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FACULTY OF GRADUATE STUDIES & RESEARCH

REPORT TO THE PRINCIPAL

OF

MC GILL UNIVERSITY

APRIL, 1931

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*Orig  
to [unclear]*

*MEMORANDUM*

*Submitted for the use of the Board of Graduate Studies in the  
Faculty of Arts*

*MEMORANDUM*

*Recommendation for the study and research in many  
departments*

A REPORT

to

Sir Arthur Currie, G.C.M.G., K.C.B., LL.D. *several*

Principal of McGill University

*in some cases a certain increase of staff.*

on the

FACULTY OF GRADUATE STUDIES AND RESEARCH

*in improvement of standards, with  
perhaps the possibility of earlier matriculation,  
the  
and  
four years*

prepared by the

Dean and a Special Committee

April, 1931.

*FOR CONSIDERATION*

*Increased facilities for outdoor and indoor  
sports and recreation, both for staff and  
graduate students.*

*Free tuition at McGill for the children of  
full-time professors.*

*Lower to graduate students*

FINAL SUMMARY

IMMEDIATE PROBLEM

Additional seating room for graduate students in the McGill Library.

DESIRABLE IMPROVEMENTS

Fellowships for graduate study and research in many departments.

An increase in the library material for several literary departments.

In some cases, a moderate increase of staff.

In some cases, increases of salary.

An improvement in the entrance standard, with perhaps the abolition of Senior Matriculation, the institution of a twelfth grade in the schools, and an honours matriculation with four years honours at McGill.

FOR CONSIDERATION

Increased facilities for outdoor and indoor exercise and recreation, both for staff and graduate students.

Free tuition at McGill for the children of full-time professors.

Loans to graduate students.

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INTRODUCTION

This report on the Faculty of Graduate Studies and Research is intended not merely as a temporary statement, but as a book of reference which can be consulted by the Principal or Dean from time to time for a few years to come.

It contains a number of reports on Research and Graduate Instruction from the Head of each Department concerned, drawn up, in most cases, after consultation with the other members of his department.

The reports are not in a stereotyped or standard form, so that they reflect the individual and varied character both of the subjects and of the staffs concerned in connection with these subjects.

The distribution of information contained in this report is indicated by the following diagram.

Group I  
Group II  
Group III  
Group IV  
Group V

Dr. Brittain  
MACDONALD  
COLLEGE

1. Animal Production  
2. Horticulture  
3. Agril. Bacteriology  
4. Chemistry  
5. Zootechnics  
6. Acoustics  
7. Animal Husbandry  
8. Entomology  
9. Plant Culture  
10. Pathology  
11. Dairy  
12. Sugar's Section  
13. Various following  
14. Subjects only  
15. Agronomy, Bacteriology  
16. Chemistry, Plant  
17. Pathology, Entomology

Dean Johnson

1. Botany  
2. Chemistry  
3. Zoology  
4. Physiology  
5. Zoology

Dr. Woodhead  
AMES

1. Classics  
2. Economics  
3. Education  
4. English  
5. Government  
6. History  
7. Mathematics  
8. Music  
9. Philosophy  
10. Psychology  
11. Romance Langs.  
12. Sociology

THE DEAN

Group I	Group II	Group III	Group IV	Group V
<p>Dr. Woodhead ARTS</p> <ol style="list-style-type: none"> <li>1. Classics</li> <li>2. Economics</li> <li>3. Education</li> <li>4. English</li> <li>5. Germanic Lang.</li> <li>6. History</li> <li>7. Mathematics</li> <li>8. Orient. Lang.</li> <li>9. Philosophy</li> <li>10. Psychology</li> <li>11. Romance Lang.</li> <li>12. Sociology</li> </ol>	<p>Dean Johnson SCIENCE</p> <ol style="list-style-type: none"> <li>1. Botany.</li> <li>2. Chemistry</li> <li>3. Geology</li> <li>4. Physics</li> <li>5. Zoology</li> </ol>	<p>Prof. E. Brown ENGINEERING</p> <ol style="list-style-type: none"> <li>1. Civil Eng.</li> <li>2. Electrical Eng.</li> <li>3. Mechanical Eng.</li> <li>4. Metallurgical Eng.</li> <li>5. Mining Eng.</li> </ol>	<p>Dr. Meakins BIOLOGY and MEDICINE</p> <ol style="list-style-type: none"> <li>1. Anatomy</li> <li>2. Bacteriol.</li> <li>3. Biochem.</li> <li>4. Medicine</li> <li>5. Pathology</li> <li>6. Pharmacol.</li> <li>7. Surgery</li> </ol>	<p>Dr. Brittain MACDONALD COLLEGE</p> <ol style="list-style-type: none"> <li>1. Animal Production</li> <li>2. Horticulture</li> <li>3. Agri. Bacteriology</li> <li>4. " Chemistry</li> <li>5. " Economics</li> <li>6. Agronomy</li> <li>7. Animal Husbandry</li> <li>8. Entomology</li> <li>9. Horticulture</li> <li>10. Plant Pathology</li> <li>11. Poultry</li> </ol> <p>N.B. Master's degree given for following subjects only- Agronomy, Bacteriology Chemistry, Plant Pathology, Entomology.</p>



Each group is preceded by a covering report the dealing with the Group concerned.

At the beginning is a report by the Dean endeavouring to cover as far as possible in a reasonable space the salient points of the whole report.

The main report written by the Dean follows from p. 4 to p. 33.

The Faculty of the Graduate School, consists of the Professor of the Faculty of Arts and Applied Science, but the initiative and administration of the School is placed in the hands of a committee selected from these faculties and known as the Committee on Graduate Studies. The Chairman of this Committee is the official head of the Graduate School. The advanced courses of study offered in the Graduate School lead to the degrees of Doctor of Arts, Master of Science, and Doctor of Philosophy. (Extract from Minutes, March, 1967).

The first Committee, appointed by the Principal, Sir William Pollock, consisted of the following members: Dr. D. B. Allen (Chairman), Professor E. J. Darby, Professor E. Rutherford, Professor A. E. Taylor, Dr. H. H. Tury, Professor J. Woodhead, Professor A. G. Smith, Professor G. W. Golby, and Dr. S. A. ...

