow he wants, will make his heifer grow that way for him. Then the present of our dairying strikes me as being weak in this respect, that even if we had good cows on the average we have not learned to feed them economically. We have 2,235 pound cows, but these same cows are five-acre cows, needing the fodder from five acres to produce that small quantity of milk, viz.: three acres of pasture and two of fodder. There is no adequate return for the labor spent upon such animals. Instead of five-acre cows we want to have a good many of one-acre cows, and instead of 2,235 pounds as a record we want at least a record of 7,000 pounds. A man may feed a cow on one acre which will give him 7,000 pounds of milk a year, and he is making a good deal more food per acre than the man who makes only 2,235 pounds per cow and has to feed her the fodder of five acres. As a man produces food he creates wealth, and will have his own share in the handling thereof. Now, I do not want to denounce an evil without suggesting a remedy for it. Reduced acreage is the thing, and I would recommend the farmers to sow some rye. Two acres of winter rye is enough for a one hundred acre farm, and that will furnish food early in the season before the other crops are fit to use. Then bran should be fed; bran or pease meal, or something like that when early pasturage is rank and not calculated to give the best results. Oats and pease cut in the green state should then be fed; and after they are through there should be a crop of ensilage corn ready, of some variety that will give a large growth of leaf and stalk, full to overflowing with nourishing properties. If he would have that, the farmer must give up the old-fashioned practice of sowing three bushels of corn to the acre. Last year many men who sowed a quarter of a bushel to the acre reaped a most satisfactory crop.

A successful dairyman, whose hairs are grey and whose bank account is heavy, gave me this statement as his experience. He bought bran and fed fodder corn by the most

improved methods, and he found that the supply of milk yielded by his cows was largely augmented thereby. The bran cost him $14 per ton After one week's experimental work he went to the cheese factory and found that at the price cheese was then selling for he had made just $2.41 more in the value of the milk than the extra cost of the bran had been to him. He had got enough milk to pay for his bran and leave him a profit of $2.41 in one week, besides having his cows in better condition, able to give more milk for a longer period that season. The manurial value from feeding the bran was not the least important gain.

Having said so much upon that aspect of the question, I will pass on to the consideration of our factory equipment—buildings, utensils, and so on, in which we are very far behind indeed. Cheese factory buildings are not on the average such as are adapted to the present requirements of dairying. They should be constructed in such a way as to enable those managing them to have perfect control of the temperature. I find from the reports of Instructors in Western and Eastern Ontario that many of them are very imperfectly constructed in this respect. The equipment of utensils is quite inadequate to the needs of the present system of cheese-making, and in some instances these are kept in such a state that the less they are used the better for the cheese. There is also improvement needed in the class of men who are employed in running cheese factories. The men who run our cheese factories to-day are not men of the same ambition as they were ten years ago. In many instances I find the sole ambition of makers is to make a cheese that will pass. Ten or fifteen years ago there was a feeling of rivalry between makers to make cheese that would please—to reach a higher standard that would please everybody, the eater included. That is what is wanted. We want cheese makers who are enthusiastic about their work, and will take the pains to make themselves masters of all the details of their business. I need not refer to prices beyond saying that even during a year of moderate prices such as we have passed through, no part of the farm work has left the same profits as the cheese-making and dairying industry. If that can be said after a year of moderate prices, with 2,235 pound cows that take five acres to feed, what could we not do in a good year with the right kind of cows rightly fed, and with buildings and appliances of improved utility. The future of dairying, to my mind, is bound up with the future of the farmers of this province of Ontario. If by any means the farmers of this province can have their energies awakened into action they will make lots of money out of cheese, but if they cannot be led to think and read and work for themselves they can never, by any extraneous process or method, be helped very much. Therefore let us work at the man who keeps the cow that gives the milk that makes the cheese. In doing so we get these individuals waked up into acting intelligently, and if we do our success is assured The foundations of the business will be established, its field extended, its profits increased, and our reputation will certainly be much higher than it is at present. We want better cows kept by better men, better and yet more economically fed, so as to produce better milk ; we need the highest class of men that can be induced to be cheese-makers, for the cost of an extra ten or twenty dollars a month is nothing compared with the desirability of supporting and strengthening our prime industry of cheese-making. We require besides to have a cheaper summer feed for our cattle. It will be found that by carrying ensilage from the winter to the following summer it is possible to get the cheapest food for cows. Then, having this, it will be found possible to make cows milk at least ten months in the year, and the milking season should begin, not in March or April, but from November to January. If the cheese factory is to be made profitable the cows may come in early, and then when the cheese factory closes as a cheese factory it can be opened the next day as a butter factory. One set of buildings and apparatus will do for the whole year. The skim milk can be used for the purpose of raising the best class of calves. When the spring comes the milk will not be needed for the calves, and it can go to the factory for cheese-making. I think winter dairying is full of the greatest promise in Ontario—full of great possibilities. If we only avail ourselves of these new openings for the exercise of intelligence—these starting points for new enterprise and the achievement of new results—we shall have no occasion to be ashamed of either the past, present or future of our dairying industry.

8.—THE HOG AS AN ADJUNCT TO THE DAIRY.

From Bulletin xxx, issued by the Bureau of Industries on "the Swine Industry in Ontario," I quote the following sentences from pages 40-41 : "During the last eight years 60,000,000 lb. of hogs, valued at $3,160,000, have been slaughtered in bond in Canada for exportation. What change is necessary in order to enable the Ontario farmer to supply this pork?" On page 7 of the same Bulletin it is stated that during the five fiscal years 1884-9, "there were also imported to be slaughtered, in bond, 41,155,383 lb. of hogs, live weight, valued at $2,044,398, which with the imports for home consumption make a total deficit of $9,409,597 in the five years, being an annual average of $1,881,920 ; or, if the duty be added, an annual deficit of $2,167,800."

The facts presented in these quotations indicate that there is a large demand for hogs and their products that might be and ought to be furnished to our own markets with profit, by the dairy farmers of the Province. By way of further introduction of this subject, I will quote some passages from an address which I had the honour to deliver before the Dairymens' Associations in 1889. "Dairymen neglect one of the best servants they can have in the animal creation, when they do not avail themselves of the hog to aid in making money from the by-products of milk. The attitude of farmers towards the pig has been an unfriendly one. It is a popular, though untrue, saying that "the only good Indian is the dead Indian," and farmers seem to cherish a similar belief in regard to the hog. That opinion, however, is in direct opposition to the best interests of the men who keep cows for the manufacture of dairy products. If the man who keeps ten cows will fatten twenty hogs in the summer and half as many in the winter, he will find, perhaps to his amazement, that this little branch of business will bring him in more money and profit than he thought could be made from it. Whey is a valuable hog feed. There are nearly seven pounds in every hundred pounds of whey which the hog can use to advantage. The composition of whey is as follows :—Water, 93 per cent. ; nitrogenous substances, 0.92 ; fat, 0.35 ; milk sugar, 4.65 ; lactic acid, 0.33 ; ash, 0.75.

These elements of food value in whey should produce at least two pounds of live weight in hogs. One hundred pounds of whey, fed in the most judicious manner, should produce two pounds of pork ; it will not do it when fed alone, but fed in combination with other foods it will. Sows, like cows, should be selected for their profit-making powers. A man who knows well enough that unless he has a good dairy cow he need expect no profit from her, often acts as though he believed that anything that grunts and squeals will make money for him out of its feed ; but the squealing and the grunting are the main part of it with some hogs. In selecting a sow, she should be selected first for her length, then for her depth and then for her breadth. The three qualities should be valued in that order of merit—length, depth and breadth. A sow should be made to farrow in March or April and in September. A breeding sow should never be fed upon decayed food. The waste from the kitchen and the table is wholesome feed for pigs when it is fed clean and before it becomes decomposed ; but a never-empty and consequently never-clean swill barrel is a menace to the health of the hogs and a hindrance to profit. A breeding sow should always get as much salt as she likes to take ; her food should be salted and she should have access to salt besides ; she will not thrive without it. The quarters of breeding sows during the winter should be comfortable. They too often lie in and under strawstacks, or out in open sheds, and the other swine which are being wintered lie with them and on them to make more warmth. Dead pigs and sickly pigs from birth are the consequence. Their sleeping places should be well ventilated and dry.

A boar should be selected for length, depth and breadth. He should have proportionately large bones, for small bones are indicative of a weak constitution and a disposition to lay on lard instead of muscular meat. A plentiful supply of hair indicates a strong constitution, and a predisposition to lay on flesh.

Young pigs should be suckled for about three months ; if they are weaned when five or six weeks old they will not do as well. The sow can nurse them as well as not

if properly fed, and the pigs will grow and thrive so much the better. Skim-milk, buttermilk and bran should form some part of a milking sow's ration. It is profitable to scald or boil her feed until after the pigs are weaned.

