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ANNUAL REPORT
OF THE
GOVERNORS, PRINCIPAL AND FELLOWS
OF
MCGILL UNIVERSITY, MONTREAL,
For the Year 1894.

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OF THE
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MCGILL UNIVERSITY, MONTREAL.
FOR THE YEAR 1894.

*(Published by permission of His Excellency, the Governor
General, Visitor of the University.)*

*To His Excellency the Right Honorable John Campbell
Hamilton Gordon, Earl of Aberdeen, Governor General
of Canada.*

MAY IT PLEASE YOUR EXCELLENCY :—

We beg leave respectfully to submit to Your Excellency, as Visitor of the University under its Royal Charter, the following report of its history, and of the progress of its various departments during the educational year ending December 31st, 1894.

Early in the year we had to lament the death of Mr. Peter Redpath, the Senior Governor of the College, and one of the great benefactors of the University. It occurred on February 1st, 1894, and the announcement was received with general sorrow.

On February 6th, the day of the funeral in England, a memorial service was held in the reading-room of the Library, which he had so recently presented to the University, at which the following address was delivered by the Rev. Dr. Mac-Vicar :—

*“ We unite this morning, at the same hour in which his funeral service is being conducted at Chiselhurst, England, in a public tribute of respect and honor to the memory of Mr. Peter

Appendix to Report of 1893.)

Redpath. He was born of godly parents in this city, in 1821, where he received his early education, his business training being completed in England. He was a man of good ability, sound judgment, refined and elevated taste, and excellent culture—a lover of literature and art, and, what is infinitely better, a lover of truth and the God of Truth. He was probably as widely read as most of his mercantile contemporaries.

“After a long and successful career, having retired from business, he removed to England and devoted several years to the study of Law, and was admitted to the Bar as a barrister of the Middle Temple, London. Both in this city and in the old land he was deservedly called to occupy many positions of trust and responsibility. In business he was uniformly characterized by indefatigable diligence and unswerving integrity. His yea was yea, and his nay, nay. Gentle, amiable and considerate of the opinions and feelings of others, ever ready to take a broad and generous view of their actions, and yet when purity and principle were concerned he was as firm as a rock. It was vain for those who had sinister ends to serve to attempt to turn him aside from truth and righteousness. In these respects he furnished a notable pattern which young men and all others may do well to imitate.

“As a philanthropist he took rank with the foremost in our land. His benefactions in various forms to McGill University and other public institutions bear witness to his unstinted liberality. The Museum and this Library which bear his name will perpetuate his memory amid the respect and gratitude of generations of students and citizens through coming centuries. He had grace and wisdom given him to administer his large resources in his life-time for the good of his fellow-men; and this fact deserves to be emphasized. His last public appearance amongst us was in this very hall three months ago in the performance of a crowning act of educational usefulness.

“But let it not be supposed that all his benevolence took visible forms like those just mentioned. He was naturally unobtrusive, strongly averse to all ostentatious display and vulgar advertising of the good he purposed or accomplished.

His unreported charities were numerous and wisely distributed. He sought to do his alms before God, and not before men to be seen of them. The Father who seeth in secret alone knoweth in what abundant measure he gave help and comfort to others.

“As a Christian he was devout, conscientious, consistent. His christianity was a life and character rather than a demonstrative profession. He detested quackery and sham in religion, and he was right. I had opportunities of knowing his views on these matters intimately. For many years he was an exemplary member and office-bearer of the Free Church, Coté Street, now Crescent Street Church. He served with me there most faithfully as a deacon during my entire pastorate, and was twice elected as an elder, the duties of which office, through the modest estimate of his own ability, he judged himself unable to undertake.

“His simple trust in the Word and in the Christ of God was the secret of his meek and quiet spirit, unfailing generosity and sterling worth. And I must add that in all his Christian service and public munificence he was lovingly aided by his partner in life, with whom, in her great bereavement, we today deeply sympathize. Finally, in this hour of sorrow over the removal of one of Montreal's noble benefactors, let us seek through the mediation of Jesus Christ the help of His Holy Spirit that we may emulate the example of the one whose memory we honor.”

Another member of the Corporation of the University, the Rev. George Douglas, LL.D., Principal of the Wesleyan Theological College, died on February 10th, 1894. Born in Scotland in 1825, he came with his parents to Montreal in 1832. Educated in England for the ministry of the Methodist Church, he went as a missionary to the West Indies, and returning subsequently to Canada for ministerial work, was appointed eventually head of the Wesleyan Theological College in Montreal. The duties of this office he discharged with great efficiency. In 1870 the University conferred upon him the degree of LL.D., “Honoris Causâ.”

NEW APPOINTMENTS, RE-APPOINTMENTS AND CHANGES OF
APPOINTMENT.

The Hon. John Sprott Archibald, M.A., D.C.L., and Chas. J. Fleet, Esq., B.A., B.C.L., have been appointed members of the Royal Institution for the Advancement of Learning and Governors of the College.

In the different Faculties the following changes of appointment, new appointments and re-appointments have been made:—

Dr. Thos. J. Roddick, Professor of Surgery and Clinical Surgery, to be Professor of Surgery, and relieved of the additional chair of Clinical Surgery.

Dr. James Bell, Assistant Professor of Surgery and Clinical Surgery, to be Professor of Clinical Surgery.

Dr. R. T. Ruttan, Assistant Professor in Chemistry, to be Professor of Practical Chemistry.

Dr. T. Johnson Alloway, Lecturer in Gynæcology, to be Assistant Professor of Gynæcology.

F. G. Finley, M.B., M.D., Lecturer in Medicine and Clinical Medicine, to be Assistant Professor of Medicine and Clinical Medicine.

Henry A. Lafleur, B.A., M.D., Lecturer in Medicine and Clinical Medicine, to be Assistant Professor in Medicine and Lecturer in Clinical Medicine.

George Armstrong, M.D., Lecturer in Surgery and Clinical Surgery, to be Assistant Professor in Clinical Surgery.

Wyatt G. Johnson, M.D., to be Lecturer in Bacteriology.

C. W. Colby, B.A., Ph.D., Lecturer in English Language and Literature.

W. E. Deeks, B.A., M.D., Lecturer in Zoology.

The Lecturers, Instructors, Sessional Lecturers and Demonstrators in the following subjects have been re-appointed, viz. : German, Chemistry, Classics, Mathematics, French, Botany, Elocution, Gymnastics.

H. M. Tory, B.A., and Fred. H. Pitcher, B.A.Sc., have been appointed Demonstrators in Physics.

Alex. Brodie, B.A.Sc., Assistant in the Chemical Laboratory.

Cecil B. Smith, Ma.E., Assistant in charge of the Drawing Department (Descriptive Geometry).

Robert Bickerdike, B.A.Sc., Assistant in Surveying and Descriptive Geometry.

Geo. S. Smith, B.A. Sc., Assistant to Professor of Mechanical Engineering.

W. H. Warren, B.A.Sc., Demonstrator in Electrical Engineering.

NEW ENDOWMENTS AND DONATIONS.

The total amount of the endowments and donations for the past year has been \$200,000. Of this the largest part is a superannuation fund of \$150,000 for the teaching staff of the Faculties of Arts and Applied Science, created by subscriptions of \$50,000 each from Sir Donald Smith, Mr. J. H. R. Molson and Mr. W. C. McDonald.

The value of this fund can be fully appreciated by those only who have studied in some detail the history of Universities, and know the embarrassment that has sometimes arisen, from the want of such a fund, in maintaining the efficiency of the teaching while keeping faith with the professors who have faithfully discharged their life duties.

The Hon. Sir Donald A. Smith has renewed his donation of \$4,000 for Sessional Lecturers in the Faculty of Arts.

Mrs. J. H. R. Molson has given \$20,000 to supplement the original amount of her endowment of the John Frothingham Chair of Mental and Moral Philosophy, raising the total thus to \$40,000; also \$1,000 for salary of Asst. Curator of Museum.

Mr. W. C. McDonald has given \$10,000 to reduce the deficit in the Faculty of Applied Science; \$3,200 to provide certain salaries in the Engineering and Physical departments for one year; a piece of land near the Medical building; and the cost of additions to the Engineering building.

Mr. J. H. R. Molson, a further donation of \$500 for the purchase of specimens for the Museum; Mrs. Peter Redpath

\$1,500. for the maintenance of the Peter Redpath Museum ; Mrs. John McDougall, donation of \$500 for the Dr. Craik endowment.

Mr. George Hague has continued the Exhibition of \$125, offered regularly for many years in his name, in the Faculty of Arts.

Mr. S. Carsley, \$105, to pay for models of the old gates of Quebec for the Library.

Legacies have been received from the estates of the following :

The late Jane F. Learmont, \$3,000 to be added to the Dr. Craik endowment in the Faculty of Medicine.

The late Dr. Sterry Hunt, bank stock to the amount of \$2,000 at par value, yielding an annual income of \$160, to found a Scholarship bearing his name.

The late Mrs. Stuart (Dame Agnes L. Gale). balance (in full) of her legacy endowing the Gale Chair in the Faculty of Law, amounting to \$4,054.54.

THE PAST AND PRESENT SESSION.

In the meetings of Convocation, at the close of last session, the following Degrees in Course were conferred :

Law, D.C.L..... 1 }	10
“ B.C.L. 9 }	
Medicine, M.D.....	55
Arts, B.A. (10 women).....	40
“ M.A. (2 women).....	4
Applied Science, B.A.Sc.....	23
“ “ Ma.E.....	4
Veterinary Science, D.V.S.....	19
	155

The Honorary Degree of LL.D. was conferred on His Excellency the Earl of Aberdeen, Governor General of Canada ; and on Francis Reuleaux, Professor of Kinematics and Machine Design, Berlin.

Seven gold medals were awarded to successful candidates, besides the Wicksteed Medal for Physical Culture, and the Aberdeen Silver Medal in Applied Science.

In the classes of the Normal School, 93 Diplomas were granted by the Superintendent of Public Instruction, namely,

7 for Academies (issued to graduates in Arts of the University), 40 for Model Schools, and 46 for Elementary Schools. The total number of persons who have received diplomas in the Normal School since its establishment in 1857 is 1,761. The number of diplomas issued has been 2,435, some individuals having taken more than one diploma.

In the June Examinations for the title of Associate in Arts held this year at 39 centres, 228 candidates presented themselves, of whom, however, 122 came up for preliminary subjects only; 142 candidates completed successfully the examinations for Associate in Arts. Many of these candidates fulfilled the requirements for matriculation, and, in addition, 74 candidates were examined for matriculation only. The total number of candidates thus qualified for entrance was 85, viz., 70 for Arts or Medicine, and 15 for Applied Science.

In the past session, 66 partial "exemptions from fees" were given to students, in some cases in competition, in others as Benefactors' Scholarships and as aids to Theological colleges. These have been given principally to students from the country.

At the September Entrance Examinations in Arts, 3 scholarships, 8 exhibitions and 2 bursaries were awarded, varying in value from \$125 to \$100 for the two former, and half this amount for the bursaries. They are the gifts of Sir Donald A. Smith, Mr. W. C. McDonald, Mr. Hague, the late Major Mills and Mrs. Jane Redpath.

In Applied Science, the British Association Exhibition of \$50 and the Scott Exhibition of \$60, and other prizes, were awarded.