A SHORT HISTORY OF THE FACULTY

Total

"Graduate instruction was for many years offered in the various Departments of McGill University without definite organization. The increased demand for such work led the Corporation in 1906 to formally organize and extend the higher teaching work of the University. A Graduate School was, therefore, established, and in it are enrolled all the graduate students in the University who are following advanced courses of study in subjects which in the undergraduate work fall within the scope of the Faculties of Arts and of Applied Science.

The Faculty of the Graduate School consists of the professors of the Faculties of Arts and of Applied Science, but the initiative and administration of the School is placed in the hands of a Committee selected from these Faculties and known as the Committee on Graduate Studies. The Chairman of this Committee is the official head of the Graduate School. The advanced courses of study offered in the Graduate School lead to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy." (Extract from Minutes, March, 1907).

The first Committee, appointed by the Principal, Sir William Peterson, consisted of the following members: Dr. F. D. Adams (Chairman), Professor R. J. Durley, Professor E. Rutherford, Professor A. E. Taylor, Dr. H. M. Tory, Professor J. Harkness, Professor W. Scott, Professor C. W. Colby, and Dr. B. J. Harrington.

STUDENTS REGISTEREDDEGREES AWARDED

Year	Master	Ph.D.	Total	Master	Ph.D.	Total
1906-07	23	7	30	12		12
1907-08	36	8	44	14	2 D.Sc.	16
1908-09	55	11	66	18	1	19
1909-10	69	16	85	24	3	27
1910-11	Records incomplete			15		15
1911-12	"	"	"	19	1	1 D.Sc. 21
1912-13	"	"	"	20	1	21
1913-14	"	"	"	5		5
1914-15	"	"	"	1	1 D.Sc.	2
1915-16	"	"	"	14	1	15
1916-17	"	"	"	8	2	10
1917-18	"	"	"	8		1 D.C.L. 9
1918-19	"	"	"	4		4
1919-20	"	"	"	8		1 D.Sc. 1 LL.M. 10
1920-21	32	10	42	26		26
1921-22	58	11	69	17	1	1 LL.M. 19
1922-23	58	22	80	25	7	32
1923-24	105	17	122	48	4	1 Mus.Doc. 53
1924-25	98	31	129	51	7	1 D.Sc. 59
1925-26	100	36	136	59	7	66
1926-27	98	40	138	43	10	1 D.Sc. 54
1927-28	130	47	177	64	12	76
1928-29	100	53	153	56	20	76
1929-30	112	56	168	56	15	1 Mus.Doc. 72
1930-31	167	70	237	67	13	80

CHAIRMEN

Dr. F. D. Adams..... 1906-12  
 Dr. J. Harkness..... 1912-20  
 Dr. H. M. Mackay..... 1920-21  
 Dean G. Laing..... 1921-22

DEANS

Dr. F. D. Adams..... 1922-24  
 Dr. R. F. Ruttan..... 1924-28  
 Dr. F. C. Harrison..... 1928-30  
 Dr. A. S. Eve..... 1930-

FEEES

Toronto University  
 McGill University  
 Harvard University

Masters \$25.-\$35. Ph.D. \$60.  
 " \$70. " \$70.  
 \$400. for first two years and \$200. for  
 subsequent two years.

COVERING REPORT

by the

DEAN OF THE FACULTY OF GRADUATE STUDIES AND RESEARCH

"No system can rise higher than the men who operate it," and a student cannot be educated more highly than his capacity and previous training permit.

THE PROFESSORS

Professors at McGill, and no doubt in other universities, find themselves in a rather perplexing situation, owing to the variety and conflict of their duties. The first call on their time and energy is the teaching of undergraduates. This is always an arduous and difficult task, and it must be done well, with freshness and enthusiasm. Dull or stale lectures, especially when compulsory, have, rightly enough, no appeal to youth. The University and the Professors are judged by parents, schoolmasters, and others, in accordance with the thoroughness and efficiency with which this primary duty of lecturing and teaching is fulfilled.

In recent years the heavy work of a Graduate Faculty, awarding Masters' and Doctors' degrees, has been added, and as every graduate student is almost a class by himself, and is entirely so as regards his research and thesis, the call on the time and energy of nearly every Professor has already

greatly increased, and will continue to do so. (This double load calls in some cases - e.g. Classics, Philosophy, and Mathematics, - for some relief. It is not suggested that those are the only or chief sufferers; indeed there is an unbalanced and unequal load on the various professors at McGill.)

The third demand on the time and power of a professor is his natural ambition to prosecute research, to investigate, to write books or notable articles which will advance knowledge. His reputation as a man of science, among the scientific leaders of the world, rests upon his achievement in research. The same is of course true of a man of letters.

The prestige of McGill in the realms of literature, science, law, and medicine is dependent on the best work of the greatest men at McGill. I name two examples - Osler and Rutherford. Those who have special gifts in this direction should have special opportunities, both in money and time.

We are fortunate at McGill in having a considerable number of young professors of high promise and achievement, who seem capable of handing on the torches of advanced learning and research.

The fourth duty of professors is of a mixed character. There are Corporation, Faculty, and Departmental meetings,

and committees, reports, marks, attendance lists, lectures by and entertainment of distinguished visitors, lectures to various associate bodies in Montreal, extension lectures in the surrounding cities and villages, speeches over the radio, besides various social duties and home life. In many cases the perplexity of the above conflict of duties is gravely weighted with the difficulty of balancing the family budget in an expensive city on a moderate or small salary. It may be necessary to subdivide the duties of (1) undergraduate teaching, (2) graduate training, (3) administration, (4) outside lecturing, etc., among the staff, assigning the greater part of each to those most fitted to undertake it. The main difficulty is that a man who deliberately abstains from research work finds himself on a lower plane of prestige, both within and without the university, not, of course, as a man, but as a man of letters or of science.

ON GRADUATE STUDENTS

Education does not consist of separate links, but of a whole chain, or rather of a string of pearls of different sizes and values. The Graduate Faculty can only do its utmost with the best material available - the output of the Undergraduate Faculties. These in turn are dependent on the High Schools, which derive their students from Elementary Schools. The Graduate Faculty is interested in, and dependent upon, all the other Faculties and all the Schools.