The little pigs should always have access to cold water for drinking. In feeding and fattening these little pigs, they should have the trough room in length, not in depth. Many of the hog troughs, I see around the country, seem to have been constructed with the object of affording bath accommodation for the pigs, so deep and wide are they that the pigs take headers right into them. The feed room of the trough should be in length and not mainly in depth for all sizes of hogs and it should be kept clean. Pigs have the reputation of being filthy animals, but a pig will keep itself clean if it gets instruction in that way for one week and a good example. The feed for little pigs should be sweet, not sour. In the souring of whey, some of the sugar is converted into acid. Lactic acid has no feeding properties. It has a slightly helpful digestive action, so that whey or milk which is sour will do a pig no harm, but part of the food value has been lost. Thoroughly sour whey is extravagant food and unsuitable for pigs. All meal fed with whey had better be of a mixture of grains: pease, wheat, middlings and bran are suitable. And let me remark in passing, that since a farmer can frequently grow thirty bushels of "goose wheat" to the acre, in this time of cheap wheat, he cannot market that so well any other way as through his hogs. With their mixed feed, pigs should receive a liberal allowance of salt every day; charcoal or wood ashes are very beneficial when hogs are fed mainly on whey. A very small quantity of saltpetre and sulphur once a week would help to keep them thriving when the whey is unavoidably sour, as it will sometimes become in spite of the best of care. A mixture may be made of eight pounds of salt, eight pounds of charcoal, half a pound of saltpetre and one pound of sulphur. The hogs may be allowed to take all they like of the mixture. Pigs should have some green feed in the summer time when penned up; half an acre of clover will yield the best returns in pork when fed to pigs that are also given whey and grain in combination therewith.

The sleeping quarters of pigs that are being fed should be dry, clean and well ventilated. The best weight at which to sell hogs in order to realise the highest price and the best returns for food consumed is from 150 to 200 pounds, live weight."

The following tables give the observed results from five of the pens of hogs that were fattened during the season.

On Aug. 9th sixteen hogs were separated into three pens, containing 6, 5 and 5 respectively. They were divided to be as near alike as possible in age, size and breeding. None of them were pure bred, though most of them showed Berkshire or Chester White points. They were all fed on middlings only, with salt and water, and were allowed as much as they could eat, being fed three times a day. The middlings were mixed with cold water in the troughs immediately before the time of feeding.

		Weight Aug. 9th.	Weight Sept. 13th.	Gain.	Middlings consumed.	Middlings consumed per lb. of increase live weight.
Pen 1	6 hogs.	586 lb.	924 lb.	338 lb.	950 lb.	2.81 lb.
2	5 "	465 "	726 "	261 "	836 "	3.20 "
5	5 "	399 "	673 "	274 "	908 "	3.31 "
	16 hogs.	1450 lb.	2323 lb.	873 lb.	2694 lb.	3.08 lb.

The average live weight of the hogs on Aug. 9th was 90.6 lb. each.
" " " Sept. 13th " 145.2 "

The object in feeding the middlings was to prepare the three lots for an experiment in the feeding of corn meal alone, pease meal alone and a mixture of barley meal and middlings alone in the fattening of these 16 hogs. The hogs of each of the three lots in pens 1, 2 and 5 were weighed every week. The meal in each case was fed, as were the middlings, mixed with cold water in the trough, immediately before the hogs had access to it. They were fed three times a day and each pen was allowed as much as the hogs would eat. In the tables I have arranged the figures under *four* feeding periods of four, four, four and three weeks each.

Pen 1—Six hogs fed on cornmeal only with water and salt, Sept. 13th to Dec. 28th.

Feeding period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Cornmeal consumed.	Cornmeal consumed per lb. of increase live weight.
Sept. 13th to Oct. 12th	924 lb.	1184 lb.	260 lb.	1111 lb.	4.27 lb.
Oct. 12th to Nov. 9th	1184 "	1447 "	263 "	1174 "	4.46 "
Nov. 9th to Dec. 7th	1447 "	1666 "	219 "	1161 "	5.30 "
Dec. 7th to Dec. 28th	1666 "	1842 "	176 "	911 "	5.17 "
Sept. 13th to Dec. 28th	924 lb.	1842 lb.	918 lb.	4357 lb.	4.74 lb.

Pen 2—Five hogs fed on pease meal only with water and salt, Sept. 13th to Dec. 28th.

Feeding period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Pease meal consumed.	Pease meal consumed per lb. of increase live weight.
Sept. 13th to Oct. 12th	726 lb.	945 lb.	219 lb.	1049 lb.	4.79 lb.
Oct. 12th to Nov. 9th	945 "	1140 "	195 "	931 "	4.77 "
Nov. 9th to Dec. 7th	1140 "	1390 "	250 "	1126 "	4.50 "
Dec. 7th to Dec. 28th	1390 "	1534 "	144 "	815 "	5.66 "
Sept. 13th to Dec. 28th	726 lb.	1534 lb.	808 lb.	3921 lb.	4.85 lb.

Pen 5—Five hogs fed on a mixture of barley meal and middlings alone with water and salt, from Sept. 13th to Dec. 28th.

Feeding period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Feed consumed.		Mixture of barley meal and middlings consumed per lb. of increase live weight.
				Barley.	Middlings.	
Sept. 13th to Oct. 12th	673 lb.	877 lb.	204 lb.	399 lb.	399 lb.	3.91 lb.
Oct. 12th to Nov. 9th	877 "	1070 "	193 "	436 "	419 "	4.43 "
Nov. 9th to Dec. 7th	1070 "	1275 "	205 "	486 "	489 "	4.75 "
Dec. 7th to Dec. 28th	1275 "	1403 "	128 "	351 "	361 "	5.56 "
Sept. 13th to Dec. 28th	673 lb.	1403 lb.	730 lb.	1672 lb.	1668 lb.	4.57 lb.

The following table is arranged for comparison of the quantities of feed consumed per lb. of increase live weight :—

Feeding period.	Corn meal consumed per lb. of increase live weight.	Pease meal consumed per lb. of increase live weight.	Mixture of barley meal and middlings consumed per lb. of increase live weight.
Sept. 13th to Oct. 12th	4.27 lb.	4.79 lb.	3.91 lb.
Oct. 12th to Nov. 9th	4.46 "	4.77 "	4.43 "
Nov. 9th to Dec. 7th	5.30 "	4.50 "	4.75 "
Dec. 7th to Dec. 28th	5.17 "	5.60 "	5.56 "
Sept. 13th to Dec. 28th.....	4.74 lb.	4.85 lb.	4.57 lb.

On November 9th, after a period of preparatory feeding, eight hogs of similar age and breeding were weighed, and left four in each of two pens. They were not pure bred, but in appearance would have passed for Berkshire hogs. A test was undertaken with them to obtain some information on the value of rape ensilage for fattening purposes. The four hogs in pen 6 were fed on middlings only, with water and salt mixed in the trough before the hogs were allowed access to it. They were fed three times a day, and were fed as much as they would eat. The four hogs in pen 7 were fed on about one-third the quantity of middlings consumed by the hogs in pen 6, and were allowed as much rape ensilage as they would eat. The treatment otherwise was alike. The feeding lasted from November 9th to December 21st, when the supply of rape ensilage was exhausted.

The following table shows the comparative quantities of middlings and rape ensilage consumed :—

	Feeding period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Middlings and rape ensilage consumed.		Middlings consumed per lb. of increase live weight.
					Middlings.	Rape ensilage.	
Pen 6: 4 hogs	Nov. 9th to Dec. 21st	905 lb.	1164 lb.	259 lb.	1491 lb.	.....	5.75 lb.
" 7: 4 "	" "	905 "	1084 "	181 "	487 "	2849 lb.	.....

According to this one test one pound of middlings is equal to 5.12 lbs. of rape ensilage for the production of pork. The *cost* of the rape ensilage in this case could not be correctly calculated.

I desire here to call attention to the fact that in the feeding of the hogs in Pens 1, 2 and 5 from August 9th to September 13th on middlings only, from an average weight of 90.6 lbs. each up to 145.2 lbs. each, *only 3.08 lb.* of middlings were consumed for each pound of increase live weight, whereas in feeding the hogs in Pen 6, on middlings only, from an average weight of 226.2 lbs. each up to 291 lbs. each, *5.75 lbs.* of middlings were consumed for each pound of increase live weight.