A comparison with the Annual Report of 1884 shows that the numbers both of the students in the Faculties only and of the degrees given have about doubled in the decade, viz., 541 students in 1884 against 1,031 in 1894, and 74 degrees in 1884 against 155 in 1894.

The total number of students attending classes in McGill College in the present session is distributed as follows:—

Faculty of Law.....		43	
“ “ Medicine.....		401	
“ “ Arts, including students from other Faculties attending lectures, about	600		
“ “ Arts, exclusive of students from other Faculties { Men.....	237	} 350	
Women.....	113		
Faculty of Applied Science.....		189	
“ “ Veterinary Science.....		48	
McGill Normal School— Teachers in training.....		175	
		<hr/>	
		1,205	
Deduct repeated in different lists		11	
		<hr/>	
		1,194	

In the Affiliated Colleges in Arts the following are in attendance:—

Morrin College, Quebec— Undergraduates.....	5
St. Francis College, Richmond— Undergraduates	11
Wesleyan College, Stanstead— Undergraduates.....	5

The total given above, for the Faculties alone of McGill College, is 1,031, which exceeds that of last year by 50, the increase being due chiefly to the increase of the Medical Faculty.

FACULTY OF LAW.

There is nothing special to be reported about this Faculty. Under the able and energetic professors of the Faculty the duties of teaching are thoroughly carried out. The number of students is the same as last year, viz, 43, of whom 15 are Bachelors of Arts of this or other Universities.

FACULTY OF MEDICINE.

The students in the Faculty of Medicine number 401 in all, being 52 more than last year; of these there are 112 in the 1st year, 122 in the 2nd year, 94 in the 3rd year, and 73 in the 4th year. These do not include students in Comparative Medicine, but there are included 16 students enregistered as partial students, namely, Dental students and others who are

not taking the full course. The total number of new students, including those entering upon the 2nd year, is 123, being 20 new students more than last year.

Two important events are to be chronicled in the history of the Faculty for the past year :—

The first is that the class of students entering in 1894 and their successors will be required to take 4 sessions of 9 months length each, instead of 6 months only, like their predecessors, in order to attain the degree of M.D.

This change the Faculty deemed necessary for thorough professional training, in consequence of the rapid advances made in Medicine and Surgery, and the consequent accumulation of knowledge. It was supposed that the increase in the term would cause a decrease, at first, in the number of students. On the contrary, there has been a considerable addition, and the total in this Faculty is larger than ever before.

The second event was the opening on January 8th, 1895, by your Excellency, of the new buildings due to the generosity of Mr. J. H. R. Molson.

On this occasion the Dean, Dr. Craik, gave a sketch of the history of the Faculty, tracing it to the Montreal Medical Institution, founded in 1824 by four of the attending physicians of the Montreal General Hospital, Drs. Robertson, Caldwell, Holmes and Stephenson, its first building being on the present site of the Bank of Montreal.

This Medical Institution became the Medical Faculty of the University in the session 1829-30. From about 1845 to 1851, the Faculty occupied what is now called the Centre, or Arts, building of the University, moving however to Côté street in 1851-2, and not returning to the University grounds until 1872, when a new building was erected for it by the Governors—the beginning of the extensive series of lecture rooms and laboratories which belong to it to-day.

FACULTY OF ARTS.

The number of students in the Faculty of Arts is the same as last year; the want of adequate accommodation in

the class-rooms for this number reported last year still continues.

The total number in attendance on lectures, including those from other Faculties, is about 600.

The number belonging to the Faculty alone is 350. Of these, 113 are in the Donalda Department, 19 are graduates taking extra courses, 179 are under-graduates, and 152 are partial students.

The most important occurrence of the year has probably been the construction of a definite scheme, by which students who cannot afford the time requisite for taking the fullest advantage of the various courses offered in the Faculty of Arts, before proceeding to professional studies, may take the courses necessary for the degree of B.A. and for the professional degree in six years. For this purpose careful arrangements have been made of lecture hours and of the courses in the Academic years, which will prevent the repetition by a student in the two Faculties of studies of the same character, or having the same educational effect. Time may thus be saved without any detriment to the general education of the Bachelor of Arts, or any diminution of professional knowledge. In this way it is hoped that many more than at present may be enabled to get the benefit of the higher education, to the extent indicated.

The detailed regulations in connection with the scheme will necessarily vary for the several professional Faculties, the principle observed being that a fair balance shall be maintained between literary and scientific culture in the general education. The arrangements under this scheme have been completed or nearly completed for the Faculties of Medicine and Applied Science.

Another interesting event in the history of the Faculty has been the receipt from H. B. M.'s Minister at Athens (E. Egerton, C. B.) of a letter, in which he offers to Canadian students, gratis, the advantages of the British School of Archæology in that city, and expresses the hope that Scholarships or Studentships may be founded, in order to enable classical students to proceed from Canada thither to study, in the same

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way as students from the United States go to the American School of Archæology there.

As professors of United States universities make use of their School of Archæology, it is probable that there are professors in Canada also who would be glad to have a similar opportunity. It might be offered in this University as part of a more general scheme applicable to other departments as well as to the classical, by which at least one professor yearly might be appointed to visit Europe and report on the most recent advances there in his own department. Such reports would be specially valuable with regard to science (considering its rapid progress), the applications of science, and educational methods and equipments. Each report might be embodied in a lecture to be given to the university by the professor on his return. An endowment for a university Lectureship or a Travelling Fellowship to the extent of \$500 a year would probably suffice, although it might not meet all expenses.

FACULTY OF APPLIED SCIENCE.

The number of the students in this Faculty for the session 1894-1895 is 189, of whom 4 are taking a graduate course.

A report from the Dean shows a number of valuable donations in machinery and apparatus. An Accumulator Room and an extension to the basement of the testing laboratories have been added. Mr. McDonald defrays the expense.

A very interesting account is given in the same report of the work done in the several laboratories—Mathematical, Chemical, Hydraulic, Cement Testing, Strength of Materials, Thermodynamic, Electrical, Geodetic and Mechanical. In some of these, valuable series of experiments are being carried out.

FACULTY OF COMPARATIVE MEDICINE AND VETERINARY SCIENCE.

The number of students during the past year has been 48.

The students continue to attend the lectures in the Faculty of Medicine, but the re-arrangement of the course of study in that Faculty and the extension of its session to nine months

is likely to cause inconvenience in the future, from the difficulty of grading the courses to meet the requirements of both Faculties.

The necessity for increased accommodation is much felt, and the progress of the Faculty is greatly hindered in consequence.

Many applications for a graduate course have been made, but it has been considered inexpedient to undertake this, owing to the want of the necessary accommodation.

WANTS OF THE UNIVERSITY.

The most urgent of these is the want of means to raise the income of the University to an equality with its expenditure. The deficit for the present year is over \$13,000. If this deficit were due to a new advance of the University, to its efforts to occupy new parts of the educational field, a remedy might be found by pausing and resting. Unfortunately the case is otherwise; the deficit is caused solely by the struggle to avoid retreating from the position it took up some years ago, and is chiefly attributable to the fall in the rate of interest on investments, and to the difficulty in finding a new body of subscribers to continue subscriptions that have expired by lapse of time, among which may be included those for the Chair of Botany. The Botanical Garden also, for which at one time subscriptions were obtained, costs this year over \$1,800.

Fresh subscriptions might meet this deficit for a time, but obviously a permanent addition to the endowment fund is needed. This might be given either by additions to the general fund, or by the endowment of some of the present Chairs not already provided for, thus releasing a part of the general fund. Such Chairs would, according to the ordinary University practice everywhere, be named either after the donors, or after those whom they wished to commemorate. A beginning, but only a beginning, was made some time ago, for a botanical endowment.

Another method is by additions to the funds already in existence for certain endowed Chairs. This method has already

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been followed by two well-known liberal benefactors of the University.

Next in importance come two wants, both so urgent that it is hard to distinguish between them in this respect, namely, greater class-room accommodation for students in the Faculty of Arts, and a larger number of professors and lecturers to teach them. The number of professors' Chairs might well be doubled for the present work.

The present need for a suitable class-room in Chemistry affects the Faculty of Applied Science as well as that of Arts. This is strongly shown in the report of the Faculty of Applied Science.

Our inferiority to other Universities in the number of Bursaries, Exhibitions and Scholarships for students is severely felt.

Scholarships for distinguished Graduates in Arts pursuing the courses of the Professional Faculties would greatly aid the efforts of the several Faculties in encouraging professional students to take the B. A. degree.

Of the same kind but of a higher character would be Studentships or Fellowships for graduates capable of and desiring to pursue original research.

One such scholarship, although from an outside source, is that offered by Her Majesty's Commissioners for the Exhibition of 1851 to this University, for the encouragement of such sciences as Physics, Mechanics and Chemistry. This is open therefore to the Faculties of Arts and Applied Science. There is room for similar scholarships in many other subjects. In the Faculty of Medicine, after the recent extension of its buildings and laboratories, travelling studentships, to enable graduates of the requisite capacity to pursue original research in the great schools of Europe, would be of high value.

That a Convocation Hall is wanted of sufficient size to accommodate the large numbers who assemble when degrees are conferred in two or three Faculties on the same day is well known. Such a Hall would be useful also for all public assemblies and receptions of the University, by reducing the

risk of loss by fire to a minimum. There is a natural and increasing reluctance to use for these purposes University buildings whose contents in books, instruments, scientific collections and machinery are of great and growing value.

Rooms for University offices and meetings of Boards and Committees, the need for which is felt, might be combined with the new building alluded to above.

A common dining-hall for students, and suitable buildings for residences, have long been spoken of.

AFFILIATED COLLEGES.

Morrin College, Quebec, has recently received a considerable addition to its endowments, which will place it in future on a firmer footing than heretofore. It has 4 lecturers.

The number of lecturers in St. Francis College, Richmond, is 3.

The Wesleyan College, Stanstead, which has done good work since its affiliation has 3 lecturers.

The four affiliated Theological Colleges in Montreal have about the same number of students as last year.

THE MCGILL NORMAL AND MODEL SCHOOLS.

In the McGill Normal School the numbers of students and of diplomas issued to teachers are year by year increasing. At the close of the session 1893-4, 47 Academy diplomas, 40 Model School diplomas and 46 Elementary School diplomas were conferred by the Honorable the Superintendent of Public Instruction.

During the present session 96 persons were admitted to the Elementary School Class, and 71 to the Model School Class. Eight undergraduates are enrolled as members of the Academy Class, and sixteen graduates and undergraduates have attended the lectures on Pedagogy. The total attendance in the Normal School is much larger than in any previous year of its history.

The Model Schools maintain their efficiency. Three hundred and eighty-two pupils are now enrolled, of whom 157 are boys and 225 girls.

The great increase in the numbers has been productive of a certain amount of embarrassment from the want of means to make an adequate increase in the number of bursaries. It is hoped, however, that an addition to the income may be obtained which will overcome the difficulty. The Model School is doing a very important work in educating Montreal children without receiving a proportionate share of the taxes raised in the city for educational purposes. Negotiations are at present being carried on with the Protestant Board of School Commissioners to put this matter on a right basis.

GYMNASIUM.

The Report of Dr. R. Tait Mackenzie is unusually interesting. It tells of the introduction (for the first time, it is believed, in any Canadian university) of a system of Medical examination tests and measurements of all candidates for athletic contests, which seems already to have shown its own value.