From the point of view of developing to the utmost the best intellectual talent in the Dominion it must be admitted that the standard of the Schools is, at the end of a schoolboy's career, a clear two years behindhand as compared with Western Europe, in such important primary subjects as Mathematics and Classics; nor is it possible at a later stage to make good these deficiencies. The idea that a Graduate School can make good the shortcomings in Undergraduate Schools must be strenuously resisted. Even more dangerous is the suggestion that the deficiencies of Schools can be made good in the Undergraduate courses.

Since, then, all the links in the Chain of Education must be well forged, it is important that McGill, when critical, should not be open to criticism. There must needs be relatively strong and weak departments in every university. There is no

need, however, for obvious shortcomings which greatly discourage the enthusiasm of good students. This matter concerns the welfare of the Graduate Faculty, but it is understood that it will be considered by other committees more directly concerned. It would be a mistake to overlook the matter, and a worse mistake to emphasize the magnitude of the trouble when so much sound and admirable work pervades so large a fraction of the community.

Returning, however, to the standard of the Schools, governed by the Junior Matriculation examination, it may be admitted that this is a high enough standard for the normal or subnormal individual, yet it has been strenuously contended for the last thirty years that this standard is too low for the abler students, who therefore come to the University too young (sometimes at sixteen) or continue at school marking time and wearied with repetition.

Either the High Schools must move forward, or McGill, like other universities, requires a school under university control. There is so much wasted effort under present conditions.

There is a movement on foot, worthy of support, to establish a twelfth grade in the High Schools. Successful candidates of this grade might enter the Faculty of Engineering without a year in Arts. Those who entered Arts might proceed at once to an Honours Course, taking four years of undergraduate training.



The Senior Matriculation might well be abolished, and there would be two, and only two, ways of entering McGill - (1) ordinary; (2) honours matriculation.

At present the Graduate Faculty at McGill is drawing students from all parts of the Dominion, from the United States, and elsewhere. Many McGill men after a year or two in the Graduate Faculty go to Europe or the United States to complete their training. Free trade in students is of the utmost advantage both to the universities and to students alike. Students have great wisdom in discovering the real leaders in modern thought and progress, and they attach themselves promptly to the best men.

It is possible to build up a great Graduate School at McGill. It is essential to achieve quality not quantity.

The responsibility for maintaining a high standard rests with the whole faculty, but the department concerned must always shoulder the major share of the burden. The conference of a higher degree to a weak student is a nail in the coffin of the department, and the funeral should not be too long postponed.

The Ph.D. degree has to-day a not insignificant commercial value to the holder. It is a guarantee of combined study and achievement. Hence there is a grave danger of "degree-hunting", and lower motives usually imply lower standards. McGill should steadfastly set her face against any lowering of standards.

## FELLOWSHIPS

The word "Scholarships" should be used in connection with Undergraduate emoluments, and the word "Fellowships" for Graduate emoluments, given with a view to research work and not for services rendered to the University, but for merit.

Where there is payment for services rendered it is more correct to use such terms as Demonstrator, Instructor, or Assistant.

Nearly all the departments urge the desirability of more Fellowships, and indeed it is one of our chief needs; for the number of Fellowships in the United States is attracting many of the best Canadian students away from the Dominion, and there is a tendency for them to remain there. Thus in Dalhousie men often get Fellowships at Yale, and at the University of Minnesota there were in the Graduate School forty-two Canadians in 1928-29, and thirty-two in 1929-30. These facts are taken from the Biennial Report of the Graduate School, 1930. The whole Graduate School at Minnesota exceeds 2,000 students, and the President justly states, "The teaching of this mass of students on the graduate level is a growing burden on the staff already, with schedules often not arranged with reference to the services they are performing as members of the College Staffs," and again, "Too often, for a disproportionate part of his time, the graduate student is still being treated as an undergraduate."

At McGill a large proportion of the Graduate Faculty

is composed of those who are assisting in the laboratories as demonstrators, or with large first year classes as assistants. The National Research Council awards annually a number of Fellowships, Studentships, and Bursaries of values of \$1200., \$1,000., and \$750. respectively to students of high distinction in Chemistry, Engineering, Geology, Metallurgy, Mineralogy, Physics, and Mathematics. These emoluments have been of inestimable value to students, to universities, and to the Dominion. The Moyse Travelling Scholarship, the 1851 Exhibition Scholarship, the Rhodes Scholarships have also given great opportunities to many able young Canadians.

Students who have already worked for four years in Arts, five years in Engineering, nine years in Medicine as undergraduates do not wish to draw further on their own resources or on the family budget, and if they are to continue to do research work it is essential that emoluments should be provided for those who are capable of advancing knowledge for the benefit of the whole community. The present competitive struggle between nations cannot be successfully maintained merely by tariff walls which may, if too high, tend to strangle industry and finance. Those nations with a superiority in scientific, technical, and engineering skill will always maintain a leading position in times either of success or of difficulty. Canadian brains are second to none and the perseverance and reliability of Canadians are well known.

The two shortcomings are the earlier training of the better minds and the reliance of Canada on research work done in other countries. It is certain that the institution of the Research Council Laboratories at Ottawa is a step in the right direction of far-reaching consequences.

to the following effect:

"And what would be revealed if the Chamber of Horrors in each university library which houses the M.A. and Ph.D. theses were unlocked by some Canadian Flexner?"

These suggestive insinuations are insidious and unjustifiable.

The theses are open to the whole world to inspect and to criticise. They are frequently consulted by professors and students of McGill and of other universities. These for the Ph.D. degree must involve some contribution to knowledge, and be presented in good literary form. One examiner is the McGill professor with whom the student has worked at his research and thesis. The other examiner must not be a McGill man, but he must be a professor at some other university, such as Toronto, Harvard, Yale, Princeton, where some authority on the matter of the thesis may be found. In the case of Chemistry and Physics, for example, with which the writer is naturally best acquainted, the condensed results of the full thesis are for the most part published in one of the high-class scientific journals of Canada, Great Britain, or the United States. So, also, the theses in Economics are published by the department and form a real contribution to

ON THESES

In the case of theses for the degree of Master, In an article on Flexner's book on "Universities, American, German, English" there is a statement signed "F.H.U." in the April, 1931, issue of the Canadian Forum to the following effect:

"And what would be revealed if the Chamber of Horrors in each university library which houses the M.A. and Ph.D. theses were unlocked by some Canadian Flexner?"