The twenty-four hogs of Pens 1, 2, 5, 6 and 7 were killed on December 31st and January 1st. The last feed was given to all the hogs on the morning of 30th December. The hogs of Pen 1, and numbers 4 and 5 of Pen 2, were killed on January 1st. The following table will give some interesting and probably useful information. The live weight of each hog was taken immediately before it was killed, and the dead weight was

taken immediately after it had ceased to bleed. The hogs were all scalded, scraped, dressed and hung up where they would not freeze. On January 6th the dressed weight was taken :

Pen.	No. of animal.	Fed on	Live Weight	Dead Weight.	Dressed Weight.	Weight of lard on guts.	Per cent. of shrinkage from live weight to dressed weight.
7	1	Middlings and rape Ensilage.	.....	.....	218½ lb.	5 lb. 2 oz.	14.3 per cent.
	2		.....	.....	254½ "	5 " 10 "	
	3		260 lb.	254 lb.	224 "	6 " 2 "	
	4		249 "	242½ "	212 "	4 " 14 "	
6	1	Middlings.	298 "	292 "	257 "	7 lb. 0 oz.	13.3 per cent.
	2		282 "	273 "	245 "	6 " 11 "	
	3		259 "	252 "	225 "	6 " 2 "	
	4		305 "	300 "	264½ "	6 " 11 "	
5	1	Barley-meal and Middlings.	273½ "	266½ "	229½ "	7 lb. 9 oz.	15.6 per cent.
	2		283 "	277 "	242½ "	10 " 1 "	
	3		238 "	232 "	201½ "	7 " 14 "	
	4		298 "	291 "	251 "	6 " 4 "	
	5		253½ "	246½ "	211 "	6 " 0 "	
2	1	Pease-meal.	289½ "	282½ "	238½ "	7 lb. 14 oz.	17.0 per cent.
	2		288 "	282½ "	242 "	9 " 12 "	
	3		301 "	293½ "	246 "	9 " 0 "	
	4		279½ "	273½ "	232½ "	7 " 12 "	
	5		312½ "	305½ "	261½ "	6 " 15 "	
1	1	Corn-meal.	295 "	290½ "	257½ "	6 lb. 2 oz.	14.1 per cent.
	2		342½ "	336½ "	293½ "	9 " 0 "	
	3		241 "	235½ "	206½ "	6 " 10 "	
	4		332½ "	326 "	287½ "	5 " 13 "	
	5		283 "	276½ "	238½ "	8 " 11 "	
	6		277½ "	271½ "	237 "	7 " 4 "	

One hog of each lot was cut through in front of the shoulders, behind the shoulders and in front of the hams. It was intended to photograph these sections had the difference between the proportions of fat and lean from the different kinds of feed been decidedly apparent. The difference would not have been evident to the eye from an exact photograph. A few of the notes made on the spot are transcribed here :—

Corn-Meal Fed.—Lean meat rather brighter in the color than the others ; equal to the pease-meal fed in firmness and proportion of fat and lean ; lard more chalky in shade than others.

Pease-Meal Fed.—The color of the lean meat hardly so bright as the corn-meal fed.

Barley-Meal and Middlings Fed.—Color of the lean meat rather pale ; larger proportion of lean to fat than in the corn and pease-meal fed ; flesh and fat softer in body than in the two other lots.

In the following table is shown the order of quality under the three heads of "color," "largest proportion of lean to fat," and "firmness of flesh and lard."

Order.	Color.	Largest proportion of lean to fat.	Firmness of flesh and lard.
First	Corn-meal	Middlings and rape ensilage.	Equal { Corn-meal / Pease-meal
Second	Pease-meal	Middlings	
Third	Barley-meal and middlings	Barley-meal and middlings	Barley-meal and middlings
Fourth	Middings	Equal { Corn-meal / Pease-meal	Middlings
Fifth	Middlings and rape ensilage.		Middlings and rape ensilage.

Other hog-feeding has been in progress. From the data given in these tables, and from conclusions safely reached by observation, I desire to point out that as a hog becomes older and heavier there is a gradual increase in the quantity of food consumed per pound of increase live weight. It is not prudent to base a scale of the per cent. of increased consumption of feed upon these few tests, but I may mention that in the case of feeding hogs upon middlings only from 226.2 lb. each up to 291 lb. each (pen 6), they consumed EIGHTY-SIX PER CENT. more feed for every pound of increase live weight than did the hogs from 90.6 lb. each up to 145.2 lb. each.

By comparing the quantities of feed consumed per pound of increase live weight by the hogs in pens 1, 2 and 5 on corn-meal, pease-meal and barley-meal and middlings respectively during the first eight and the last seven weeks the following results appear:—

Feeding period.	Corn-meal consumed per lb. of increae live weight.	Pease-meal consumed per lb. of increase live weight.	Mixture of barley-meal and middlings consumed per lb. of increase live weight.
Sept. 13th to Nov. 9th.	4.36 lb.	4.78 lb.	4.16 lb.
Nov. 9th to Dec. 28th.	5.24 "	4.92 "	5.06 "

The increased per cent. of the consumption of feed per lb. of increase live weight in the hogs in the second period from Nov. 9th to Dec. 28th over the rate of consumption during the period from Sept. 13th to Nov. 9th is as follows:—

In corn-meal fed hogs, 20 per cent. more feed per lb. of increase live weight.

In pease-meal fed hogs, 3 per cent. more feed per lb. of increase live weight.

In barley-meal and middlings mixture fed hogs, 21 per cent. more feed per lb. of increase live weight.

I consider that it is possible by a judicious mixture of grain in hog-feeding to obtain one pound of increase live weight up to 200 lb. for every four pounds of grain fed.

The floors of our feeding pens all have their fall towards the trough; that arrangement leaves the back part of the pen always dry for a sleeping place.

Hog manure is one of the best fertilisers; in feeding hogs little is taken off the farm, much is left on it of manurial value, and satisfactory money returns may be realised in addition. For these reasons I believe the hogs of this province are an unrecognised and undeveloped source of wealth for the men who will endeavor to understand and use them well.

9.—FODDER CORN AND THE SILO.

Indian corn (Zea Mays) is cultivated in every quarter of the globe. The plant is believed to be indigenous to South America, though the origin of its use as an agricultural product is still obscure. The remains of charred cobs have been dug from Indian mounds; and the Spaniards in the course of their conquering inroads found it growing as a holy ornament upon the graves of Mexicans. Mention is made of the discovery of cultivated corn fields about the mouth of the Kennebec river, Maine, in 1605. Cartier found waving corn fields at Hochelaga in 1635. Its spread into Europe is believed to have been from America by the ships and hands of the Norsemen long before the adventures of Columbus. From Mediterranean ports it was spread through Europe, and as everything foreign in those days was called "Turkish," it carries the name of "Turkish corn" to this day in many of the kingdoms there. As an agricultural product it is of vast commercial importance to the farmers of this continent, and its enormous yields, without serious exhaustion of the fertility of the soil, have made it the means of rapidly enriching the districts and countries where it has been grown successfully. Contrary to the belief of many farmers in Ontario, it can be grown to advantage for fodder purposes in every section of the province. In the counties in Ontario where it is valued for its grain producing qualities, the average yield per acre in 1888 was 78.2 bushels in the ear against the officially stated yield of 26.3 bushels (shelled corn) in the corn-growing States. With this crop, as with the more commonly grown cereals, the several varieties attain their maximum of service and value in the most northernly limits within which they can be grown to maturity. In the season of 1889 corn was ripened successfully as far north as Minden, Haliburton. It can be grown for fodder purposes profitably in every part of the whole province.

While a loose loamy soil is thought to be best adapted for its growth, large crops can be obtained from clay lands as well as from sandy soils. The varieties are practically innumerable. They are due to climatic conditions, selection, cross-fertilisation and cultivation. Attention to the controllable treatment will doubtless enable the farmers of this province to develop varieties more suitable and serviceable to themselves than any that are yet known. The height, attained by the plants of different varieties, ranges from two feet to fourteen feet. The number of nodes or joints on each stalk is irregular. The leaves vary in size and number. Ears may be carried at any node; sometimes two or three are borne on one node; occasionally as many as ten ears form on one stalk. In our climate, varieties that carry more than two or three ears per stalk have not been ripened. The number of rows of kernels on each cob may always be evenly divided by two; they range from eight rows up to thirty-six. The kernels vary in shape, size and color. Sixty-eight varieties were grown during the season experimentally. The valuable and essential pecularities of most of them will be presented in tabular form. A bulletin of instruction on the methods of cultivation that should be adopted was issued early in the season. A second edition was called for in November. The following is the bulletin which contains simple cuts to illustrate the way of constructing silos adapted for the economical preservation of green crops in their most digestible state.

Fodder Corn and the Silo.

No single subject connected with agriculture is to-day creating so much discussion or receiving so much thoughtful attention from the farmers of Ontario as that of ensilage. And it deserves more attention than has yet been given to it. A lingering prejudice still exists in the minds of a few farmers against the construction and use of silos. That feeling, which is unworthy to be called a judgment, had its origin in the partial failures of some of the first efforts to introduce the ensilage system of preserving fodders into this country. But as the causes of such failures, (or, at the best, only partial successes), have been discovered and can be always guarded against, remedied or removed, satisfactory results may now be relied on with certainty.

In the handling of any perishable commodity, hap-hazard treatment will give hap-hazard results. Occasionally no loss may be sustained, but generally the damage and

loss will be proportionate to the absence of applied knowledge and skill. A clear knowledge of "how to do it" and "the doing of it" just that way will enable farmers as well as other men to successfully cope with the things most difficult to do well. The simplest and easiest jobs need similar preparatory equipment and performing ability in the men who undertake them. The curing of a crop of fodder corn in a silo is now an easy and invariably satisfactory task to the farmer who follows right directions with reasonable prudence.