The introduction is due to a regulation of the Committee on Grounds and Athletics, compulsory on all such candidates.

A record is kept of the results under three heads, two of which are : (1) The condition of the heart and lungs, not only under normal conditions, but also after a definite amount of violent exercise ; and (2) anthropometric measurements. For these last the Committee provided a part of the necessary apparatus.

It may be "more than a mere coincidence," as Dr. Mackenzie points out, "that during the past foot-ball season, not a single man had to leave the field from injury before the call of time."

There has been a small addition to the apparatus in the gymnasium besides the instruments for anthropometric measures. There is great need for improvements in the heating and ventilation.

The total number of men in attendance was 114, most of whom came from the Faculties of Arts and Applied Science.

The number of Donalda Students in Miss Barnjum's class was 19.

APPENDED REPORTS.

Appended are a sketch of the History of the Medical Faculty and the Reports of the Library Committee, Peter Redpath Museum, McDonald Physics Building, Observatory, the Botanic Garden, Applied Science Faculty, and the financial statements. Some of the salient points may be indicated here.

Library.—It is gratifying to find that the attendance of the present year has been much more than double that of 1892-93, and that the number of books borrowed has increased in nearly the same proportion.

The library now contains (independently of some 16,000 volumes in departmental or faculty libraries) almost 39,000 volumes, an increase for the year of over 1,500 volumes. Among recent accessions are to be found the excellent selection of German literature presented by the Chancellor, Sir Donald A. Smith.

Mrs. Peter Redpath has most liberally completed the two storeys of the stack, hitherto unfinished, and has presented a fine clock for the reading room; besides which, she has added more than 100 volumes of beautiful and expensive works to the Peter Redpath Historical collection, which was so long an object of interest to her late lamented husband.

The Peter Redpath Museum.—In connection with the Museum, it may be mentioned that steps have been taken by the Committee, in conjunction with the Board of Governors, to place in the Museum a tablet with suitable inscription in memory of Mr. Redpath, who not only presented the building to the University, but up to the time of his death took a lively and sympathetic interest in the work carried on there.

The members of Corporation are already aware that a biographical sketch of Mr. Redpath, with historical notice of the Museum, prepared by Sir William Dawson, has been issued by the Committee, and records the great services rendered by Mr. Redpath to the whole University.

Shortly after his death, Mrs. Peter Redpath showed her desire to keep up his work by placing herself in communication with the Museum Committee, and more recently she has

continued her husband's liberality by a donation of \$1,500 towards the expenses of the past year.

In the month of March the Museum was deprived of its curator by the sudden death of Mr. Thomas Curry, who had done much useful work in arranging and naming the collections. Mr. Curry's salary had for thirteen years been generously paid by Mrs. J. H. R. Molson, who has kindly placed the balance of the fund which she had provided for the purpose at the disposal of the Committee, to aid in carrying on the work of the Museum.

Among publications issued by the Museum or containing descriptions of specimens in the Museum, may be mentioned: "The Canadian Ice Age" and "Bivalve Shells of the Coal Measures," by Sir William Dawson, and papers by Dr. Harrington and Dr. Adams on certain minerals and rocks from Ontario (*Am. Jour. Sci.*, July, 1894); also a paper by Professor Penhallow on "Structural Variations in Canadian Coniferæ." Other original papers relating to specimens in the Museum, and adding to their scientific value, are expected to follow in the present year.

McDonald Physics Building.—The McDonald Physics Building is rich in valuable apparatus, and requires a proportionate time and staff to bring the collection into full working order, so as to meet the needs not only of the University students generally, but also of those, possibly outside of the University, who wish to pursue original research. For the information of the latter it is intended to prepare a catalogue next vacation showing the facilities which the collection can offer them.

The report shows very satisfactory progress during the year. Additions have been made to the staff in the appointment of Messrs. Tory, B.A., and Pitcher, B.A.Sc., as demonstrators; and the services of a skilled mechanic have been secured in order to construct in the workshops of the buildings special pieces of apparatus as the need arises.

The average number of students attending the classes in the buildings in the first term of 1894-5 has been 180.

A large part of the time of the professors and demonstrators is of course devoted to lectures and to laboratory work—what remained has been given chiefly to the testing, correcting and setting up of instruments. The advanced practical work has, owing to the arrangements of the Electrical Engineering course, been limited very much to Electricity and Magnetism. Much time has been given to the testing and comparison of a fine collection of standard resistance coils, resistance-boxes, potential and current standards, to magnetic tests and tests of the magnetic quality of iron and steel. It is satisfactory to notice that the motors and machinery at one end of the building produce hardly any appreciable magnetic disturbance in the parts of the building devoted to delicate observation.

Much progress is also reported in the equipment for advanced work in Optics, Acoustics and Heat.

Observatory.—The Superintendent reports that there is an increasing demand in the city for special weather forecasts, and says that facilities for establishing these under the direction of the Meteorological Office would be of great use. The plan has been found successful in the United States.

Observations on soil temperature are being carried on in co-operation with Prof. Callendar, with thermometers devised by the latter and constructed under his direction.

The Astronomer Royal has not yet announced the final value of the longitude of Montreal resulting from the observations of 1892.

Botanic Garden.—The educational work done by this garden is steadily increasing. The number of students (not including medical classes) deriving benefit from it is 432, being an increase of about 11 per cent. over the previous year.

In consequence of changes due to the extension of the Medical sessions to 9 months instead of 6, the Medical classes will use the garden in spring and summer, in future.

(Signed), DONALD A. SMITH, LL.D.,
Chancellor.

ALEX. JOHNSON, M.A., LL.D.,
Vice-Principal.

MONTREAL, January 23, 1895.

SKETCH OF THE HISTORY OF THE FACULTY
OF MEDICINE.

*(From the Address of the Dean, Dr. Craik, at the opening
of the new Building, January 8th, 1895.)*

Soon after the opening of the old Montreal General Hospital in 1822, more than seventy years ago, four of its attending physicians, Drs. Robertson, Caldwell, Holmes and Stephenson, all of them graduates of Edinburgh University, being impressed with the necessity for providing medical instruction in this country, for students who might find it impossible to seek their education abroad, took steps to establish a medical school in Montreal, after the model of the Medical Department of the University of Edinburgh, and bearing the same relation to the Montreal General Hospital in its clinical work as that of the Edinburgh Medical School to its Royal Infirmary.

After negotiations continued through 1822 and 1823, the School was successfully organized under the name of the "Montreal Medical Institution," and in the autumn of 1824 it commenced its active work, in a small wooden building then standing on Place d'Armes, on what is now the site of the Bank of Montreal. The number of students during the first session was 25, and the whole of the work of teaching was done by the four men whose names I have already mentioned, the departments of Anatomy, Physiology, Chemistry, Pharmacy, Practice of Physic, Midwifery and Diseases of Women and Children, Materia Medica, Surgery and Botany being divided as evenly as possible among them. The name of Dr. Loedel was at first associated with the others as Lecturer on Materia Medica, succeeded after a few years by that of Dr. Lyons, but neither of these gentlemen seems to have taken any active part in the work.

But the arduous and responsible work was not only done by the other four men, but it was well done,—so well, that it received official recognition at Edinburgh, two of its sessions counting for one, but giving it, nevertheless, a status as one of the publicly recognized Medical Schools of the day.

The work of the School thus begun in 1824 was continued until 1828 with scarcely any change, the establishment of a French School of Medicine in the interval having drawn away a number of students and prevented the anticipated increase. The average attendance for the first five years was barely 26, or only one more than in the opening year. This result was disappointing and discouraging, and, with less resolute men at its head, the Montreal Medical Institution would probably have died and been forgotten. But it did not die, and it has not been forgotten. Not only did it continue to live, though under another name, but it was instrumental in preserving the life of its future foster mother, the University of McGill College, which was then in imminent danger of being strangled, almost at its birth, by adverse litigation.

It had become necessary that the University should assume active teaching functions within a certain date, then fast approaching, in order to secure its McGill endowment; and being unable to provide the necessary staff of teachers in the other Faculties, the struggling Medical Institution was asked, and gladly consented, to join the University as its Faculty of Medicine, and the crisis in the life of the University was thus successfully tided over.

The session of 1829-30 was the first under the new conditions, and it opened with 30 students. Its material resources, however, were not in any way increased, and for the next ten years its condition was, if anything, worse than before; but it was now the Faculty of Medicine of a University, acting by authority of a Royal Charter, and its battles were afterwards to be fought under its banner. This was no mean advantage. It gave prestige and courage to men who must otherwise have been worn out in a hopeless struggle, and gave distinction to the results of their labors by enabling them to procure for their successful students the honor of a University Degree.

The political troubles which culminated in the Rebellion of 1837-39 had at that time begun to disturb the community, and interfered considerably with the progress of the School. It was obliged to close its doors from 1836 to 1839, until the political storm had blown over, re-opening its classes in 1839-

40, with an attendance of 28, a number actually less by 2 than when its connection with the University began ten years before.

Other changes soon followed the joining of the School to the University. Edinburgh at once accepted the certificates of the Faculty on their face value at par, and the other British Schools almost immediately followed its lead.

In 1833 the first break in the ranks of the four veteran leaders occurred, by the death of Dr. Caldwell from fever. The gap was temporarily filled by the appointment of Dr. Racey, and on his removal to Quebec in 1835, the late Drs. George W. Campbell and Archibald Hall were added to the staff, the former lecturing on Surgery and Midwifery, and the latter on *Materia Medica*.

It was not until the session of 1841-42 that the real growth of the School began, when it opened with 39 students; and it is gratifying to know that three out of the four original founders had the satisfaction of realizing it, for before the beginning of another session, two more of them had fallen in the fight. Dr. Stephenson died in 1842, and Dr. Robertson's health gave way to such a degree as to necessitate his retirement from active duty, his death occurring in 1844.

The filling of these vacancies in 1842 led to extensive changes in the Faculty, with a redistribution of Lectureships, amounting almost to a reorganization. Dr. Holmes took Practice of Physic and Dr. Hall took Chemistry, while there were brought into the Faculty: Dr. McCulloch in Midwifery, Dr. Bruneau in Anatomy, and Dr. Sewell in Physiology and *Materia Medica*. In 1845 Dr. R. L. MacDonnell was brought in, to preside over the new department of Institutes of Medicine; Dr. Fraser, to take charge of the new department of Medical Jurisprudence; and Dr. Crawford, to assume the duties of still another new department, Clinical Medicine and Surgery. Dr. Papineau was also brought in to relieve Dr. Holmes in Botany. In or about this year also, Dr. Scott was appointed Demonstrator of Practical Anatomy. Further extensions were made in 1849, when Clinical Surgery was separated from Clinical Medicine, Dr. Crawford retaining the former, while Dr. MacDonnell assumed charge of the latter, only to

be replaced on his removal to Toronto in 1850, by Dr. Sewell.

I have dwelt somewhat in detail upon these changes, not so much on account of the personnel of the appointments, but because they serve to mark the growth and development of the Faculty, in its efforts to keep abreast, and even in advance, of the progress of medical education on this continent.