These suggestive insinuations are insidious and unjustifiable.

The theses are open to the whole world to inspect and to criticise. They are frequently consulted by professors and students of McGill and of other universities. Those for the Ph.D. degree must involve some contribution to knowledge, and be presented in good literary form. One examiner is the McGill professor with whom the student has worked at his research and thesis. The other examiner must not be a McGill man, but he must be a professor at some other university, such as Toronto, Harvard, Yale, Princeton, where some authority on the matter of the thesis may be found. In the case of Chemistry and Physics, for example, with which the writer is naturally best acquainted, the condensed results of the full thesis are for the most part published in one of the high-class scientific journals of Canada, Great Britain, or the United States. So, also, the theses in Economics are published by the Department and form a real contribution to

the study of Canadian economics.

In the case of theses for the degree of Master, there must again be two examiners, not from the same department in McGill. The time is perhaps ripe for insisting that in all cases the second examiner shall be a member of a university other than McGill.

It might be well to accept the challenge of the writer to the Canadian Forum and to request a report on the theses presented and accepted during the past five years. A committee of men like Sir Andrew Macphail, Dr. C. W. Colby, and Dr. F. D. Adams, if they could spare a few days of their time, could rapidly review the theses, point out shortcomings, and assign praise where it is due.

This section closes then with two questions:

1. Should all theses be examined by an examiner who is not a member of McGill, as well as by an internal examiner ?
2. Should a small committee be appointed to investigate and report on theses during the last few years ?

MONEY

Nearly all the reports endeavoured, without success, to avoid reference to money. At the present time of universal depression it is more pertinent to consider how to make a given sum of money go a long way than to base the future on a dream of money which may not be forthcoming.

Briefly, McGill is a great university worthy of all possible support, and capable of making valuable returns to the community. The University is, however, hampered seriously for want of funds in nearly every department. Weeding out the less essential expenditures is a most difficult matter. There might well be an appeal to the whole staff for the most rigorous economy. Under no conditions should the University involve itself in any new commitments until the pressing needs of a primary nature in connection with fundamental subjects have been met.

STANDING ADVISORY COMMITTEE

Dean F. M. G. Johnson points out in his report that it might be desirable to institute a small standing committee to advise the Principal, subject of course to his wish and approval, after careful inquiry as to:

- (1) the general financial policy of the University as to the more pressing needs;
- (2) the rival claims of Faculties and Departments for staff, laboratory, and library requirements.



Extract from Private LOAN FUND Loan, English, German.  
by A. Flexner. Osaka University Press, 1930.

P. 339

Extract. Some benefactor who wishes a small sum of money to confer a great benefit might well institute a Loan Fund for graduate and for undergraduate students at McGill. Experience at other universities and in the Engineering Faculty at McGill shows that moderate loans are often most helpful to students, and are repaid with interest, so that the capital sum is not lost, but slowly augmented.

usually scientific literature may be regarded as just so many commercial 'orders', whose value will be determined by business considerations. The person who treads this path will soon sacrifice his scientific sense of values to a commercial or social sense of values. Indeed we live in an era characterized by a mania for 'instruction.' Every possible subject wants to win university recognition. Let us consider whether the university is best adapted to popular purposes and whether the public does not wring from disappointed lectures and courses results that cannot be thus obtained, because all the essential prerequisites are lacking."

Extract from Universities: American, English, German,  
by A. Flexner. Oxford University Press. 1930.

P. 339

Extract consisting of a translation by E. Spranger:

"I need not urge that a modern university professor should not be blind to the social conditions of modern life. But if this idea is loosely conceived, if holidays and free hours are devoted to giving popular courses, the university as an institution of learning is imperilled, for as such it must remain a selective, aristocratic institution. The university teacher must strive upward; the spread of knowledge among the people at large he has to leave to others. To this same category belong the temptations which come to investigators in the natural and intellectual sciences from the business world. There is danger that gradually scientific literature may be regarded as just so many commercial 'orders', whose value will be determined by business considerations. The person who treads this path will soon sacrifice his scientific sense of values to a commercial or social sense of values. Indeed we live in an era characterized by a mania for 'instruction.' Every possible subject wants to win university recognition. Let us consider whether the university is best adapted to popular purposes and whether the public does not expect from disjointed lectures and courses results that cannot be thus obtained, because all the essential prerequisites are lacking."

THE MCGILL LIBRARY

The limitations of the Library are partly responsible for the fact that  
With the steady growth of the Graduate Faculty there is a serious problem - namely, sufficient space for graduate students to work in the Library. In all literary subjects, the library is the laboratory. There is not now sufficient room for the students. This is an immediate problem for solution.

The Library to-day fulfils many functions; it used to be merely a repository for books, with reasonable space for studying them. There are some strong remarks, perhaps too strong, from the Department of History, but there is ample justification for calling attention to the very serious, perhaps the most serious, question in connection with the Graduate Faculty.

Some departments - e.g. Chemistry, Physics - are fortunate enough to have first-rate departmental libraries well stocked with essential books and magazines, and with room for students to read and study them.

In the case of certain subjects, such as History, it will never be possible to institute the degree of Ph.D. at McGill in that subject, until a systematic and continued effort has been carried to fruition in the provision of sufficient "material" for historical study. This will be a costly undertaking. In many subjects, such as Mathematics, for example, there has been a steady marked improvement in the material for graduate study.

THE ARTS DIVISION

The limitations of the Library are partly responsible for the fact that not much to be added to the able report of Dr. 17 departments offer the M.A. degree  
 21 " " M.Sc. "  
 shortage of able students from schools, of money, fellow-  
 and only  
 ships, staff, and books.