Let me make clear the use of the new names. A *silo* (from the French) is simply an air-tight building, box, tank, compartment, trench or pit into which fodders in a succulent state are put for preservation and curing. *Silage*, or as it is sometimes written *ensilage*, is the feeding substance after it has been so preserved and cured. Hence there are corn silage, clover silage, oats and pease silage, etc.

Former Results.—It used to be stated that there was a loss on the feeding value of fodders when put into and taken from a silo. When the silage was partially rotten, of course that was the case, but a similar depreciation of quality and consequent loss in feeding value would result if hay, grain or straw were allowed to become rotten in the mows or granary. The rotting was and always is resultant from unsuitable conditions. These the silo is intended to guard against and remove. Then came the period when scientific (?) men and others loudly advertised the presumption of those who stated that they found the feeding value of the fodder increased by the heating in a silo. However, the cows agreed with the statement, and in estimating the feeding value of a fodder the verdict of the animal that consumes it is always worth more than the opinion of the analyst. "You cannot take anything out of a silo you did not put into it," was the bravado used as a silencer. But the fact still contradicts the assertion. Would a dairyman pay any heed to "a book scientist" who told him with scholarly dignity and unbecoming contempt for facts that he could not take anything out of his cheese curing room which he did not put into it? He knows he puts in green, uncured cheese, almost wholly indigestible, and that he takes out cured cheese almost wholly digestible. In the same way, to some extent, cured silage has a higher feeding value than the dried fodder.

Growing the Crop.—The manner in which the crop is grown has very important influence on the possibility of its advantageous curing. In Ontario the corn crop is the most suitable for ensilage uses. It should be grown to near maturity. Thereby the several plants will contain the largest amount of nourishment, and will also be capable of long preservation without loss. The feeding value per acre is also highest when the crop is almost mature when cut. The conditions requisite for securing that degree of growth in the corn plants in our province are: (1) early planting, (2) thin seeding, (3) frequent cultivation.

(1) *Planting.*—The land for a corn crop should be drained, either naturally or by artificial underdrainage. It should be worked into a fine seed-bed. To attain that I recommend for most Ontario soils deep fall plowing, and only surface cultivation in the spring. Early planting should be shallow, that the sun may warm the seed-bed and seed and so prevent rotting. A liberal quantity of barnyard manure worked into the soil will be profitably applied. Phosphate fertilisers are said to be valuable.

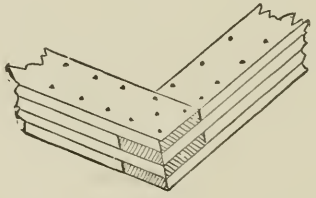
(2) *Seed.*—The crop should be grown in rows. If the land be very weedy it can perhaps be cleaned more economically by planting in hills. The largest variety of corn that will grow to near maturity in the locality is the sort that should be used. Three seeds to the hill three feet apart both ways will be enough. The rows should be from 3 ft. to 3 ft. 6 in. apart. The seed should be put in not thicker than one grain every six inches in each row. A common force-feed seed drill may be used, all the spouts except two or three being stopped up.

(3) *Cultivation.*—Level cultivation is preferable to "hilling up" or "moulding up." As soon as the corn appears two inches above ground it should be harrowed over with light harrows. That treatment will keep down any growth of grass and destroy tender weeds. The harrowing should be repeated twice before the corn is six inches high. Frequent cultivation between the rows or hills afterwards will keep down weeds and promote growth. The cultivation should be continued, but after the corn grows to be two

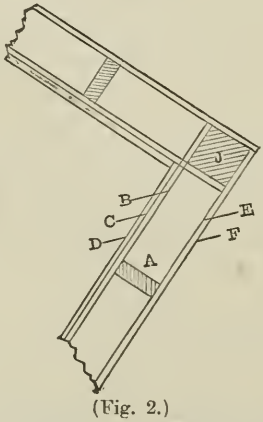
feet high it should be shallower. That may be kept up until the stalks are higher than the man and the horse. When the lower leaves begin to turn yellow and the ears of corn are in the milky stage, and quite fit for boiling for table use, the crop should be cut.

Theory of Curing.—It is possible to cure silage to advantage, and in such a way that it may be preserved indefinitely, mainly because the cells of plants continue to live after the stalks are severed from the roots. It is the function of plants while growing to deoxidise carbon and accumulate the energy of the sun for the future service of lower animals and man. It is the function of animals to oxidise and so expend the energy previously stored in the plants and which the animals have appropriated in the form of food. The cells of plants in the stalks, leaves and grain, after these parts are separated from the root or whole plant which bore them, simulate the action of living animals so far that they begin to absorb oxygen and evolve carbonic acid. In this manner is heat generated. And if these cells be robust from sufficient maturity, the temperature will be considerably increased. Robust cells from plants almost mature are also much less liable to become the prey of minute bacteria. They are able to resist their attacks. If confined in bulk in the presence of ordinary atmospheric air, they will raise the temperature to a point between 125° and 150° Fahr. When the temperature is maintained anywhere between these points for some days the life of the cells is destroyed, as are also the spores of mould, etc., which will have been deposited from the air on the plants or parts of the plants These spores are practically everywhere disseminated. Hence in building and filling a silo the observation of a few simple requirements are indespensible to success.

Building a Silo.—If a silo be erected as a separate structure, its foundation had better be a low stone or concrete wall. A clay floor raised above the outside level to prevent dampness will be cheapest and best. A sill of planks may be bedded on the top of the foundation wall. A common balloon frame may be erected by using as studs 16 ft. or 18 ft. planks, 2 in. x 10., or 2 in. x 12 in., placed 2 or $2\frac{1}{2}$ feet apart. To secure them safely at the bottom against lateral pressure while the silo is being filled, they should be mortised and toe-nailed, or cut so that the heels will extend down in front of the sills as shown in Fig. 2. To give additional security, the planks for the sills may be cross-lapped at the corners, as shown in Fig. 1.



(Fig. 1.)

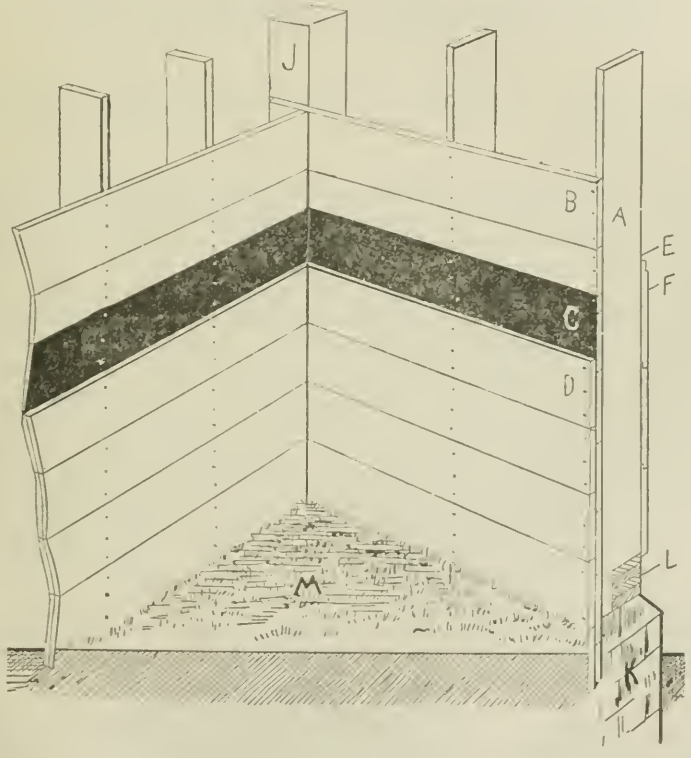


(Fig. 2.)

(A) Studs. (B) Inch lumber. (C) Tar paper. (D) Matched or planed lumber. (E) Tar paper. (F) Outside siding. (J) Post.

The roof will give additional strength to the sides for resistance to outward pressure if it be made after the truss pattern. Instead of ties or joints running straight across from the tops of the studs or the plates, where they would be in the way during the filling, they should extend like false rafters from the top of each stud to the rafter opposite, being spiked to it at about one-third of its length from the ridge. On the inside of the studs should be first nailed a lining of inch lumber running horizontally. It should be so put on as to make lock-joints at each corner, as shown in Fig. 2.

A covering of tar paper, with the edges lapped four inches, should then be tacked on. Over that should be put inch lumber running horizontally, planed on the exposed side and all the better for being tongued and grooved. That will make a practically air-tight building. To make it also frost proof, the outside of the studs may be covered in a similar way. A single thickness of lumber can be made to do, but the double boarding, with paper between, is preferable, since the tar paper is thus kept close against the outside boards.