But the growth and development of the School was not only in the direction of the increase in the number of teachers or of the subjects taught, but also in additional time devoted to the preparation of the students. Almost from the beginning, the sessions were made six months' sessions, instead of sessions of four and a half months; and almost, also, from the beginning, the obligatory course of study was changed to four years instead of three; and in this way the Faculty succeeded in establishing a reputation for thoroughness, which has stood it in good stead up to the present day.

I have already stated, that at the opening of the Medical Institution in 1824, the Lectures were delivered in a wooden building, on the site of the present Bank of Montreal. Some time afterwards, the School was removed to a brick building, still standing, on St. George street near the corner of Craig. In or about 1845, the Faculty took possession of quarters in the Central Building of the University, now occupied by the Faculty of Arts, and continued to occupy these premises until its removal to Coté street in 1851. Of the precise dates of the removals to St. George street and to the University Buildings, I am not as yet in a position to speak with certainty, for the early records of the School and Faculty are not as complete in detail as they might have been; but the dates of the appointments and other changes, as I have given them, are from the records, and may, I think, be relied upon. Of the dates and changes after 1850, I can speak with confidence from personal knowledge, for my connection with the Faculty began as a student in that year, and has continued almost without interruption until the present time.

Up to 1850, the increase in the number of students had not been great. Commencing in 1824-25 with 25 students, the

number, after twenty-five years, in 1849-50, was only 44, an increase of less than one in each year. From this time, however, the reorganized and strengthened departments began to attract more students, and the session of 1850-51 opened with 53.

In 1851, the St. Lawrence School of Medicine was started, in opposition to our Medical Faculty. It had a strong staff of teachers, and its class-rooms were in the heart of the city. As the University buildings were at that time—more than forty-three years ago—thought to be rather remote from the centre of the city, it was feared that the more central position of the new school would place our Faculty at a disadvantage; and after careful consideration, it was decided to move the classes once more back to the city. As no University funds were available to assist in this matter, three members of the Faculty themselves advanced the money; and a substantial brick building was erected in Coté street, in time for the session of 1851-52, where the classes opened with 64 students.

This building, which is still standing in Coté street, served the purposes of the Faculty for twenty-one years; and in it occurred many of the changes and much of the progress which have left their mark upon the history of the Faculty. It was here that, in 1852, all the Lecturers in the Faculty were promoted to the rank of Professors, Dr. Holmes alone having previously, I believe in 1843, been appointed the sole Professor. It was here also that, in 1854, Dr. Holmes was made Dean, the first in connection with the Faculty. Here also we had the happiness of receiving amongst us, as Professor of Botany and Zoology, our much loved and gifted Principal, Sir William Dawson, now retired, to whose great ability, zeal and untiring industry the University, in all its departments, owes so much. Here in 1854, it was made optional with the student to divide his examinations into Primary and Final, and here also, a department of Practical Chemistry, under Dr. Girdwood, was established in 1870, though it was not for some years later that a Faculty Chemical Laboratory was provided. Here also in 1870, an optional Summer Session of three months was established, and in 1871 an optional course in

Hygiene and Public Health, under the late Dr. George Ross, which was converted into a Professorship under Dr. Godfrey in 1875. During the twenty-one years of the occupancy of the Coté street building, the number of students increased from 64 in 1851-52 to 139 in 1871-72; but the attendance in several of the years had been above 170, and in one year, 1866-67, it had reached 184.

But time will not permit me to dwell with as much of detail upon the remaining years of the history of the Faculty; and I must content myself by referring only to the more important changes and occurrences of the last twenty-two years.

Owing to the increased number of students and the extension of the curriculum, as well as to the growth of the Museum and Library, the building on Coté street had for many years been inconveniently crowded, and the Faculty had been casting about for means of acquiring better accommodation. The opposition of the St. Lawrence School of Medicine had long since come to an end; indeed, the School itself could scarcely be said to have been born before it began to die, and the last vestiges of it had disappeared after a few years. Moreover, the city had spread greatly in the direction of the University Buildings, and, influenced chiefly by the advice of Sir William Dawson, the Faculty, in or about 1870, applied to the Board of Governors to be received again within the precincts of the College grounds. There was at that time no available building on the College grounds of sufficient size to accommodate our growing Faculty; but the Governors generously offered to erect and place at our disposal a building suitable to our needs; and their offer being gladly accepted, the substantial stone building forming the front portion of the present block was erected by them in 1871 and 1872, at a cost of \$27,000, and placed at the disposal of the Faculty. The building was unfurnished, and without equipment of any kind; but, nothing daunted, the members of the Faculty proceeded to furnish and equip it from their own individual resources, at an expense of several thousand dollars, and our classes were opened in it in the autumn of 1872, with an attendance of 154.

Dr. Fraser, Professor of Institutes of Medicine, died in 1872, and Professor Drake, who had occupied the Chair of Clinical Medicine since 1868, was transferred to the Chair of Institutes of Medicine, a position which he filled with eminent ability. In 1874, owing to the failure of the health of Professor Drake, the position of Lecturer on Institutes of Medicine was conferred upon Dr. William Osler, one of our own graduates, then just returned from a two years' sojourn among the great Schools and Laboratories of Europe ; and in 1875, on the permanent retirement of Professor Drake, Dr. Osler was promoted to the vacant Chair. The assumption by Dr. Osler of the duties of the department of Institutes of Medicine was immediately followed by active Laboratory work, in Physiology, Histology and Pathology ; and it is due to Professor Osler to say, that to the contagious influence of his example, together with his great ability and enthusiasm, is largely due the greatly increased proportion of practical work in all departments of the Faculty.

But the increase of practical and laboratory work in many departments, though it added greatly to the efficiency of the teaching, added also greatly to our expenditure, and we soon began to find ourselves crippled for means to carry on the work ; and to add to our embarrassments, in 1882, we suffered what seemed to be an irreparable loss by the death of our Dean, the late Dr. George W. Campbell, whose great influence and ability, for upwards of forty years, had been the mainstay of the Faculty.

But the darkest hour is often just before the dawn ; and while our Chancellor, Sir Donald A. Smith, was listening to a eulogy on his late friend Dr. Campbell, and a recital of our needs by the late Dr. Howard, he resolved to come to our rescue in a most effectual way. He offered to confer upon the Faculty no less a sum than \$50,000, on condition that a like sum should be collected from the other friends of the University. I need not say with what alacrity we set about the collection of the stipulated sum, nor with what readiness and liberality we were met by many of our citizens, nor need I allude to the liberal contributions given by nearly every

member of the Faculty. It is sufficient to say that the amount was soon collected and paid, Sir Donald's contribution was also paid over, and, in 1883, the Faculty found itself relieved from its embarrassments by a handsome endowment of \$100,000.

But our troubles were not ended, if, indeed, in some respects they can ever be expected to end. Our session opened in 1883 with 200 students, and with the increased space rendered necessary by the enlargement of our laboratories, our building was full to overflowing. In 1884 the number of students increased to 227; and it became necessary therefore to make immediate provision for increased accommodation. The Governors were, unfortunately, without funds to help us; and our only alternative, therefore, was to draw upon our Endowment for the enlargement of our buildings. This we did, with the consent of the Governors, to the extent of \$23,000; and in the autumn of 1883, we opened our session with greatly increased accommodation, and a class of 234 students.

In 1884, we had the misfortune to lose the valuable services of Professor Osler, the University of Pennsylvania having offered him the Chair of Clinical Medicine. This offer opened up to him so large a field for advancement in his profession in every way, that he was fain to accept it; and we parted with him with good wishes, but with very great regret.

In 1889 the Faculty suffered another great loss in the death of its Dean, the late Dr. R. Palmer Howard. Dr. Howard's marked ability, untiring industry, unwavering integrity and unbounded popularity with all classes made him a man who could ill be spared, and the loss of his strong personal and professional influence for good will be felt in the Faculty and in the community until his generation shall have passed away.

Two other lamentable deaths in the Faculty followed that of Dr. Howard in quick succession. Dr. Richard L. MacDonnell, Professor of Clinical Medicine, died in 1891; and Dr. George Ross, Professor of Medicine, and Vice-Dean of the Faculty, died in 1892. Of these two it may safely be said that there have probably never been in the Faculty two men of greater promise or usefulness; and the loss of them, follow-

ing, as it did, so closely upon that of Dr. Howard, was the cause of great grief and anxiety.

The late Dr. Howard had greatly at heart the establishment of a Chair of Pathology, and lost no opportunity of pressing its claims upon friends of the University. It was not, however, until two or three years after his death, that, in 1892, the Faculty succeeded in obtaining what had been so long desired, by the appointment, by the Governors, of Dr. Adami, from Cambridge University, England, to the newly established Chair of Pathology. With reference to this appointment, it is only necessary to say, that it places our Faculty at least on a par with the best Schools of this continent in this important department.

Other extensions of the curriculum were made from time to time. Dr. Frank Buller was made Lecturer on Ophthalmology and Otology in 1878, and was promoted to the rank of Professor in 1883. A Chair of Gynæcology was also established in 1883, with Dr. William Gardner as its first occupant; and a Department of Laryngology, under Dr. George W. Major, was commenced in 1882, and erected into a Chair in 1893, with Dr. Major as its first Professor.

In 1894, Summer Sessions were abolished; and the Ordinary Session of six months was changed to one of nine calendar months.

From 1884 to 1889, the number of students remained nearly the same, the number in 1888-89 being 227. In 1889-90 the number increased to 256; in 1890-91 to 261; in 1891-92 to 291; and in 1892-93 the number reached 312.

We were again face to face with the old difficulty of overflowing buildings, and had again to look for the means of providing increased accommodation. Our difficulties in this instance were even greater than in 1885, for, to afford room for additional buildings, it would be necessary to purchase the land adjoining the College property, and which was valued at \$25,000. The required new buildings were estimated to cost \$30,000, making a total of \$55,000 required to serve our purpose. We laid our case before the Board of Governors, asking them to acquire the necessary land, and to allow us to

borrow from our Endowment Fund the \$30,000 required to erect the necessary buildings. What was our surprise and delight, when Mr. John Henry Molson (now our senior Governor), with scarcely a moment's hesitation, asked to be allowed to relieve us of the whole burden, by placing at our disposal the munificent sum of \$60,000, a sum greater by \$5,000 than the whole estimated cost!

It is difficult to find words fitly to characterize such princely generosity. To it we owe the erection of the Building in which we are now assembled and the ground upon which it stands; and to it, also, we owe the comfortable accommodation of the rapidly increasing number of students, for last year the number was 350, and this year it has already reached 400.

It remained only for our Chancellor, Sir Donald Smith, at the Convocation in 1893, with one of his many acts of magnificent bounty, to fill our cup full to overflowing, by the endowment of the Chairs of Pathology and Hygiene with the sum of \$50,000 each, thus placing our Faculty, so far as can be foreseen, in a position to carry on and to extend its work without financial anxiety.

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ANNUAL REPORT OF THE LIBRARY COMMITTEE.

To the Corporation of McGill University :

GENTLEMEN,—

During the past year the University has had to deplore the death of Mr. Peter Redpath, one of its greatest benefactors. Deeply as this loss has been felt in every department of the University, it comes home with especial force to the Library, which has long held a chief place in Mr. Redpath's interest, which has for years benefited largely by his munificence, and of which, in view of the magnificent building that he has recently given for its home, he may, without exaggeration, be called the second

The University has cause for gratitude that Mrs. Peter Redpath, who not only shared her husband's interest in the Library but co-operated with him in his crowning benefaction, has taken up the work which he has laid down.