17 departments offer the Ph.D. degree

At present McGill does not offer the Ph.D. degree for such fundamental subjects as Classics, English, French, and Mathematics.

The other cause of this limitation is shortage of staff.

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 hold Science, and so forth.

to offer Ph.D. degrees. The best has been so dragged  
 where have been the great gifts for Classics, Mathematics, English, History, French, Philosophy, and so forth? It is true that many Chairs have been endowed, but in a perfectly unbiased way the writer ventures to call attention to the desirability of strengthening in every possible way the nucleus and foundation of every university, the great and historic subjects of the humanities, with their proud record coming down the ages, and to-day not dead, but living.

A word of sympathy may be added for Dr. Leacock's desire to raise sufficient money to continue the publication in book form of the N.A. theses in Canadian economics.

These studies are THE ARTS DIVISION community at large.

This brief note is not intended as an alternative to

Dr. Woodhead. There is not much to be added to the able report of Dr. W. D. Woodhead, which is a jeremiad lamenting the shortage of able students from schools, of money, fellowships, staff, and books.

As regards the schools, perhaps the real trouble is that the boys have not been fortunate enough to come into contact with first-class and highly trained minds.

As to the other points, separately dealt with in this report by the Dean, it is fair to point out that the great benefactions to McGill have been for Engineering, Physics, Chemistry, Biology, Medicine, Agriculture, Household Science, and so forth.

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The report of Dr. F. M. S. Johnson, now Dean of Science, deals with Chemistry, Physics, Botany, Zoology, and Geology. The reports from these Departments are comprehensive in character, dealing with past history and achievement, as well as with present status and future aspirations. They thus form a useful record for future reference. The growth of undergraduate and of graduate teaching has occurred to a degree which will render future development difficult without much expenditure on staff and building, and for a few years it may be wise to select students rather than to increase numbers.

The work of the Departments of Chemistry and of Physics has been of such a noteworthy character that it would justify a special appeal to the Rockefeller Foundation for a grant of money to give extension to both buildings, unifying certain lecture rooms and libraries, and giving further scope for research. Such grants have been made by the Rockefeller Foundation to the University of Bristol and to Dr. Bohr's Laboratory at Copenhagen. Their policy, rightly enough, seems to give assistance and encouragement where there has been definite achievement.

Geology is a subject of great importance to this wide and partially explored Dominion, and McGill University

is thus carrying SCIENCE DIVISION and public load in the training of young geologists, and in the exploration of new territories. The report of Dr. F. M. G. Johnson, now Dean of Science, deals with Chemistry, Physics, Botany, Zoology, and Geology. The reports from these Departments are comprehensive in character, dealing with past history and their achievement, as well as with present status and future aspirations. They thus form a useful record for future reference. The growth of undergraduate and of graduate teaching has occurred to a degree which will render future development difficult without much expenditure on staff and building, and for a few years it may be wise to select students rather than to increase numbers.

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is thus carrying part of a general and public load in the training of young geologists, and in the exploration of new territory and possibilities. All possible sources of assistance should be tapped in the development of this subject.

The appeal of the Department of Botany for a Chair of Mycology should not be forgotten. The ravages of fungi on fruit and forest trees demand constant watchfulness and scientific research. Here again we approach a situation with a practical demand on Dominion and Provincial assistance.

A good mycologist at McGill would usefully co-operate with Botany at McGill, Plant Pathology at Macdonald College, and with the Forest Products Laboratory at McGill.

Perhaps the taxonomist-ecologist appointment might well be postponed for later consideration, particularly as the Université de Montréal has so able a representative as Professor Marie-Victorin.

In Zoology there appears to be the possibility of further co-operation in Economic Entomology between the Department at McGill, in Montreal, and Macdonald College. If the Atlantic Biological Station at St. Andrews, N.B., closes its door to pure science, its practical work will also suffer, and provision must be made for a biological station in the full sense of the word. Otherwise, our leading marine biologists will be forced to go to the United States or elsewhere. Pure and applied research



always react beneficially on each other, and a curtailment of freedom in investigation strangles progress.

Finally, it is recommended that a committee be appointed with reference to the annual choice of a Somerville Lecturer on Natural History, with a stipend of \$100. a year. I suggest the Directors of Zoology, Botany, the President of the Sigma Xi, and the Dean of Science. It is as important to secure a good audience as to invite a good lecturer.

The number of outside lecturers who come to McGill is now sufficient so far as University professors and students are concerned. If there is further increase of lectures it should be clearly understood that these are for the public, and there should be no obligation on the part of professors or students to attend them.

Great care in selecting none but the ablest lecturers is also essential. These reflections are quite general and have no reference to any individuals. It must be remembered that professors and students give and receive many hours of lectures, week after week, during the session. A moderate number of outside lectures is sufficient, and those only of high quality on the most modern material.

The teaching of Mathematics and Physics and Chemistry in High Schools in the Province of Quebec demands attention. There is a shortage of competent and well trained teachers, and the profession is not sufficiently attractive.

McGill would be well advised to give special training to young men and women who are destined to teach scientific subjects in the High Schools. These teachers must both know their subjects and be able to teach them. Any assistance given by McGill to the High Schools would be repaid a thousandfold in a harvest of young matriculants with enthusiasm and sound foundational training. It is a curious fact that many of our best young mathematicians come from Jamaica rather than the Province of Quebec. The Beatty Entrance Scholarships, \$500. for Classics, and \$500. for Mathematics, are, however, producing a marked improvement in the quality not only of successful scholars, but also of those who, though unsuccessful, have benefitted by competing for the emoluments.

standards set thirty years ago as regards fundamental training, and it is desirable that at least the abler men should receive a more advanced training in Mathematics and Physical Science. This idea is more strongly held by the academic school than by the engineers themselves, and some compromise between the two views is desirable. The striking advances in aerodynamics, telephone and radio communication, steam turbines, etc., have been made by engineers with a blend of Mathematics, Physics, and practical insight and foresight.

Professor E. Brown's efficient summary will naturally carry more weight than the present notes on research work in Engineering.