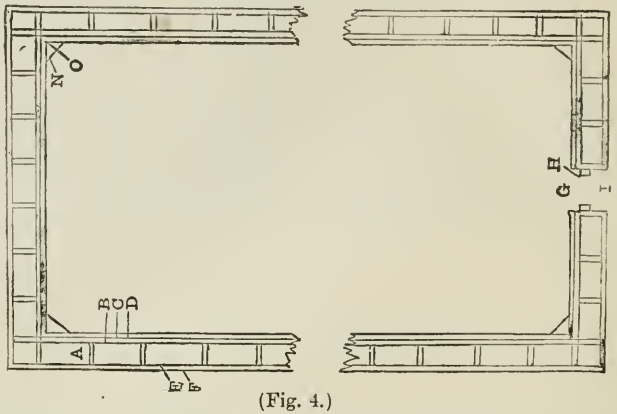


(Fig. 3.)

(A) Studs. (B) Inch lumber. (C) Tar paper. (D) Matched or planed lumber. (E) Tar paper. (F) Outside siding. (J) Post. (K) Stone foundation. (L) Sill. (M) Clay floor covered with cut straw.

The door should be of the ice-house style. A space between two studs may be left unboarded, or may be sawn out flush with their sides. Cleats may then be nailed on and the short boards fitted in. Care should be taken to so place strips of tar paper that they will make the joints at both sides of the door air-tight. A 10 or 12 inch board should be fastened into each corner to extend from the bottom to the top, and the space behind should be filled with sawdust. To preserve the inside lumber it should receive a

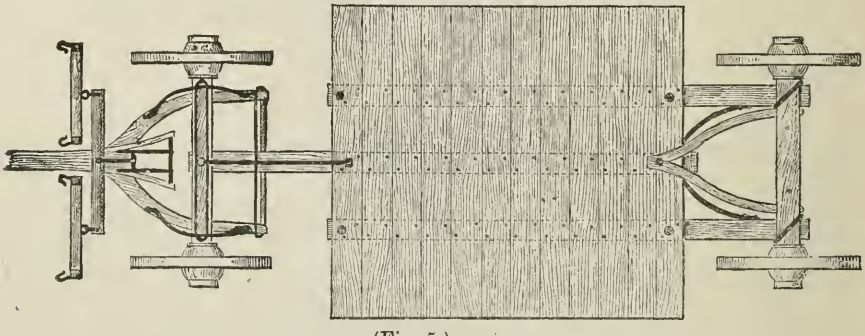
coating of coal tar, mixed with a few ounces of rosin, applied hot and liberally. Where a mow of a barn or part of some other building is to be fitted up for silage uses, the inside finish of the silo should be the same as for a separate structure.



(Fig. 4.)

A) Studs. (B) Inch lumber. (C) Tar paper. (D) Matched or planed lumber. (E) Tar paper. (F) Outside siding. (G) Door. (H) Cleats. (I) Outside door on hinges, and in two or three pieces. (N) Corner board. (O) Sawdust.

Filling the Silo.—For economical filling the tools, implements and conveniences should as far as possible, be adapted to the cheap and easy performance of the work. That implies the making the best use of the machinery already owned on the farm. For the cutting of the corn in the field I prefer and recommend a common corn knife, or an old-fashioned sickle. A strong reaper may do the work by horse power, but if the crop be heavy and the corn from ten to twelve feet high the rakes will not clean the board, and stalks will be dragged behind. For a hauling convenience an ordinary waggon may be made to serve by putting the wheels from a front axle on the hind axle. A truck or a waggon with low wheels and a large flat platform may be used. In either of these cases, by trailing a gangway behind the persons loading the fodder may carry it up in armfuls. These are not the best conveniences, nor do I recommend that way of loading. In the way now to be described the handiest kind of a truck can be provided. Three strong pieces of timber 6 by 6 inches and each 12 feet long are used. Strong poles will serve the purpose if flattened on one side. They are placed 16 inches apart, centre to centre, and the middle piece is extended 3 feet beyond the two outside ones. Three feet from the other ends of the two outside pieces a 2-inch plank, 8 feet long, is securely bolted across the three 12-feet pieces. A covering of planks is continued, each securely bolted, until the platform comes to the end of the two outside pieces, leaving the middle piece extending. Then by removing the reach from a common farm waggon, the platform so constructed



(Fig. 5.)

can be attached to the under side of the axles. The middle piece will serve the double purpose of a reach and front support. It can best be attached to the front axle by a long king-bolt passing down through it. A large flat washer and a screw nut with a key under it will make a strong, suitable and safe connection. A brace passing back from the top of the king-bolt to the front plank of the platform, will improve the attachment. The two pieces extending beyond the platform at the other end are to be attached to the hind axle on the under side. Two clamps passing over the axle with a bar and nuts beneath the six by six pieces will fasten them securely to the under side. The "hounds" can be used as a brace by attaching the end of it to the middle piece through the hinder plank of the platform. A rough sketch accompanies this to make my description more easily and clearly understood.

The stalks may be filled into the silo without cutting, but more labor is involved and the work of emptying for feeding is rendered doubly difficult. Any strong cutter, with capacity for a large quantity per day, will serve the purpose. Carriers should be attached unless the cutter stands on a level with the top of the silo, which ordinarily is neither practicable nor desirable. Horse power or engine may be used. Everything in the way of machinery equipment being ready, the filling may be commenced. From six inches to a foot of cut or uncut straw should be placed evenly over the bottom of the silo. Every farmer with a large crop should provide two of the carrying platforms already described. If the corn field be near the silo, one team will do the hauling. The stalks can be loaded most economically direct from the roof. If the crop be as ripe as it should be, wilting will be unnecessary. The person cutting the corn might as well throw it on the low platform as on the ground, and thus avoid the double handling. The teamster might at the same time be loading on the same platform the corn which will have been cut and laid in armfuls on the ground during his absence from the field with the previous load. At the silo the corn can be fed into the cutter from the waggon platform. The horses may be changed from the loaded to the empty waggon. At the cutting box two men will be required. A 2-inch cut is as good as an inch and a half, and both are better than one inch or less. During the filling, care should be taken to occasionally level the heavier parts of the stalks out against the sides of the silo. The filling may proceed every day, every second day or every third day as may be found convenient. In either case the contents should be tramped around the sides and in the corners just before the addition of a new layer. When the silo is full, after the lapse of two days the sides and corners should be again thoroughly tramped, and afterwards covered with a layer from two to three feet thick of any kind of straw, cut or uncut. It should be laid on close, and for that reason cut stray is rather preferable. It should also be closely tucked around the sides and into the corners. The silage may be thus left to cure and to keep until wanted, be that time four weeks or ten months.

Size and Cost of Silos.—A silo 10 feet wide by 50 feet long by 16 feet deep, inside measurement. will hold about 125 tons of settled corn silage. That is a desirable and convenient shape and should not have any partitions. Every 100-acre farm should have one of at least of that capacity. From the foregoing data the probable cost may be easily calculated. Where lumber is cheap and the farmer does most of the teaming work, the necessary cash outlay need not exceed $1 per ton of capacity. It will vary according to the finish of the building, the quality of lumber used, the price of material, etc. Tar paper can be purchased and put on at an expense of from 2½ to 3 cents per square yard. Fifteen tons of silage per acre may safely be reckoned on. Every two tons of well cured corn silage has a feeding value equal to one ton of ordinary hay for the production of milk or the maintenance of cattle, horses and sheep; and 100 tons of silage can be grown and cured at a total cost for rent, seed, labor, ect., not exceeding $150.

Summary. To sum up the whole matter—

1. It seems to be essential that the silo be air-tight.

2. The crop to be ensiled must be grown to a stage when the several plants will be almost mature.

3. The crop to be ensiled should be put in loosely at first, to permit of quick and sufficient heating; only the sides and corners should be tramped.

4. The filling may proceed every day, every second day or every third day with equally satisfactory results.

5. The silage may be covered with cut straw to a depth of two feet; or it may be left uncovered altogether at the expense of wasting only the top six inches or less.

Conditions and Results.—In the following four sets of conditions and results, I have tried to put the whole theory. By "life" I mean life as in the cells or life in the spores, which would be destroyed by a temperature above 125° Fahr. If air finds admission through a knot-hole or crack or, down the sides from neglect of tramping, it will carry spores with it and so introduce new life.

Silo Conditions.	*Results.*
A. Life in the cells in the presence of air.	Oxidation generating heat.
B. Life in the spores in the presence of air.	Mould.
C. Life in the cells with no air.	Fermentation.
D. No life in cells or spores with no air.	Preservation.

Growing a Corn Crop for the Silo.

The field set apart for growing corn was one of twenty acres of area; its soil was a clay loam, apparently nearly uniform in quality on the surface; the land lay almost level; the inclination towards the north-east was not sufficient to call for more than passing mention. The intention was entertained to clean the field from thistles and to provide a crop for the filling of the silos. The land was plowed in the fall, one-half only of the field received a dressing of manure, which had been hauled out during the winter. Part of it was plowed under in the spring and part was cultivated on the top by the use of the disc harrow and spring-tooth harrow. There was no apparent difference in the crop from these two different treatments of the manure.