Mrs. Redpath has, during the summer, completed the two unfinished storeys of the stack, thus rendering its entire capacity available for use ; has presented the beautiful clock, which now adorns the Reading-Room ; and has added to the Peter Redpath Historical Collection more than one hundred magnificent volumes, including such works as Von Sybel and Von Sickle's *Kaiserliche Urkunden*, Huillard-Bréholles' *Frederick II.* and others of equal value.

To two prominent features of this year's work your Committee now wishes to direct your attention.

The first is the very satisfactory growth in the use of the Library, as indicated whether by the number of books read or of readers, during the past year.

For the quarter just ended, the books taken from the stack amount to 5648 vols., as against 4247, the highest previous record. But these figures do not by any means indicate the full growth. The shelves of the reading room now contain a select library, comprising nearly all the works which are absolutely required by students in the various courses. To these books readers can freely help themselves, and hundreds of volumes are thus used daily without the possibility of estimating how many are read, although the number must certainly exceed the number taken from the stack. Besides this, a very considerable use is made of the books in special studies.

As to readers, the proportion of those who fail to sign the register increases as the readers increase ; and at a moderate estimate the figures given fall 20 per cent. short of reality from this cause.

Taking the record as it stands, however, and comparing it with that of the best previous quarter and of the year ending January, 1894, we have the following results :—

Quarter closing to-day, 5462 readers, previous maximum 4766, increase 696 ; 5648 volumes read, previous maximum 4247, increase 1401 vols.

This, however, is comparing two quarters of the same year.

The total number of readers who signed the register for last year was 5712 ; this year it is 12,680,—a gain of more than 120 per cent.

The increase in the number of books read, though not quite so striking as this, is very nearly so. And although the Library was last year closed for eight weeks during removal and the necessary preparations, it was also found necessary to close the stack for six weeks during the present year, while the additional shelving (to which reference has been made) was being set up. The comparison between the two years is therefore not an unfair one.

On the whole, your Committee, while encouraged by the results of this year, yet looks upon them as only the beginning of a further growth, and feels confident that before long a still larger proportion of the students will have become aware, not merely of the advantages of verifying for themselves the references of their Professors, but of extending their reading beyond the limits of obligatory study. Thus only can the University hope to send out fully cultured graduates.

The other feature calling for special remark is the exceedingly scanty grant which the University is able to make for the purchase of books. Your Committee would fain give figures, but content themselves with saying that apart from the income from one or two small endowments, the aggregate amount placed at the disposal of the Faculties of Arts and Applied Science for purchase of books and periodicals is less than many an economical worker spends upon his own library.

Were it not for the liberality of a few friends and of many of the professors, who, as far as possible, supply deficiencies from their own libraries, it would be almost impossible to carry on the work of the Library at all under such circumstances.

Your Committee feels justified in asking every member of the Corporation to endeavor to stimulate interest in the formation of an adequate fund for the purchase of books. Without this, notwithstanding the assistance of friends, the Library must continue to be hampered in its work, as it now is daily for want of the most necessary books.

Your Committee must not be understood to complain, since, as has long been the case, the scanty resources of the Library are offset by a large number of important donations of books.

These have been duly acknowledged in the several quarterly reports, and have, by the kindness of the proprietors of the *Montreal Gazette*, appeared in that journal with the thanks of the Corporation.

Special thanks have been tendered to Sir Wm. Dawson for his donation of rather more than 400 volumes last spring ; to Mrs. Peter Redpath for

her valuable donation of historical works ; to the Graduates Society ; and to the McGill College Book Club.

In the quarter just closed, the most important donation is that of the Chancellor, who has generously purchased some 260 volumes (carefully selected) of Modern and Classical German literature—a much needed gift. The Library is likewise indebted to Mr. S. Carsley for presenting it with 5 beautifully constructed models of the Gates of Old Quebec. These will be of interest to students of Canadian History.

The donations, all told, amount for the quarter to 433, purchases to 66, total 499 volumes, exclusive of many unbound books and pamphlets.

The number of bound volumes in library in last report was 38,362

499

The number to-day is therefore

38,861,

showing an increase for the year of 1511 volumes.

Your Committee cannot close this report without once again recalling the kindness of Mrs. Peter Redpath in completing the shelving in the stack, and in presenting the valuable clock which now adorns the Reading Room.

Cataloguing and registering books newly added have made satisfactory progress, in spite of many unavoidable interruptions; and the entire staff [of assistants has worked with praiseworthy zeal and perseverance. A conspectus of reading, attendance and additions is appended.

The whole respectfully submitted,

On behalf of your Committee,

C. H. GOULD,

Librarian.

CONSPECTUS OF READING AND ATTENDANCE, JANUARY,

1894-1895.

	<i>Readers.</i>	<i>Visitors.</i>	<i>Total.</i>
Quarter ending April 24, 1894,	4,766	208	4,974
“ “ June 20, “	441	*113	554
“ “ Oct. 24, “	2,011	627	2,638
“ “ Jan. 23, 1895,	5,462	*174	5,636
	<u>12,680</u>	<u>1,122</u>	<u>13,802</u>

*The number of visitors was actually large,—though it was impracticable to obtain many signatures.

	<i>Books read.</i>	<i>Books added.</i>
Quarter ending April 24, 1894,	5,345 vols.	610 vols.
“ “ June 20, “	892 “	183 “
“ “ Oct. 24, “	2,014 “	219 “
“ “ Jan. 23, 1895,	5,648 “	499 “
	<u>†13,899</u>	<u>1,511 “</u>

†Represents number taken from stack only.

REPORT OF THE PETER REDPATH MUSEUM.

To the Corporation of the University:

GENTLEMEN,—

In presenting this the fourteenth annual report of the Museum, your Committee have pleasure in stating that gratifying progress has been made in the various departments of Museum work.

The death of Mr. Peter Redpath has deprived the Museum not only of its founder, but also of a generous friend, who always took a sympathetic interest in everything concerning its interests. Steps have been taken by your Committee, in conjunction with the Board of Governors, to erect in the entrance hall of the building a memorial tablet to Mr. Redpath. The inscription has already been prepared, and it is hoped that the tablet will soon be in place. A biographical sketch of Mr. Redpath, with historical notice of the Museum, prepared by Sir William Dawson, has been issued by the Committee, one of its members, Mr. J. R. Dougall, contributing the cost of printing. It fittingly commemorates Mr. Redpath's great services to the University.

Shortly after his death, Mrs. Redpath expressed to the Committee her desire to keep up her husband's work in connection with the Museum, and more recently she has continued his liberality by a donation of \$1500 towards the expenses of the past year.

In the month of March (18th) the Museum was deprived of its assistant curator by the sudden death of Mr. Thomas Curry, who had done much useful work in arranging and naming the collections. Since his death the work has been entrusted to Mr. Edward Ardley, whose faithful services to the Museum have often been mentioned. Already he has accomplished much in cleaning and re-arranging large portions of the collections of fossils and antiquities, in arranging the collections of eggs in glass-topped boxes, renewing labels, etc. From the time of his appointment in 1881, Mr. Curry's salary has been paid by Mrs. J. H. R. Molson; and a balance of the fund which she had provided for this purpose has since his death been generously placed by Mrs. Molson at the disposal of the committee, to aid in carrying on the work of the Museum. Mr. J. H. R. Molson has also given \$500 for the purchase of specimens in continuation of his previous liberal gifts for the same important object.

Sir William Dawson has devoted a large portion of his time to the determination, naming and publication of specimens in the Museum. In addition to the complete list of the Pleistocene fossils published in the *Canadian Ice-Age*, he has revised the collections of bivalve shells from the coal formation and has issued a paper describing the species. He has also gone over a large amount of material containing remains of Batrachians and

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other land-animal from the coal-formation of Nova Scotia, and has in the press a complete revision of all the known Palæozoic land animals of Canada. A memoir has also been prepared on the collections from the Canary Islands, presented some time ago by Dr. Lambert, and has been sent to England for publication.

The progress of the herbarium has been marked by the addition of 2,733 sheets to the collection, and in this connection, mention should be made of the efficient services rendered by Miss E. Tatley, B.A., in mounting and arranging specimens. The collections have also been improved by the addition of a large number of North American woods designed for special studies relative to their anatomy, and also by specimens illustrative of special pathological conditions and peculiarities of growth.

The material so far accumulated has in the past served most important purposes in the prosecution of special Museum studies relative to both recent and fossil vegetation; and it may not be out of place at this time to point out that it has also served as the basis for the preparation by Professor Penhallow of an important monograph on the classification of the North American Coniferæ as based upon a study of the anatomy of the wood. This work is now nearing completion, and it is hoped that it may be issued as a special Museum memoir during the present year. Papers on subjects connected with the Museum have also been published by Dr. Adams and Dr. Harrington in the *American Journal of Science* and *Canadian Record of Science*. Among these may be named that of Dr. Harrington on Nepheline, Sodalite and Orthoclase; that of Dr. Adams and Dr. Harrington on Nepheline Syenite; and that of Professor Penhallow on Structural Peculiarities in Canadian Coniferæ.

Among the additions to the Museum during the year, probably the most important, are the suite of casts of prehistoric skulls from Cro-magnon and Laugerie Basse, France, the plants already mentioned as having been added to the Herbarium, and a collection of specimens of native silver and other minerals chiefly from Montana. The casts and plants were obtained by purchase, the cost being defrayed out of the Molson Fund, while the minerals were presented by Mr. Charles A. Molson, Bachelor of Arts and Logan medallist, now residing at Elkhorn, Montana. The specimens of native silver were exhibited by Mr. Molson at the World's Fair, and afterwards generously donated to his *Alma Mater*.

The number of visitors who have registered their names in the visitors book during the year is 2700.

Respectfully submitted,

B. J. HARRINGTON,

Hon. Curator.

On behalf of the Committee.

JAN. 23rd, 1895.

MCDONALD PHYSICS BUILDING.

The work of the year has been mainly devoted to completing the equipment of the Laboratory, and starting the practical work on a systematic basis. Additional cases, tables and other fittings have been obtained, tools and machines for the workshop, mercury stills, vacuum pumps, and other apparatus required in Experimental Physics.

Mr. H. M. Tory, B.A., and Mr. F. H. Pitcher, B.A.Sc., have been appointed Demonstrators in Physics, and have largely contributed to the progress of the equipment by their unremitting industry.

A skilled mechanic has also been retained by Mr. McDonald's endowment, and we have been enabled to turn out a considerable number of special instruments as occasion arose in the laboratory workshop.

In addition to the lecturing and practical work, a large proportion of the time both of professors and demonstrators has been devoted to testing, correcting, and setting up the great variety of apparatus for the elementary course. Such instruments, unfortunately, as a rule, require alteration and adjustment in several essential details before they can be put into the hands of students.

By the kind permission of Mr. J. H. R. Molson, the gas engine, which he presented to the University some years ago, has been transferred to the basement of the Physics Building, where it has been set up with the assistance of the staff of the Engineering Building, and forms a suitable and useful addition to our equipment. With it has been transferred the dynamo presented by Mr. Lawson.

In connection with the dynamo, a small alternator has been installed in the same part of the building, and a continuous current transformer for charging storage cells and generating oxygen and hydrogen by the electrolytic method.