ENGINEERING

The Faculty of Applied Science has this year become the Faculty of Engineering, and a Master of Engineering degree has been substituted for M.Sc.(Eng.) This wise change leads to a clearer understanding of the differences between Physical Science (Physics and Chemistry), Biological Science, Medical Science, and Engineering. The change also calls attention to the proud record of Engineers in Canada, whose work surrounds us splendid in magnitude and efficiency.

The advance of knowledge in all branches of science will in the future require a larger proportion of engineers with the highest possible training in Mathematics and Physics, particularly Electricity. McGill is still working on the standards set thirty years ago as regards fundamental training, and it is desirable that at least the abler men should receive a more advanced training in Mathematics and Physical Science. This idea is more strongly held by the academic school than by the engineers themselves, and some compromise between the two views is desirable. The striking advances in aeronautics, telephone and radio communication, steam turbines, etc., have been made by engineers with a blend of Mathematics, Physics, and practical insight and foresight.

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MEDICINE

contribution to knowledge." There are at McGill many  
 important The institution of a subject in the Graduate  
 Faculty entitled "Experimental Medicine and Surgery" raises  
 some important questions. The staff whose names appear in  
 the Announcement of the Graduate Faculty (1932) is a  
 guarantee of the highest efficiency. The real question is  
 that of the duplication of laboratories. It appears desir-  
 able that when a graduate student selects research work and  
 thesis in some definite subject such as Bacteriology, Bio-  
 chemistry, Pathology, Physiology, etc., that the investigat-  
 ion should be carried out in the laboratory and under the  
 guidance of the professor of the subject. (Whether it will  
 be possible in some cases to carry out research work in  
 Surgery proper the present writer is not qualified to state.)

The institution of a comprehensive laboratory  
 covering all the above subjects would be an expensive and  
 rather wasteful undertaking, so that at least under present  
 circumstances it cannot be justified. A somewhat similar  
 difficulty arises in the question of appointing a Professor  
 of Organic Chemistry in the Department of Pharmacology. A  
 suggestion for a full-time Professor of Experimental Surgery  
 is stated in Dr. Meakins report. Dr. Oertel justly calls  
 attention to the difficulty of combining a broad training  
 in a subject with the highly technical and specialized effort  
 involved in research work and thesis "which constitutes a

contribution to knowledge." There are at McGill many opportunities for graduate students to broaden their outlook in literature, science, and philosophy, and a large number take advantage of these opportunities. no  
out

In some few cases, however, great advances have been made by men with a narrow and concentrated outlook, but these men have made a personal sacrifice for the good of the community.

It is interesting to note that there is a general desire on the part of those who are conducting graduate work to raise "in some way the scientific standard of the students who enter McGill." The immediate solution seems to be:

- (1) A twelfth grade in the High Schools.
  - (2) Honour matriculation and four years at McGill in the Science Branch in the Faculty of Arts and Science.
  - (3) A most careful planning of that four years' course, which cannot be done in a day; it must be evolved!
- copy

A recent article in Farmer stated that Canada was losing \$150,000,000. Annually by insect pests, and Dr. Fry told the present writer that this was probably an underestimate. To combat the pests, and to save the loss, the total expenditure in Canada is very small. The staff at McDonald College is overworked in their effort to carry on their triple duties of undergraduate teaching, graduate teaching, and most desirable research work. Both the

Dominion and MACDONALD COLLEGE

the possibilities of Macdonald College by annual grants, and the Macdonald College is a part of McGill University, not a separate corporation. It has a large number of ideals and operations, but in the present review confines itself to the question of research.

Careful investigation shows that detailed control from Montreal, owing to time and space conditions, is neither desirable nor practicable. On the other hand, sympathetic and actual cooperation, particularly in the biological sciences, is possible, desirable, and increasingly effective.

There seems to be no reason why Macdonald College should not capture and maintain the leading position among scientific research agricultural colleges in the Dominion, why it should not help to fill the many Canadian agricultural colleges with able and well trained scientific staffs, why it should not continue to solve many of the important problems in Agriculture and Forestry.

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Dominion and the Provincial Governments have recognized the possibilities of Macdonald College by annual grants, and the National Research Council is co-operating. The growth of efficiency in practical scientific research, and the magnitude of the grants-in-aid, are likely to react on one another towards greater efficiency and more important results. There seems no reason why in a reasonable number of years the full dream or vision of Sir William Macdonald should not be realized.

For further details the report of Dr. W. H. Brittain, which has the sanction and approval of Dean Barton, should be read.

One word more. It is most undesirable at present to duplicate higher work both in Montreal and at Macdonald College. The more advanced graduate students in such fundamental subjects as Chemistry and Physics should be encouraged to come to Montreal for at least a Doctor's degree. In other subjects, such as Bacteriology, the emphasis in Montreal is on human, and at Macdonald College on animal bacteriology, and so in other sciences.

Finally, the writer deprecates a tendency to look down as from a height on those who are building up a useful structure in agricultural and practical industries which will add to our knowledge of Nature, and at the same time bring increasing prosperity to the community.

SUMMARY OF THE REPORTS OF THE ARTS DIVISION  
FACULTY OF ARTS AND SCIENCE

by Dr. W. D. Woodhead.

CONTINUITY OF STUDIES

Graduate Courses are logically a continuation of the work pursued in undergraduate years; and this in turn depends in most subjects largely on school training.

There are several subjects, e.g. German and Greek, in which the inadequacy of school training is so serious that it is very difficult to secure a supply of Honours undergraduates: and these alone can proceed to higher degrees. German in fact is not even one of the subjects prescribed for Teachers' Certificates in this province.

Other Departments also complain of the weakness of student material, the Dept. of Philosophy in particular noting the poor equipment of students in general knowledge, and the Dept. of Oriental Languages insisting that general slovenliness of thought should be counteracted by a compulsory undergraduate course in Logic in all Departments. The Honour Student, according to the Dept. of Philosophy, seldom learns to correlate his knowledge in his special field with the other studies which he pursues, and even fails to obtain a comprehensive view of his own subject. This difficulty, the same Dept. suggests, might be overcome by a comprehensive examination on the whole of the last two years' work in Honours undergraduate study. Numerous searching essay topics might also be assigned to students during these two years.