Each variety of corn was planted across the field, running across both the part that was not manured and the part that was manured. There was a marked difference between the two sides of the field, in the appearance of each variety, during the whole period of the growth of the crop.

A force-feed seed drill was used to do most of the planting. It was found to be in every way as serviceable as the corn planter. The rate of seeding was gauged by driving the seed-drill for a distance of 100 feet on the bare lane; the number of grains that dropped from each spout, that was allowed to run, were then counted; the gauge was varied until only the number desired would pass through within 100 feet. When 150 grains of the large ensilage varieties were dropped per 100 feet in each row, from 15 to 18 lb. of seed were required per acre, with the rows three feet apart. The drill was set to plant as shallow as possible; the seeds were put in at an average depth of two-and-a half inches.

As the crop on the part of the field that was not manured, came up and continued to grow, it was seen that it was altogether too irregular to afford any useful data, for comparison with the yield of the same varieties on the manured land, or for comparison between the yield of the different varieties on the unmanured land. Within a few feet of each other in the same row, the height and weight of the plants would vary as three is to one, on the part of the field where no manure had been put; there was a generally uniform height, during all stages of the growth in the plants in the same row, on the part where manure had been applied. For that reason mainly, no weighings or analyses were made of the corn from the parts of the rows where no manure had been put.

The following may be mentioned as OBSERVED DIFFERENCES RESULTING FROM THE APPLICATION OF BARNYARD MANURE:

(1) The corn on the manured half of the field was on the average from 2½ to 3 feet taller than on the other half when both were cut in September.

(2) It tasselled out from a week to ten days earlier.

(3) The varieties which carried an average of ten ears or nubbins to every ten stalks on the manured part of the field, bore an average of only three small nubbins per ten stalks on the unmanured land.

Over a large portion of the field either "sulphate of ammonia" or "superphosphate" was applied with the seed in every second row of corn, across both the manured and unmanured parts. The use of these commercial fertilisers produced no observable effect on the rapidity of the growth or the weight or quality of the crop. The absence of noticeable results from the application of concentrated fertilisers may have been due to conditions of soil or season which eluded observation.

After the corn-planting was commenced the weather was exceptionally unfavorable. On the morning of 23rd May, a light frost hurt slightly the plots that were up; and on the morning of 29th May, the frost was so severe as to cut back to the ground all the corn plants that were above it. These frosts were followed by heavy rainfalls, which left the field too wet to permit the planting to be resumed before June 11th. After the planting was finished, frequent and heavy rains came and almost entirely prevented cultivation or hoeing. Until the first week of July, the corn had a very poor chance to grow, while the weeds had to be left in undisturbed possession of the field. That state of matters very much increased the labor required to clean the field afterwards. The following was the method of cultivation: (1) light harrows were used after the corn was about four or five inches high; (2) as the long-continued rains had caused the soil to become very hard, a two-horse cultivator, that stirred the ground on both sides of one row at a time, was improvised to loosen it to a depth of three or four inches; (3) shallow cultivation with a one-horse scuffler was then continued; (4) hand-hoeing between the plants in the rows was done twice, and in places oftener, to complete the task of exterminating the thistles.

Although it has been practically decided by the judgment of those who have had the longest and most successful experience, that corn for ensilage should be grown in hills or rows, it was considered desirable to plant some at different rates of seed per acre, to gain further information on the comparative quantities and values of the yield per acre. Some useful knowledge may also be gleaned by a comparison of the yields from the same variety when planted at different dates. The unusually cold and wet weather, which prevailed until the end of June, hindered the early-planted corn from having the advantage which ordinarily would accrue to it from the longer period of growth.

I have gathered the most of the information gained from these comparisons and examinations into a number of tables.

Table I shows the quantity of seed per acre, the mode and time of planting, the date of the various stages of growth, and the yield in green weight of the several varieties tested.

Varieties.	Field lot.	Mode of planting.—Rows apart.	Seed per acre.	Date of— Planting.	Tasselling.	Silking.	Blossoming.	Out of bloom.	No. of ears per 10 stalks.	Yield per acre in green weight.
			lb.							lb.
Mammoth Southern Sweet.	1a & b	3 ft.	15	May. 7	Aug. 26	Aug. 30	Aug. 30	Sep. 7	7	.....
	1c	"	28	"	.....	.....	.....	.....	.....	.....
	2c	"	18	22	22	29	29	7	6	22,045
Red Cob Ensilage ...	2d	"	18	"	"	"	"	.....	10	25,389
	3	"	28½	8	21	"	"	7	5	29,356
	4	"	15	"	"	27	27	.....	4	31;233
Mammoth S. S.	5	7 in.	196	"	20	28	28	7	0	44,719
Red Cob Ensilage	6	"	152	22	22	"	"	...	0	44,126
Giant Prolific S.	7	3 ft.	15	June 11	"	29	29	7	7	34,043
Ensilage...	8	"	15	May 8	21	26	26	"	8	31,929
	9	"	28	"	"	27	27	"	7	29,910
	10	7 in.	165	"	"	"	28	"	0	41,582
Pearce's Prolific	11	"	180	"	2	5	8	22	.....	27,228
Sibley's Pride of the North....	12	3 ft.	18	June 18	21	25	25	7	5	29,701
Pearce's Prolific	13	"	20	13	8	19	21	.....	10	32,828
Red Cob Ensilage	14b	"	56	May 22	24	27	27	7	6	42,932
	14c	"	31	"	"	"	"	7	5	37,710
	15b	"	28	June 11	28	Sep. 5	Sep. 5	.....	0	28,726
	15c	"	15	"	"	"	"	.....	7	23,642
Giant Prolific S,....	16b	"	30	"	26	Aug. 30	Aug. 30	.....	7	34,158
Ensilage..	16c	"	16	"	"	"	"	.....	9	24,757

NOTE.—Lots 1a, b and c badly injured by frost May 29; lots 5, 6, 10 and 11 were virtually broadcast and not cultivated.

TABLE II.—Showing average result of analyses of Corn in Table I.

	Per cent. of water.	Per cent. of crude protein.	Per cent. of soluble carbo-hydrates.	Per cent. of crude fibre.	Per cent. of fat (ether extract.)	Per cent. of ash.
Corn in rows 3 ft. apart.....	80.421	1.391	11.841	5.331	.425	.591
Corn in rows 7 inches apart.....	74.768	1.038	16.040	6.854	.507	.793

The low per cent. of water in the "corn in rows 7 inches apart" (broadcast), is doubtless due to the fact that the stalks had become somewhat withered and dry at the lower end before they were cut.

The weights per acre were calculated from weighing of 250 ft. of the crop, from two rows of each lot planted 3 ft. apart; a larger area of the broadcast corn was weighed.

Table III shows the results of the analyses of the ears (husk, grain and cob), stalks and leaves separately, from 160 corn plants, which were 10 average plants taken

from each lot grown in rows 3 feet apart, and reported on in Table I. The plants were cut on September 18th and cured in bundles in the field for 10 days, after which they were put in a dry loft in the barn until the middle of November, when they were weighed and sampled for analyses. The green weight was 300.75 lb. and the cured weight was 169.18 lb. which was made up of

103 ears (husk, grain and cob)	32.40	lb.
160 stalks	102.30	"
Leaves	34.48	"
Total	169.18	lb.

Division of Plants.	Per cent. of water.	Per cent. of crude protein.	Per cent. of soluble carbo-hydrates.	Per cent. of crude fibre.	Per cent. of fat (ether extract.)	Per cent. of ash.
Ears (husk, grain and cob)	80.82	1.63	13.98	2.97	.49	.11
Stalks	72.87	1.25	16.69	8.35	.58	.26
Leaves	28.14	6.87	40.37	18.82	1.52	4.28

Table IV shows the results of the analyses of the leaves and stalks separately, from 10 stalks from each of the lots of broadcast corn reported on in table I.

Division of Plants.	Per cent. of water.	Per cent. of crude protein.	Per cent. of soluble carbo-hydrates.	Per cent. of crude fibre.	Per cent. of fat (ether extract.)	Per cent. of ash.
Stalks	65.49	.97	23.66	8.86	.65	.37
Leaves	26.15	4.48	42.08	21.85	1.65	3.79

Table V shows *the per cent. of the total quantity* of dry matter in the plant, which were found in the ears (husk, grain and cob), stalks and leaves respectively.

Division of Plants	Crude protein.	Soluble carbo-hydrates.	Crude fibre.	Fat (ether extract.)	Ash.
Ears (husks, grain and cob)	12.6	12.7	6.1	12.4	2
Stalks	30.6	48.	53.3	46.5	15.
Leaves	56.8	39.3	40.6	41.1	83.

It will be seen, in the case of these 160 corn plants, representative of the bulk of the crop on the whole field, and none of which had reached maturity, that *over 42 per cent. of the total dry matter and over 56 per cent. of the total crude protein* was contained in the leaves.