Of the Advanced Practical Work, the greater part hitherto, owing to the arrangement of the Electrical Engineering course, has been confined to Electricity and Magnetism. It may be of some interest, therefore, to give a brief abstract of the work of the last year in this direction, together with a description of the principal electrical standards and instruments of precision in the McDonald Collection.

Resistance Standards.—We have thirty standard resistance coils of various patterns, including the B.A., the Board of Trade and the German, with a few others, ranging in value from 1,000 ohms to one ten-thousandth, and adapted for various different purposes. These have been tested and compared, and their values are found to agree as closely as could be expected with the Cambridge certificates, and those of the Reichsanstalt and the makers. The temperature co-efficients of a few have also been

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determined. The comparisons have been made chiefly with Nalder's pattern of the Carey Foster Bridge.

We have also a duplicate of the Fleming Bridge used at Cambridge, recently presented by the Duke of Devonshire.

Resistance Boxes.—The collection of resistance boxes includes almost all the best types. We have a Thomson-Varley slide-box by Nalder, which has proved extremely useful and accurate. This box has been accurately calibrated throughout. The largest discrepancy between two sets of observations on different dates and at different temperatures is one part in 50,000. The mean divergence less than 1 in 100,000. We are thus in possession of an instrument which can be used for calibrating other boxes with great ease and accuracy. Among the other boxes we may mention: two megohm boxes and four 100,000 ohm boxes of different patterns; a four dial and a six dial P.O. box; and a bar-dial box of Professor Anthony's pattern; also a compensated resistance box with mercury contacts, reading from 0 to 50 ohms continuously by the Carey-Foster method; this is extremely useful for the accurate determination of resistances which cannot be made up of any simple combination of standards, and has been accurately calibrated throughout.

For the comparison and determination of small resistances, we have a Kelvin conductivity bridge, and a Lorenz apparatus, with the improvements made by Prof. V. Jones, which is now being completed under his supervision.

Potential Standards.—As potential standards, we have a number of Clark cells of Dr. Muirhead's pattern with attached thermometers, and a dozen of Professor Carhart's with his certificate. These have been frequently tested at various dates by different methods, and are found to agree with each other to about one-tenth of one per cent. The students have also set up a number of cells in accordance with the Board of Trade directions. The agreement of these is considerably closer, and though not of a portable form, they are more convenient for laboratory work.

For the use of these cells to measure potential differences for the calibration of voltmeters and ammeters, and for the measurement of current with standard resistances, we have three types of potentiometer: two direct reading in volts for ranges of 200 volts and 2 volts respectively, and one a cylinder potentiometer of Latimer Clark's pattern. The latter has been accurately calibrated throughout at different dates and temperatures, with results concordant to 1 in 50,000.

To mention only the more accurate of our direct-reading instruments, we have nine Weston ammeters and voltmeters of different ranges. The majority of these have been carefully calibrated. The relative scale errors prove to be extraordinarily small, rarely amounting to more than the thickness of one of the lines of the graduation; but in each case the

absolute constant of the instrument has varied, and they now read too high by amounts varying from 1 to $1\frac{1}{2}$ per cent. This correction, however, is very readily determined and applied, and we have found these instruments by far the most convenient and trustworthy for general use.

Current Standards.—We have a Kelvin composite balance, which can also be used as a voltmeter and wattmeter, and two Siemens dynamometers. The constants of these have been determined by the voltametric method, and found to be accurate to one-half of one per cent. They have been used for calibrating common types of alternate current instruments. We have also in course of instalment a set of 4 large storage cells with convenient commutators and resistances for furnishing large steady currents for the testing of ammeters and low resistances, and for other purposes. This equipment is similar to that in use at the Board of Trade in England and in the laboratories of some leading instrument makers.

As an absolute current standard we have a duplicate of the Weber electro-dynamometer made by Latimer Clark for the Committee of the British Association, the coils of which were wound by Clerk Maxwell, and used by Lord Rayleigh in his standard experiments. This instrument has been very carefully set up by R. O. King. It has been thoroughly tested and measured, and its constants determined. The time of oscillation, giving the directive force of the bifilar suspension, which is generally the weakest point of this method, has been obtained with a higher order of accuracy and much less trouble than is usual in these experiments, by making the instrument record its own oscillations automatically on an electric chronograph. With this and a few similar modifications we hope to make the apparatus among the most accurate of absolute measuring instruments.

We have also in preparation a new form of current standard practically equivalent to a Clark cell in adaptability, but involving only resistances, and therefore of a higher order of constancy.

Insulation and Capacity Tests.—For these and other tests we have a suitable collection of delicate reflecting galvanometers of the astatic, ballistic, differential and D'Arsonval types. The most delicate of these has a resistance of 110,000 ohms, and a figure of merit of upwards of 60,000 megohms with a 20 second swing.

We have eight quadrant electrometers of different types, the chief of which have been set up and used for various insulation and other tests. We have also one Kelvin absolute electrometer, and smaller portable electrometers and gauges on the same principle. These have been set up and tested, but no systematic measurements have yet been taken with them.

As a standard of capacity we have a cylindrical air-condenser of the B.A. pattern. This was measured, cleaned, and set up by H. M. Tory in November, 1893.

Its capacity has not yet been determined absolutely. By comparison with our certificated mica standards, it was found to be nearly 1,200ths of a micro farad the value intended by the maker.

The mica-standards and subdivided boxes have been carefully compared with each other and tested for insulation and absorption. They are above the average in quality and accuracy.

For the purpose of studying the behavior of insulators under the influence of long continued and intense electric stress, a subject which is now becoming of importance in connection with the transmission of power at very high voltage, we have in preparation a transformer capable of working up to 100,000 volts and of sufficient power to give useful, practical results.

Magnetic Tests.—Determinations of the dip and horizontal intensity have been made with the Kew instruments in different parts of the laboratory, and of the horizontal intensity with two other types of magnetometer. The values obtained showed a very satisfactory agreement, and were in all cases verified by the local and bifilar variometers. A preliminary magnetic survey with the portable variometers has been made of all the laboratories in which experiments affected by the horizontal intensity are carried on. The results have been of great utility, and show that the precautions taken in erecting parts of the building with copper pipes and heating apparatus were by no means unnecessary, and might even have been extended with advantage to the elementary laboratories. It was also found that the disposition of the motors and machinery at the other end of the building was such as to produce a magnetic disturbance scarcely appreciable for most purposes in the portions devoted to delicate work.

We have also apparatus of various types for testing the magnetic quality of iron and steel. These experiments are mainly carried on in the Engineering Building, but some tests have been made by the magnetometric method for which the Physics Building is more suitable.

Considerable progress has also been made with the equipment for advanced work in Optics, Acoustics and Heat, but little work has as yet been done by the Students in these branches owing to the arrangement of the present courses of study. The collection of apparatus is on a corresponding scale to the electrical equipment, and includes several fine and valuable instruments. Among the more interesting pieces recently added or shortly to arrive, we may mention: a set of Ewing Seismographs; a Rieffler standard clock; a set of direct-reading electrical thermometers reading to .01° Fahr., which are now being used for determining soil temperatures; a six inch Rowland grating with mountings and accessories by Brashear; a complete set of spectrum and Crooke's tubes by Geissler;

mechanical models and apparatus from the Engineering Laboratory and the Instrument Company at Cambridge.

We hope in the course of the summer vacation to be able to make a complete catalogue of the apparatus, and to publish some such list as shall be of use to outside students and experimentalists who may wish to know what facilities our Laboratory may offer for any particular line of research.

The average number of students attending the classes in the building during the past year was 160 in the second term of 1893-4, and 180 in the first term of 1894-5.

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REPORT ON THE OBSERVATORY FOR THE YEAR ENDING
DECEMBER 31, 1894.

To the Corporation of the University :

GENTLEMEN,—

I have the honor to present the report on the Observatory for the year 1894.

Meteorology.—The chief station series of meteorological observations made at every fourth hour has been continued throughout the year, and supplementary to this, the series of bi-hourly temperatures commenced in 1884 has also been carried forward without interruption. In my report to the Minister of Marine and Fisheries for this year, I have urged the importance of immediately procuring for this Station a complete equipment of continuously self-recording instruments, in order that a more thorough investigation of the climatology of the station than is possible from eye observations may be commenced without delay. The telegraphic observations forming a part of the Canadian series of observations, upon which the general weather predictions are based, have been regularly dispatched at the hours 8, 15 and 20 to the Meteorological Office, Toronto.

There has of late years been a very persistent and increasing demand on the part of the public of Montreal and vicinity for special weather forecasts, which, under the existing arrangements of the Meteorological Service, I am unable to furnish. The plan of establishing local forecast offices has been adopted with great success in the United States. It is scarcely necessary to point out that in Montreal there are many large and important industries in connection with the prosecution of which a knowledge of the special local weather probabilities is of the highest importance. Facilities for the issuing of local forecasts here under the direction of the Meteorological Office would be of very great value to the commercial interests of the City, and would be highly appreciated by the citizens of Montreal.

Time Service.—Determinations of clock errors have been made by the observation of 756 stars on 134 nights.

The noon time-ball, for the use of shipping, has been dropped on every week-day during the season of navigation. Special signals have also been transmitted daily to the Montreal fire alarm office for the noon stroke on the alarm bells.

By means of the automatic system of the clock signals, which has been in use here for several years, a knowledge of standard time has

been widely distributed through the corporations and institutions named below :—

The Canadian Pacific Railway Company transmitting it daily to all stations along its lines to the Pacific Coast.

The Grand Trunk Railway Company through the G. N. W. Telegraph Company, for all its lines east of Kingston.

The G. N. W. Telegraph Company transmitting it daily to all the telegraph stations in Eastern Ontario and the Province of Quebec.

The Harbour Commissioners at Montreal.

The time signals of this Observatory are also transmitted through the G. N. W. Telegraph Company to Ottawa for the firing of the noon gun at the Parliament Buildings. I again regret to have to state that the imperfect arrangements at Ottawa, in connection with this service, are such as to make the noon signal quite unreliable as a time standard for Ottawa.

Exchanges of clock signals with the Toronto Observatory were made on 19 days. The average of the differences obtained between the mean time clocks of the two Observatories is 0^s. 25, and the greatest difference on any one day was 0^s. 68. The comparisons for the year show that the probable error of the time, as given by one observatory at any time as compared with that given by the other, is 0^s. 21.

Soil Temperatures.—The observations on soil temperatures by means of copper and iron couples in a galvanometer circuit, as described in my report for 1888, were discontinued in July, 1892, and have not been recommenced. This method, although reliable within a somewhat large range, was not sufficiently precise to warrant its resumption. An opportunity of continuing the work under improved soil conditions, and with very much better apparatus, has, however, been taken advantage of, and a new series of observations commenced on November 1st last in co-operation with Professor Callendar. The exposures are now made at a point near the northern corner of the tennis grounds, and the reading apparatus is in the McDonald Physics Building. Eight platinum thermometers are employed: one in the air, one on the surface of the ground, and six in the soil at the depths 4 in., 10 in., 20 in., 40 in., 66 in., and 108 in. The thermometers are of the form devised by Professor Callendar, and the whole of the apparatus was constructed under his direction. It forms a portion of the equipment of the McDonald Physical laboratories.