GRADUATE STUDIES

In no one of the Departments under survey has a Ph.D. degree been granted, and in two only, Economics and Psychology, are courses leading to the Ph.D. degree offered. The reasons for this are various. Some Departments, History and Classics for example, are opposed to the degree in their particular subjects as a weak imitation of mistaken American practice, realising that, while the degree is a commercial asset, it is not necessarily a guarantee of real scholarship. But most departments do not feel themselves in a position to offer courses for the degree, owing either to numerical inadequacy of staff, or to insufficiency of library equipment, or to both causes. The needs of all the departments, with the single exception of that of Oriental Languages, which has but few requests for Graduate courses, may be expressed in the one word, MONEY.



### NUMERICAL INADEQUACY OF STAFF.

The Departments of English, Classics, Romance Languages, Philosophy, Psychology, Sociology, History, and Mathematics, alike complain that the burden of graduate work can hardly be borne without some further assistance to relieve the present staff of some of their work. The Dept. of Philosophy points out that in most of the larger Universities on this continent a professor is not called upon to deliver more than 8 or 9 lectures a week, and that professors whose undergraduate teaching alone occupies 12 hours a week must either forgo any attempt to give successful graduate courses or must inevitably sacrifice their undergraduate courses. Research and original studies are under the present system utterly impossible. The Dept. of Classics is faced with the prospect of distributing 71 hours a week of lectures among a staff of five, unless some further help can be obtained. The History Dept. will be prepared to give adequate attention to Graduate studies if the staff is doubled. Similar and equally justifiable complaints come from all the Departments above named.

### LIBRARY FACILITIES AND EQUIPMENT.

The Departmental grants for books are in many cases hopelessly inadequate, and the result is that it is impossible in many Departments to build up a library of graduate calibre. The appropriations in the case of such Departments as History and Classics are not nearly sufficient to cover even current publications, and consequently the gaps grow larger and larger. The Departments which complain specifically on this score are History, Classics, Romance Languages, English, Psychology, and Philosophy. The filling up of gaps is likely to prove a lengthy, laborious, and expensive process, and will become more difficult as time progresses.

The Department of History has also other complaints to make regarding the Library: "We are gravely inconvenienced and hindered by the inadequacy of the accommodation which the Library provides for graduate students and the teaching staff. What makes the present arrangements particularly annoying is the allocation of spacious quarters to the Library staff and the so-called Library school, to say nothing of exhibitions designed to amuse the general public. Furthermore, considering the apparent lack of money for books, one views with misgiving the expenditure of considerable sums on second-rate curiosities."

### DEARTH OF FELLOWSHIPS AND SCHOLARSHIPS

In this matter again the Departments are practically unanimous. With the exception of the Dept. of Economics, which grants six fellowships, the Departments have no means of encouraging good students to continue their work here or to come to McGill for graduate study from other Universities. This

need has been pointed out again and again, and the endowment of some good fellowships and scholarships is vital to the success of graduate studies. Funds should also be available which would enable our Graduate students to visit the libraries of other institutions, when necessary, for their research.

SUMMARY OF REQUIREMENTS

CLASSICS  
Economics

Increased Staff, Increased Libravy grant, Fellowships  
An opportunity for more personal help and supervision of students, enatiling ultimately increased staff.

ENGLISH

More assistants to deal with junior years: increased Library grant: Funds for research purposes: Fellowships. Doubled Staff. A sum of \$10,000 to fill Libravy gaps and double the regular annual grant: Fellowships. Increased Staff.

HISTORY

One further member on staff: special library funds when needed. Fellowships and scholarships.

MATHEMATICS

Doubled staff: \$1,000 a year for Laboratory equipment (\$2,000 if Nursery school is included): \$300 a year extra Library grant: Salary increases, and Fellowships.

PHILOSOPHY

Increased Staff: Increases Library grant.

Psychology

One new professor: a further suite of rooms: \$500 a year for research equipment: \$2,000 a year for collection of Social Facts. One scholarship and

ROMANCE LANGUAGES.

SOCIOLOGY

two Fellowships. be observed that the requirements of the Departments of Socio-

logy and Psychology are the most considerable.

MISCELLANEOUS

The Department of Economics pleads the necessity for some form of subsidy for the printing of its publications, and also urges the desirability of producing an Economic Quarterly Journal. The Department of Mathematics points out that, while few students specialise in Mathematics in their Graduate course the Department is called in to the assistance of students in Physics. One Department<sup>x</sup> complains that it is difficult to proceed with regular teaching work, if it is constantly interrupted by Committee Meetings and calls for reports. (The writer of the summary has so far been compelled to cancel six lectures for this reason). The History Dept. urges that the M.A. degree should be controlled by the Faculty of Arts and that the Department should not be under the jurisdiction of two faculties.

\*Psychology!

h.D.W.

REPORT ON DEPARTMENTS OF  
 BOTANY, CHEMISTRY, GEOLOGY, PHYSICS, and ZOOLOGY  
 for the  
FACULTY OF GRADUATE STUDIES AND RESEARCH

by Dean F. M. G. Johnson.

ZOOLOGY

This report is based on separate reports from each of the above departments. Each department gives an outline of its history, in most cases including valuable information concerning the work which it has accomplished, and what it might accomplish if the necessary funds were available.

The loudest cry of each is for money (the department of Zoology excepted). This is to be spent on staff, buildings, scholarships and equipment. The details of the proposed expenditures may be seen in the separate reports. Certain important suggestions are as follows:-

BOTANY

That botany be taught in the schools thus providing positions for botanists as teachers.

Appointments of a mycologist and a taxonomist-ecologist with the object of developing research along their particular lines.

CHEMISTRY

That higher degrees in chemical engineering be offered when facilities are available.

That technical assistance be provided to promote research not now possible.

(Signed) F. M. G. Johnson.

That a

-2-

That a permanent university committee be appointed to deal with matters relating to university policy.

GEOLOGY

Many fields of work which should be developed.

PHYSICS

That the University undertake no new fields of activity at present.

ZOOLOGY

That expansion in the field of economic entomology should be considered.