Table VI shows the results from growing different varieties of corn side by side—two rows of each—to discover the comparative degrees of maturity attained in 100 days' growth, and also for comparison of the yields per acre. All the varieties were planted in rows 3 feet apart, and the rate of seeding was as nearly as possible one grain every six inches in the row. The stages of growth were termed,—"Tasselling," "Silking," "Blossoming," "Out of Bloom," "Early Milk," "Late Milk." The weight per acre was calculated from the actual weighing of the crop of 250 feet of two rows of each variety. The dates of planting were from June 12th to June 13th and of cutting from September 20th to September 23rd.

Name of Variety.	Class.	Green weight per acre in lbs.	Stage of growth reached.
Sheep Tooth	White Dent	41,220	Silking.
Hickory King	do	40,530	do
Wisconsin White Flint	White Flint	37,468	Early milk.
Egyptian Sweet	White Dent	37,300	Blossoming.
Wisconsin Yellow Dent	Yellow Dent	37,149	Early milk.
South Western	White Dent	37,140	Blossoming.
Cranberry White Dent	do	36,508	Early milk.
Brazilian Flour	White Flint	35,583	Tasselling.
Sibley's Pride of the North	Yellow Dent	34,530	Early Milk.
Edmunds Prim Dent	do	34,481	do
Mammoth Southern Sweet	White Dent	33,870	Silking.
Parrish White Dent	do	33,666	do
Horse Tooth	Yellow Dent	33,379	Blossoming.
Wisconsin White Dent	White Dent	33,205	Early milk.
Angel of Midnight	Yellow Flint	33,150	do
Pearce's Prolific	do	32,828	Late milk.
Compton's Early	do	32,490	Early milk.
King Philip Flint	Reddish Flint	31,987	Late milk.
Early White Flint	White Flint	31,560	Early milk.
Pride of the North No. 23	Yellow Dent	31,494	Late milk.
Longfellow	Yellow Flint	31,320	do
Red Cob Ensilage	White Dent	30,900	Silking.
Asylum Sweet	Sweet	30,810	Early milk.
Golden Dewdrop	Yellow Flint	30,585	do
Calico Dent	Striped Dent	30,508	Out of bloom.
White Flint	White Flint	30,343	Early milk.
Longfellow	Yellow Flint	29,754	do
North Star Yellow Dent No. 21	Yellow Dent	29,522	do
Woodworth's Yellow Dent	do	29,087	do
Horse Tooth	do	29,070	do
Leaming Dent No. 9	do	28,333	do
Canada Yellow	Yellow Flint	28,170	do
Longfellow Flint	do	27,656	do
Early Adams	White Dent	27,347	Late milk.
Golden Dewdrop	Yellow Flint	27,135	Early milk.
Hickox	White Dent	26,280	Out of bloom.
Evergreen Sweet	do	26,115	Silking.
Self-Husking	Reddish Flint	25,260	Late milk.
White Western	White Dent	25,230	Blossoming.
Giant Prolific Sweet Ensilage	do	25,230	Silking.
Tuscarora	White Flint	23,954	Early milk.
100 Day Corn	Yellow Flint	23,775	do
Chester County Mammoth	Yellow Dent	22,823	do
Sweet Fodder	Sweet	22,395	do
Crosby	White Dent	21,375	Late milk.
Old Colony	do	19,285	Early milk.

Table VII shows the analyses of average corn stalks, taken from the several varieties in Table VI; they were cured from September 18th for 10 days in the field, and remained in the barn loft afterwards until November 14th, when they were again weighed

and sampled for analyses; they were divided into three classes, according to the height of the plants, the separate analyses of which will be found under the heads—"large," "medium," "small."

Division of plant.	Analyses.	Reached "Silking Stage."			Reached "Out of bloom" and "early milk stage."		
		Large.	Medium.	Small.	Large.	Medium.	Small.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Ears ...	Water	78.90	78.68	72.25	75.01	66.23	67.58
	Crude protein	17.96	18.92	23.77	2.03	2.79	2.53
	Soluble carbohydrates				18.25	25.17	24.08
	Crude fibre	2.27	1.70	2.77	3.75	4.39	4.41
	Fat (ether extract)	0.70	0.53	0.99	0.77	1.13	1.14
	Ash	0.17	0.17	0.22	0.19	0.29	0.26
Stalks..	Water	71.65	69.32	73.90	75.86	70.71	73.38
	Crude protein	18.70	21.11	18.03	1.19	1.28	1.79
	Soluable carbohydrates				15.11	20.40	16.42
	Crude fibre	8.43	7.92	7.13	6.98	6.32	7.46
	Fat (ether extract)	0.93	1.30	0.62	0.61	0.93	0.57
	Ash	0.29	0.35	0.32	0.25	0.34	0.38
Leaves .	Water	32.34	33.03	25.73	26.17	31.53	33.02
	Crude protein	46.07	44.27	46.67	7.38	5.60	5.53
	Soluble carbohydrates				41.44	38.87	37.18
	Crude fibre	16.07	18.01	21.32	18.65	18.49	18.78
	Fat (ether extract)	1.92	1.49	1.89	1.81	1.66	1.75
	Ash	3·60	3.20	4.29	4.55	3.85	3.74

Table VIII shows the composition of these corn stalks in the green state, as calculated from the analyses recorded in Table VII.

Water	81.006 per cent.
Crude protein	1.370 "
Soluble carbohydrates	12.124 "
Crude fibre	4.395 "
Fat (ether extract)	0.530 "
Ash	0.575 "

Table IX shows the *per cent. of the total quantity* of dry matter in the plant, which were found in the ears (husk, grain and cob), stalks and leaves respectively, of the sample plants taken from the lots named in Table VI.

Division of Plants.	Crude protein.	Soluble carbohydrates.	Crude fibre.	Fat (ether extract).	Ash.
Ears (husk, grain and cob)	25.6 p.c.	27.0 p.c.	13.4 p.c.	27.8 p.c.	6.2 p.c.
Stalks	24.1 "	35.2 "	36.8 "	33.9 "	13.4 "
Leaves	50.3 "	37.8 "	49.8 "	38.3 "	80.4 "

This table in the main agrees with the conclusions drawn from Table V, viz.: that nearly if not quite half the total dry matter, valuable for feeding purposes is found in the leaf of the corn plants, which have not passed the stage of growth termed "early or late milk."

Since a stage of growth near maturity is on all sides acknowledged to be advantageous for the preservation of the crop in a silo, the following varieties are named as the best adapted of any that we have tested, for growth in those districts where the corn-growing season does not exceed 100 days.

Pearce's Prolific, King Philip Flint, Pride of the North No. 23 and Longfellow.

Where a longer growing season or a favorable one may be depended upon, the following varieties have shown that they are worthy of commendation :

Wisconsin White Flint.	Angel of Midnight.
Wisconsin Yellow Dent	Golden Dew Drop.
Sibley's Pride of the North.	Canada Yellow.
Wisconsin White Dent.	Horse Tooth, and others.

In sections of the province where larger varieties of corn will mature—enough to carry ears to the glazing or roasting period—the following varieties may be expected to return larger yields than those already mentioned :

Mammoth Southern Sweet.	Sheep Tooth.
Red Cob Ensilage.	Hickory King.
Giant Prolific Sweet Ensilage.	Parish White Dent, and others.

Silo Construction.

Besides the silo, built in the new main-barn buildings, one was constructed in the corner of an old frame barn-all above ground, which was being remodelled for cows for the Experimental Dairy. The plan of its construction was made to differ in some particulars, from the directions given in the Bulletin xlii on Building a Silo. The finish on the inside of the studs was different on each of the four sides of the silo.

On one side of the silo, a lining of inch lumber dressed on one side, was nailed on the studs ; this was covered with a sheeting of tar-paper ; on the tar-paper was put a lining of inch lumber dressed on one side, tongued and grooved.

On another side of the silo, the construction on the inside of the studs was similar, with only the difference, that the inside lining of lumber was not tongued and grooved.

On the third side of the silo, the studs were lined on the inside with tar-paper ; on that was nailed horizontally, a sheeting of inch lumber tongued and grooved and dressed on the side next the inside of the silo.

On the fourth side of the silo, the finish on the inside of the studs was made by the use of only one thickness of inch lumber neither dressed nor tongued and grooved ; it was nailed on the studs horizontally.

The following concise statement may help to make the differences of inside finish, clear to the minds of the readers who have had no experience in silo building :

First side ; studs $2'' \times 10''$; inch lumber dressed on on one side ; tar-paper ; inch lumber dressed on one side, tongued and grooved.

Second side ; $2'' \times 10''$; inch lumber dressed on one side ; tar-paper ; inch lumber dressed on one side but *not* tongued and grooved.

Third side ; studs $2'' \times 10''$; tar-paper ; inch lumber dressed on one side and tongued and grooved.

Fourth side ; studs $2'' \times 10''$; inch lumber as it came from the saw.