Longitudes.—The Astronomer Royal has not yet announced the final values of the longitudes resulting from the observations made in 1892.

Some uncertainty has from time to time been expressed, in connection with longitude work, as to the equality of the wave times in eastward and westward signals through long cables. The recent completion of a third cable by the Commercial Cable Company seemed to offer an

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opportunity of measuring these relative times. By the kind impression of Mr. Ward, managing director of the Company, I was able in August last to make experiments, from which I hope, on the completion of the measurements of the syphon traces, now in progress, to obtain a comparison of the transmission times in question.

Educational.—Instruction in Practical Astronomy has been given to the Students of the Fourth Year in Civil Engineering, Faculty of Applied Science. The usual course of instruction has also been given in the use of meteorological instruments and methods of observation. The Blackman telescope has been used by the astronomical class in the Faculty of Arts, for the illustration of the lectures.

Respectfully submitted.

C. H. McLEOD,

Superintendent.

2nd JANUARY, 1895.

REPORT ON THE BOTANICAL GARDEN FOR 1894.

During the year ending December 31st, 1894, 432 students received direct benefit from the educational advantages offered by the Botanic Garden. The actual number is somewhat less than for the preceding year, owing to the fact that the medical botany has been transferred to the spring term, in accordance with re-adjustments of the course, imposed by the adoption of a nine months' session in the Medical Faculty. The relative number, however, shows an increase of about eleven per cent.—a fact which affords gratifying evidence of the extension of its usefulness and the importance of the work it is called upon to perform.

During the year, large supplies of fresh material have been furnished not only to the classes of the University, but to the pupils of the Senior and Normal Schools. In addition to the profitable and large extension of the work in practical morphology, rendered possible by the resources available, the Garden has served an important purpose in the prosecution of special studies and in the education of the public.

During the year a large number of new beds were completed and preparations made for a yet larger extension with the opening of spring.

As heretofore, seeds and publications have been distributed to kindred institutions, as opportunity permitted, and our obligations are due to the Superintendent of Government Printing for India, for publications of that office, including nine volumes of Watt's Dictionary of the Economic Products of India; to the Imperial Gardens, St. Petersburg, the Botanic Gardens of the University of Amsterdam, of Dublin, Tiflis, Lille, Valencia, Stockholm, Berlin, Belgrade, Madrid, Malta, the city of Lyon, Chamrousse, Cracow, Gröningen, Portici, Copenhagen, Utrecht, the Royal Gardens of Edinburgh; to the Institutio Agronomico, Campenas, Brazil; the Missouri Botanical Gardens; the Kolonial Museum, Haarlem; the Agricultural Society of Madras; the Botanical Department of Jamaica, for their usual publications.

We also desire to acknowledge seeds received from the Royal Gardens, Kew; the Imperial Gardens of St. Petersburg; Baron von Muëller, Australia; Mr. Walter Hill, Brisbane, Australia; Mr. A. Cockayne, New Zealand; and the Arnold Arboretum of Harvard University.

Living plants were received from Mr. Walter Hill, Australia, and from Mr. H. B. Small, Ottawa.

Respectfully submitted,

D. P. PENHALLOW,

Director.

FROM REPORT OF FACULTY OF APPLIED SCIENCE.

Amongst the more important donations received by the Faculty during the present session may be mentioned an experimental boiler (value \$1000) and a centrifugal pump from Mr. W. C. McDonald, and a turbine of the combined type from Messrs. W. Kennedy & Sons of Owen Sound; also donations of timber from the Canadian Pacific Railway Company, the British Columbia Mills Timber & Trading Company of Vancouver, Messrs. McLaughlin Bros., lumbermen of Ontario, and various others. The experimental pump, also presented by Mr. W. C. McDonald, is now approaching completion, and it is expected that it will be installed in the near future.

Very important additions have been made to the Engineering Buildings by the construction of an accumulator room, an extension to the basement of the Testing Laboratories, and a much needed coal-hole with a capacity for 475 tons. The Accumulator Room has been completely equipped, and is now working in a most efficient manner. The whole expense connected with these improvements has been defrayed by Mr. W. C. McDonald.

At this time it may perhaps be appropriate to give a brief statement of the character of the work being done in the several laboratories connected with this Faculty.

The Mathematical Laboratory is used chiefly in connection with the course in Dynamics in the First Year. Lectures are given on the fundamental and derived units of the Science, as well as on the Laws of Motion, and deductions from the same. When the students have in this way been made acquainted with some of the ideas of the subject, they are admitted to the laboratory, where experiments of a progressive character are assigned to them. These experiments are in all cases quantitative, and embrace the measurement of mass by means of accurate physical balances, of intervals of time by clock and chronograph, and of distance by means of scales, screw micrometers, etc. They then proceed to the measurements of areas, volumes, velocities, accelerations, forces, specific gravities, friction, and also to pendulum experiments, etc. The equipment of the laboratory for this work is very complete, embracing as it does the ordinary instruments for the purpose to be found in most physical laboratories, together with a variety of apparatus specially constructed for this laboratory. Particular attention is given in the lectures to the principles of observing in general, the sources of error, etc.; the whole Course having reference to the subsequent work of the student in the Physical and Engineering Laboratories.

In the Chemical Laboratory much of the work has necessarily been of the ordinary routine character, but special investigations have been made

of a number of processes employed in the assaying of ores. Something, too, has been added to our knowledge of the chemical composition of Canadian minerals of scientific interest; among the minerals analyzed being sodalite, nepheline, garnet (andradite), axinite, albite, oligoclase, orthoclase, labradorite, etc. Some attention has been devoted to the chemical and mineralogical study of rocks of scientific interest from various parts of the Dominion, including sandstones, limestones, slates, gneisses, etc. Mineral and drinking waters, coals and various other economic minerals have also been made the subject of study. The work, it will be observed, has been directed mainly in the direction of mineral chemistry, as many of the laboratory students intend devoting themselves to work in connection with mining.

In the laboratories more especially devoted to the determination of the strength of materials, a very extensive investigation, in which the Third and Fourth Year students have taken part, has been carried out on the strengths of certain Canadian timbers. The experiments have now extended over a period of more than two years, and the results are being incorporated in a paper, which will be published during the present month. The experiments have numbered some thousands, and the value of the lumber used is upwards of \$3000.00. The whole of this timber has, however, been generously presented by various companies, amongst which may be mentioned the Canadian Pacific Railway Co., the British Columbia Mills Timber & Trading Company of Vancouver, and Messrs. McLaughlin Bros., lumbermen of Ontario. Important results have been found in connection with what is perhaps the most valuable of the Canadian soft timbers, *i.e.*, Douglas Fir, but the experiments are still far from complete, and are to be continued.

Mr. P. A. Peterson has offered a prize of \$25.00 for a research to be made by the Fourth Year students on the strength of Montreal building brick and the strength of Rockland slate.

An interesting investigation has also been begun as to the effect of internal pressure upon the strength and elasticity of iron and steel tubes under internal pressure.

In the Hydraulic Laboratory, investigations are being carried out on the flow of water through orifices of different sizes and forms, on the effect of viscosity upon the flow, and for the purpose of determining the co-efficients of discharge through conical nozzles. Important results have already been obtained, and it is hoped that they will be published in the near future so that the results may be available to the general public.

Similar experiments and also experiments on the flow of water over weirs have been directly conducted by the students, who are thus able to obtain experience in the scientific treatment of hydraulic problems, which will certainly be of the utmost value to them in their future career.

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In the Cement Testing Laboratory, researches have been made on the strength of mortars set under pressure, the effect of frost on natural and Portland cements, the effect of sugar on lime and cement mortars, the strength of lime and cement mortars and of the bricks in brick piers, the effect of fine grinding on the adhesive strength of cements, and of using hot water in mixing mortars.

In addition to these researches, a large amount of work has been done by the Fourth Year students, in investigating the specific gravity, fineness, setting properties, constancy of volume, and the tensile, compressive and transverse strengths of cements, both neat and with sand.

In the Thermodynamic Laboratory, the cylinders of the experimental engine have been covered with non-conducting material, the cylinder drains altered, and a new set of jacket drains fitted, so that measurements of all jacket steam can now be made separately,—a unique feature in a quadruple engine. Several tests have been made with the low pressure cylinder. The experimental boiler has been mounted for forced draft trials; two of the Babcock-Wilcox boilers have been completely fitted up for experimental work, and with them about forty full boiler trials have been carried out.

The staple experiments in the laboratory have been made with the Robb automatic cut-off engine, fifty full trials having taken place, six of them with Hirn's analysis. The Atkinson gas engine and the hot air engine have also been tested a number of times. A mass of apparatus for testing the dryness of steam (including separating, throttling and super-heating calorimeters), a steam orifice, a Penberthy injector and a fuel calorimeter have been permanently fitted up, and form, together with numerous pyrometers, indicators and springs, the subjects of the preliminary part of the Course.

A research on the transmission of heat through wrought-iron boiler tubes was carried out in the summer of 1893 by three students, and gave interesting results.

A research on the motion of heat through the walls of steam cylinders by the thermo-electric method has been commenced, and will, it is hoped, give important results.

During the past year, the advanced students in the Electrical Engineering Course have carried out an extensive series of experiments on different subjects of interest.

The electric elevator in the building formed the subject of an enquiry into the regulating and running of electric elevators generally, and much useful information was obtained as to the efficiency of worm gearing.

Tests of efficiency were made on transformers, submitted by the makers, by a new method, which was made the subject of an interesting demon-

stration to the members of the Canadian Institution of Electrical Engineers on the occasion of their visit to McGill College in the autumn.

The photometer has been used for testing the candle-power and efficiency of a large number of incandescent lamps of different types.

Several samples of iron have been sent in for magnetic experiments, and have served a useful purpose in the students' work.

The efficiency of the magnetic clutches used in the dynamo room, which were designed at the College, was determined by a long series of tests; these clutches have been running for two years, and have proved perfectly satisfactory.

An extended series of experiments has been made on armature reaction on some of the dynamos in the laboratory; these are now being completed, and will, it is hoped, give some valuable results.

Arrangements are now being made for establishing a street railway testing department; a standard street railway motor and other apparatus have been kindly lent by the Canadian General Electric Company for this purpose.

The Geodetic Laboratory is used chiefly by the students of the Fourth Year in the Course of Civil Engineering. Investigations of the errors of the instruments employed in the field geodetic work are made by the class. The methods of graduating circles and standard bars are illustrated by example, and the products examined on the comparators. Measurements of the value of gravity and the magnetic element by field methods are completely carried out.

In the Astronomical Observatory each member of the class makes a series of determinations of latitude by the zenith and prime vertical methods, a set of time observations by eye and ear and by chronographic methods, and a determination of meridian, in all of which a fairly high standard of accuracy is demanded.

Mechanical Laboratory.—Much valuable apparatus has been added to this laboratory since the opening of the Buildings, all of which has been made in the mechanical workshops, and mainly by students. The Thurston oil tester and the Bunte's viscosimeter, which formed the original equipment, have been supplemented by a hydraulic dynamometer for testing the efficiency of machines, a rotary transmission dynamometer on a new principle, with recording attachment, a pneumatic gauge for measuring delicate pressures down to the 3000th of a lb. per square inch, two other draft gauges, a belt transmission dynamometer and a belt-testing apparatus.

With these instruments, experiments have been carried on during each session for a period of twenty full working days.