The lumber on all the sides was put on horizontally. The purpose of the differences in the construction of the sides was to discover the cheapest way of building one that would preserve the silage.

I may here anticipate by reporting that up to the time of writing, with the exception of a short distance from the top of the silage there was practically no waste or spoiling against the *first*, *second* and *third* sides. Against the *fourth* side, the silage was decayed

or moulded for a space of from 4 to 6 inches in from the side, for the first six feet from the top of the silage; below that the waste was confined to a space of about 4 inches around the seam between each two boards.

No particular statement of the expense of the construction of this silo is here made, as it formed a part of the general remodelling of the barn. The expenses charged to remodelling the barn were also augmented by the remodelling of a stone root-house into an experimental piggery, and by making the necessary changes in the water supply, etc., to the creamery to fit it for winter butter-making in connection with the Experimental Dairy, etc., etc.

Sections of the inside of the silo were covered with a painting of coal-tar applied hot; other sections were painted with crude petroleum; other parts were left with the lumber on the inside bare. Since the two substances were applied with a view to the preservation of the lumber, nothing can be said yet, concerning their efficacy in that regard. However the parts, where the crude petroleum was applied, left the silage immediately adjacent to them in a more natural state and with a more agreeable odor, than did those parts that were covered with the painting of tar.

I have no changes to make in the recommendations of the Bulletin in the part on Building a Silo, except to say that it is evidently unnecessary and without apparent advantage to have the lumber tongued and grooved.

Filling the Silo.

Two carrying platforms, almost similar in construction to the description in the Bulletin, were provided. They were found to answer the purpose admirably. The three main pieces of timber used as the carriers of the platform need not be heavier than 3″ x 6″ instead of 6″ x 6″ as previously recommended. The platform need not be constructed of planks heavier than 1½″ instead of 2″. In the Bulletin th statement is made,—"The stalks can be loaded most economically direct from the root. If the crop be as ripe as it should be, wilting will be unnecessary." Further experience has shown us that in the districts, having only a short season for the growth of corn, it is difficult to obtain a crop sufficiently ripe to obviate the need for wilting in the field. Part of the silo was filled direct from the root,—the plants were in the silo within an hour from the time when they were cut in the field; part of it was filled with corn that had been wilted for from one to three days. No analyses of the silage has been made as yet, but an examination of it reveals the fact that to the smell and taste, the silage from the wilted plants contains less acid and is better preserved. *Three conditions or treatments seem to be essential to the obtaining of the best quality of silage without waste from moulding or decay.*

1. The plants shoud be grown to a stage almost mature.

2. They should be wilted in the sunlight, until the water which they contain is less than 75 per cent of the total weight.

3. The silage around the sides and in the corners of the silo should be tramped and packed thoroughly while it is being filled.

Covering the Silage.

On the top of the corn silage, a layer of millet silage was put for preservation; on top of that a layer of rape silage was preserved for feeding to hogs as mentioned in another part of this report. The covering of the silage was a layer of straw about two feet deep. That is quite adequate when put on within two days after the last silage has been put in.

Feeding the Silage.

The silage from the silo at the dairy barn is being fed to milking cows. None of the tests or examinations into its feeding value are yet in a forward enough state to be reported upon here. When the silage is uncovered for feeding, unless the silo be frost proof above, it becomes chilled and is thus not in the best condition for offering to cattle. That may be guarded against by the putting of movable poles across the top of the silo and the placing of a layer of straw upon them.

Cost of the Crop.

I have not thought it best to introduce here a statement of the cost of raising the corn crop and putting it into the silos. The work on the whole was experimental, and involved more than twice the usual labor for planting, weighing, etc. It has been my humble opinion in all my work in connection with the college and experimental farm, that those in charge are always justified in causing a judicious expenditure of public money to obtain and disseminate information of value to the farmers, but not in growing corn or anything else for only direct profit or pay by the acre.

Correspondence on Corn and Silos.

The correspondence with farmers about the growth of Fodder Corn and the Building of a Silo has become increasingly larger. I copy here extracts from three out of the many grateful and appreciative letters received.

From Mr. Robert Murray, Avening P.O., Simcoe Co., Ont. . . . "Perhaps you "may remember me stating in a letter to you last spring, that I had planted two acres "of corn in the way you directed when here: I cultivated it the same way. Now that I "have got the crop cut and see what a large amount of first-class food I have, I wish to "thank you and to tell you that my expectations have been far more than realised. A "good deal of it was from 10 to 12 feet high. Wishing to know how many tons there "were to the acre, I measured off a piece and weighed the corn and the result was 27⅓ "tons. To be sure there was no mistake, I measured a second piece, which proved to be "a trifle more. I never had the like of it before. I am sorry I have no silo to put it in."

From Mr. John S. Read, Bayview P.O., Grey County, Ont. . . . "I write to "inform you about the silo you gave me some advice about. I sowed the corn June 18th, "which was a month too late; I could not sow sooner on account of wet weather, I "commenced cutting corn October 7th. I let it lie a couple of days to wilt, put it into "silo and left it 3½ days, then levelled it down and tramped the sides and corners well. "I did not put in more than 10 tons at a time. It heated from 120 degrees at 6 inches "to 135 degrees at 15 inches from the top of the heap. It got slightly cooler toward the "bottom. I covered with tar-paper and put a couple of feet of straw on top. I opened at "the end of six weeks; about 4 inches of top were bad, and four inches wide of the sides "were also bad for 2 feet down. Do you think it would be any improvement to put a "few inches of chaff under the tar paper? The stock are very fond of it and are doing "well. The silage is pretty sour, probably more than it would have been if the corn had "been more matured. The silo is built inside of barn; it is double boarded with rough "lumber with tar-paper between.

From Mr. W. M. Mills, Arden P.O., Frontenac Co., Ont. . . . "I write to "inform you of the complete success of my silo. We have been feeding it over a week "and my cows eat it greedily, so much so that they never appear to have enough of it. " . . . I did not commence with my corn until June, I then sowed broadcast about "six acres. I then planted in drills four acres. We next planted in hills up to July "12th eight acres, the latter on old June grass sod, dry upland, no manure. The most of "the first ten acres was well manured and a part not at all, but it made no difference. It "was all about as good as it could well be. The broadcast was as stout as possible. I lost "about half an acre by lodging and rotting; the drills were superb, the hills were grand. "Riding through it on horseback I could not reach the top with my hand in the most of "it, and it was neither cultivated nor hoed. . . ."

JAS. W. ROBERTSON.

(No. 25.)

Statement as to the disposal of the Revised Statutes of Ontario for the year 1889. Presented to the Legislature, 3rd February, 1890. (*Not printed.*)

(No. 26.)

Return to an Order of the House of the eighteenth day of March, 1889, shewing the number of documents filed under the "Custody of Title Deeds Act," up to the first day of January, 1889, and the amount of fees received. And shewing also, the amount paid in each Registration Division for the necessary books as required under the Act. Presented to the Legislature, 4th February, 1890.—*Mr. Wood (Hastings.)* *(Not printed.)*

ABSTRACT

Of Return to an order dated 18th March, 1889, shewing the number of Municipalities in which the Act to impose a tax on dogs, and for the protection of sheep is in force; the number of dogs assessed, the number of sheep killed and injured, and the amounts paid for the same in years 1886, 1887 and 1888, also, the Municipalities in which a by-law is in force for the assessment of dogs, without providing for damages to sheep, and the number of dogs so assessed for the years mentioned.

(*Mr. Dryden.*)

ABSTRACT

Of Return to an Order dated 18th March, 1889 (Sessional papers 27, 1890), shewing the number of Municipalities in which the Act to impose a tax on dogs, and for the protection of sheep (R.S.O. 1887, c. 214) is in force; the number of dogs assessed, the number of sheep killed and injured, and the amounts paid for the same in the years 1886, 1887, and 1888; also, the Municipalities in which a by-law is in force for the assessment of dogs without providing for damages to sheep, and the number of dogs so assessed for the years mentioned.

Number of Municipalities		Number of dogs assessed.			Number of sheep killed.			Number of sheep injured.			Amount paid for sheep killed and injured			Is the Act R.S.O. 1887, c. 214, in force j		Is by-law assessing dogs but not providing damage for sheep in force?	
		1886.	1887.	1888.	1886.	1887.	1888.	1886.	1887.	1888.	1886.	1887.	1888.	Yes.	No.	Yes.	No.
Townships	386	52765	55615	56510	2405	3158	2758	630	992	876	$13041 20	$15178 34	$14321 32	144	220	169	198
Villages	117	5860	6322	6710	19	12	33	13	7	9	95 99	65 80	37 00	54	56	67	55
Towns	65	10310	10247	10569	27	33	33	5	6	9	97 98	135 66	190 34	32	27	43	18
Cities	11	11343	11151	7444	18	21	14	4	6	15	242 00	32 33	72 41	7	1	7	3
Total Returns	579	80278	83333	81233	2469	3224	2838	652	1011	909	$13477 17	$15412 13	$14621 07	237	304	286	274