Many visits have also been paid to engineering works and manufacturing factories of importance.

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In the workshops, besides the numberless pieces of work carried out for the governors, the members of the Faculty, and other members of the University, a 40 H.P. air compressor has formed the staple object upon which energy has been spent. This, it is hoped, will be completed and added to the Thermodynamic Laboratory during the present year. A large boring bar, with automatic feed and double heads, an emery brass buffing machine, an overhead travelling crane of one ton capacity, with two transverse motions, in the foundry; and two electric arc lamps and projecting lanterns, complete for class demonstration, have been the principal results of steady application in the workshops.

HENRY T. BOVEY,

Dean.

ROYAL INSTITUTION FOR THE
Balance Sheet for the

SUNDRY ORIGINAL DONATIONS IN LANDS, ETC. (balance of Estate account).		\$480,101 19
SUNDRY SUBSEQUENT DONATIONS :-		
McClavish Street Property, the gift of J. H. R. Molson, Esq.	\$42,500 00	
Wm. Molson Hall and Corridors, the gift of Wm. Molson, Esq.	27,500 00	
Peter Redpath Museum, the gift of Peter Redpath, Esq.	100,000 00	
Thos. Workman Mechanical Workshops and Equipment, bequeathed by the late Thos. Workman	60,000 00	
W. C. McDonald, Esq., donation towards building of Work- shops	20,000 00	
Subscriptions towards Equipment of Thos. Workman Work- shops	13,150 04	
John H. R. Molson, donation for Extension to Medical College.	61,924 78	
	325,074 82	
SUNDRY ENDOWMENTS :-		805,176 01
Subsequent General Endowment	\$65,120 00	
Endowment Fund of 1881	33,500 00	
Dr. George W. Campbell Memorial Fund for Medical Faculty	53,006 04	
Leachon Endowment Fund for Medical Faculty	50,000 00	
Hon. Sir Donald A. Smith Endowment of Departments of Pathology and Hygiene in Medical Faculty	100,000 00	
Dr. Robt. Craik Fund in the Medical Faculty	4,000 00	
Mrs. (Mary) Dow Bequest, Medical Faculty	9,000 00	
Sir Donald A. Smith Endowment Fund for Donalds Special Course for Women	120,000 00	
Philip Carpenter Fellowship Endowment Fund	7,000 00	
John Frothingham Principal Fund	40,000 00	
Applied Science Endowment Fund	6,000 00	
W. C. McDonald Endowment Fund for Faculty of Law	50,000 00	
Do do for Maintenance of Engineering and Physics Buildings	85,900 00	
Thos. Workman Workshops Endowment	57,000 00	
Pension Fund Endowment in Faculties of Arts and Applied Science	150,000 00	
Graduates' Endowment Fund, Faculty of Applied Science	76 02	
Peter Redpath Chair of Pure Mathematics	20,000 00	
Sir W. E. Logan Chair of Geology	20,000 00	
Molson Chair of English Language and Literature	40,000 00	
John Frothingham Chair of Logic, etc.	20,000 00	
D. J. Greenshields Chair of Chemistry	40,000 00	
Gale Chair in the Faculty of Law	25,000 00	
Wm. Scott Chair of Civil Engineering	30,000 00	
Hiram Mills Chair of Classics	43,070 32	
W. C. McDonald Chairs of Physics	100,000 00	
Do Chair of Electrical Engineering	40,000 00	
Chas. Gibb Botanical Chair Endowment	2,200 00	
Hannah Willard Lyman Memorial Fund	1,074 05	
Neil Stewart Prize	340 00	
Anne Molson Gold Medal	1,200 00	
British Association do and Scholarship	2,605 00	
Henry Chapman do	700 00	
Elizabeth Torrance do	1,000 00	
Sir W. E. Logan do	1,000 00	
Prince of Wales do	1,000 00	
Shakespeare do	1,000 00	
Sutherland do	1,000 00	
Major Hiram Mills Scholarship and Medal	1,500 00	
Jane Redpath Exhibition	1,667 00	
British Association Apparatus	1,500 00	
Museum Endowment Fund	2,000 00	
Wm. Molson Library Fund	4,400 00	
Hon. F. W. Torrance Mental and Moral Philosophy Book Fund	1,000 00	
Hugh S. McLennan Library Endowment	250 00	
W. C. McDonald Scholarships	25,000 00	
Barbara Scott Scholarship	2,000 00	
Walter Scott Exhibition	1,100 00	
Wm. Wood Redpath Memorial	1,000 00	
Charles Alexander Scholarship	2,000 00	
Faculty of Applied Science Library Endowment	750 00	
	1,365,058 43	
SUNDRY ACCOUNTS, BEING INCOME DEVOTED TO SPECIAL PURPOSES NOT YET EXPENDED	30,045 72	
Less Sundry Sums expended in advance	15,318 61	
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ADVANCEMENT OF LEARNING,
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GROUNDS AND BUILDINGS :—

College Grounds	\$32,046 12	
College Buildings	95,422 03	
Medical Faculty Buildings	54,049 31	
Medical do do — Extension	29,417 30	
Porter's Lodge	2,125 00	
Observatory Buildings	3,642 14	
Gymnasium	8,718 59	
J. H. R. Molson Library Site on McTavish Street	27,296 25	
Wm. Molson Hall and Corridors	27,500 00	
Peter Redpath Museum Building	100,000 00	
Thomas Workman Mechanical Workshops	67,208 07	
		447,424 81

MOVEABLE PROPERTY :—

Equipment Chemical Laboratory	\$4,396 24	
Museum, Furniture, Specimens, etc	15,843 21	
Philosophical Apparatus	9,547 64	
Engineering do	3,188 02	
Library Fixtures and Furniture in old Building	5,661 17	
Donalda do. do.	327 63	
Law do. do.	510 50	
General do. do.	9,310 54	
Books in Law Library	1,613 70	
Books in Library	46,945 30	
Equipment Thomas Workman Mechanical Workshops	23,079 28	
		120,423 23
		567,848 04

AMOUNTS UNPAID IN RESPECT OF ENDOWMENTS	12,654 54
INVESTMENTS IN MORTGAGES, ETC.	1,501,291 01
AMOUNT PAYABLE IN RESPECT OF ARREARS OF INTEREST	12,325 75
BALANCE AT DEBIT OF PROFIT AND LOSS ACCOUNT	\$59,825 80
Less above Arrears of Interest	12,325 75
	47,500 05

CASH ON HAND IN BANK	43,342 16
	\$2,184,961 55

J. W. BRAKENRIDGE, B.C.L., Acting Bursar.

*INCOME and EXPENDITURE of the ROYAL
for the year ending*

INCOME.

CASH ON HAND OF UNEXPENDED INCOME OF SPECIAL ENDOWMENTS.		
SCHOLARSHIPS, APPROPRIATIONS, ETC., ON THE 30TH JUNE, 1893.....	\$29,853 87	
do do do 30th June, 1894.....	14,727 11	15,126 76
From Fees collected.....	\$25,614 63	
Income received from Investments, Deposits in Bank, etc.....	72,498 17	
Government and other Grants.....	5,725 00	
Donations and Subscriptions.....	12,197 50	
Sundry Receipts.....	695 27	
Balance at debit of Profit and Loss Account on 30th June, 1894.....		116,640 57
		59,825 80
NOTE.—Profit and Loss Account, 30th June, 1894..... \$59,825 80		
do do 30th June, 1893.....	46,241 34	
Deficiency for the year.....	\$13,584 46	
		\$ 191,593 13

Verified,
MACINTOSH & HYDE, *Auditors.*

*CAPITAL RECEIVED and DISBURSED by the ROYAL
for the year ending*

RECEIPTS.

CASH ON HAND for Investment on the 1st JULY, 1893.....		\$11,075 70
do do Extension to Medical Building, 1st July, 1893.....	34,625 00	45,700 70
SUBSCRIPTIONS :—		
Subscriptions for Equipment of Workman Workshops.....		\$ 700 00
ENDOWMENTS, ETC. :—		
W. C. McDonald for Chair of Physics.....	50,000 00	
Gale Chair Endowment, on account.....	428 85	
Pension Fund Endowment.....	150,000 00	
Dr. Craik Fund in Medical Faculty.....	3,500 00	
Graduates' Endowment Fund, Faculty of Applied Science.....	5 00	
Applied Science Library Endowment.....	50 00	
	203,983 85	
INVESTMENTS REPAID DURING THE YEAR.....	53,866 25	
INTEREST ON J. H. R. MOLSON'S DONATION TO MEDICAL FACULTY—Capitalized.....	1,924 78	
		260,474 88
		\$306,175 58

Verified,
MACINTOSH & HYDE, *Auditors.*

*INSTIT
30th. Ju*

Balance at d
For Salaries
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" Rent of
" Botanic
" Gymnas
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*INSTIT
30th Jun*

BUILDINGS :
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Gymnasia
Library
Fixtures

CHARGES ON

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1894.
Deduct a

INSTITUTION for the ADVANCEMENT of LEARNING,
30th. June, 1894.

EXPENDITURE.

Balance at debit of Profit and Loss Account on 1st July, 1893		46,241 34
For Salaries and Wages	\$88,948 02	
“ General Expenditure—Gas, Fuel, Water, Insurance, Printing, Stationery, Maintenance of Grounds, Repairs to Buildings, Fittings, Museum Main- tenance, Law Charges, Clearing Snow, etc., etc.	22,942 56	
“ Amount paid to Faculty of Medicine, being Interest on their endowments, Apparatus and Supplies for Class Work in Botany, Chemistry, Mechan- ical Department, etc.	11,025 89	
“ Rent of Rooms for Law Faculty	3,275 10	
“ Botanic Garden Maintenance	500 00	
“ Gymnasium	1,848 06	
“ Library—for books, etc.	1,104 41	
“ Scholarships, Exhibitions, Medals and Prizes	1,764 64	
“ School Examinations, Diplomas, etc.	3,600 30	
“ Insurance	975 11	
“ Annuities	4,671 25	
“ Interest on J. H. R. Molson's Donation to Medical Faculty—Capitalized	2,711 67	
	1,924 78	
		145,351 79
		<u>\$191,593 13</u>

J. W. BRAKENRIDGE, B.C.L., *Acting Bursar.*

INSTITUTION for the ADVANCEMENT of LEARNING,
30th June, 1894.

DISBURSEMENTS.

BUILDINGS :—		
Medical Building Extension	\$4,042 30	
Addition to Observatory and Observer's House	3,776 06	
		7,818 36
EQUIPMENT, ETC. :—		
Equipment Thomas Workman Mechanical Workshops	799 57	
Gymnasium Apparatus	30 60	
Library Account	56 00	
Fixtures and Furniture	8 25	
		894 42
CHARGES ON PROPERTIES		145 46
INVESTED DURING THE YEAR	255,117 83	
		263,976 07
AMOUNT CARRIED TO PROFIT AND LOSS ACCOUNT, being amount of Capital used to make up Deficit in Income (see Statement of Income and Expenditure)		13,584 46
CASH ON HAND FOR MEDICAL BUILDING EXTENSION, ON 30th JUNE, 1894	32,507 48	
Deduct amount invested	3,892 43	
		28,615 05
		<u>\$306,175 58</u>

J. W. BRAKENRIDGE, B.C.L., *Acting Bursar.*