It is evident that these departments are for the most part proud of their records in the past under the conditions imposed. It is also evident that they are confident of their own ability to make up their deficiencies, and to progress provided their financial needs are attended to. It is of course not certain, though probable, that such confidence is justified.

It is obvious that certain departments are in serious need of further development if their graduate work is to improve. Decisions with respect to such matters must be made. To this end attention is drawn to the suggestion of the Department of Chemistry that a permanent committee be appointed, preferably by the Principal, to deal with these and related matters.

(Signed) F. M. G. Johnson.

REPORT ON GRADUATE WORK IN THE VARIOUS DEPARTMENTS  
OF ENGINEERING OF THE FACULTY OF APPLIED SCIENCE.

by Professor E. Brown.

INTRODUCTION.

Facilities for graduate work are offered in all the departments of engineering in which the Bachelor's Degree is granted. As a rule the courses of study lead to the Master's Degree. In chemistry, a comparatively large number of students proceed to the Doctor's Degree (Ph.D.), among them being some who have graduated in chemical engineering in the Faculty of Applied Science. The majority, however, have graduated in pure chemistry in the Faculty of Arts and Science, or come from other universities.

There is an ever-widening field of opportunity for engineering graduates, and many of the largest industrial organizations appoint engineers having university training to fill the most important executive positions. Side by side with this, the rapid advance in the applications of science in industry makes it necessary to recruit men of exceptional ability and highly specialized scientific training for the engineering and operating staffs. To meet this requirement adequately, the work of the Graduate School must be strengthened. It is questionable whether it is wise for students in all branches of engineering to continue their studies in the Graduate School during the year immediately following graduation. A carefully planned course of reading, with good

experience in industry, may well result in a greater broadening of ideas than would be possible in a year of intra-mural work. Such a procedure will frequently help a man to realize the benefit resulting from continued study, and will suggest to him possible lines along which research may proceed with the hope of attaining results of definite value in industry. It is not uncommon for graduates of several years' standing to express a desire to return to college for a post-graduate course, but such hopes are seldom realized. It is probable that in the special cases in which experience in industry should precede research, one or two years following completion of the undergraduate course will suffice to develop some maturity of judgment which is essential in such work. In other cases, in which a research involves the application of processes of analysis and interpretation of experimental data, rather than a knowledge of some industrial process, only to be acquired properly by continued close observation of the process itself, the period of post-graduate study may well follow directly after the four years of undergraduate study.

#### NATURE OF WORK DONE - EQUIPMENT.

Engineering research has become so important that many of the largest industrial organizations have established their own laboratories, or have endowed laboratories in connection with the universities, where their own special problems may be investigated. Modern research frequently involves operations on a large scale, and becomes impossible in a college laboratory, designed and equipped

primarily for the teaching of undergraduates. The cost of large-scale operations, and the nature of the equipment involved, usually place such researches outside the bounds of university work. But the university should train the men who are to carry on such work in industry, and should provide facilities for research in the fundamental sciences underlying our industries. In the working out of new processes in industry, ideas first developed by pure scientific research in a laboratory, may be tried out in a small scale plant under conditions approximating to those of practice. Unexpected difficulties are frequently encountered at this stage, and the combined efforts of the laboratory staff and of those familiar with the operation of industrial processes are needed to reach a solution. Engineering practice is not infrequently somewhat in advance of theory, and the resources of the laboratories of engineering schools can aid greatly in the solution of the varied problems which arise.

The close relation between research work carried on at any given period, and the special problems of contemporary engineering practice, is noted in the reports of different departments. Several investigations of the stress-distribution in welded joints have been made in recent years in the Department of Civil Engineering. The applications of welding processes are increasing rapidly and much more research work is needed, especially in the structural field, in some branches of which welding is replacing riveted work. Likewise, in the Department of Electrical Engineering, new laboratory facilities have been provided for the

study of communication engineering in both graduate and undergraduate courses.

Attention is directed to some notable deficiencies, as for example in the high voltage laboratory of the Department of Electrical Engineering. This laboratory was established thirty years ago, and is equipped for testing up to 200,000 volts. Such facilities gave the laboratory a commanding position for a long period, but although some new equipment has been added, the facilities are now inadequate, bearing in mind the great advances made in high voltage transmission of power. The laboratory is large enough to house a 500,000 volt transformer, and such equipment should be provided to meet modern conditions. For research work in the important field of dielectric materials, cables, etc., no equipment is available.

The inadequacy of the laboratory equipment for research purposes is stressed in the various departmental reports, from the standpoint of lack of space and of apparatus. This is especially the case in the Departments of Mining and Metallurgy, and the needs of these departments can only be met by the provision of the new building which has been contemplated at various times during the past few years. In some cases, as in civil engineering, it is recognized that tests of large structural members can only be made by cooperation with the Laboratories of the National Research Council, or other laboratories where testing machines of far greater capacity than those best suited to a university laboratory are being installed. Similarly, the testing of certain models of hydraulic structures requires far



more water than can be provided in an ordinary laboratory, adapted primarily for teaching purposes, yet capable of being used for some phases of hydraulic research. Cooperation with the engineers of hydro-electric projects has helped us to meet the larger requirements if, and when, they arise.

At present, Bachelor graduates in Chemical Engineering can only proceed to a higher degree in Pure Chemistry. Steps are being taken to strengthen the undergraduate course in Chemical Engineering, and it is hoped that graduate courses will be established in due time.

#### TEACHING STAFF.

In all departments, graduate instruction has been given by members of the staff, already heavily burdened, in many cases, with undergraduate teaching. This places definite limitations on what can be accomplished. Members of our staff maintain close contacts with engineering practice, and are fully alive to the opportunities which exist for the study of special problems. By restricting the courses offered, both as to number and content, good work has been accomplished in a limited field, but the staff should be augmented by the appointment of full-time professors who would devote themselves mainly to research. Such professors, while keeping close touch with developments in engineering work, should not, as a rule, be engaged in practice. Generally speaking, however, they should give some instruction in undergraduate work allied to their special activities, so that

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the importance of advanced study may be impressed on the general body of students. In this way, students of exceptional ability may be encouraged to continue their studies in the Graduate School. Salaries sufficiently high to attract and retain men of proper calibre would be required for such professorships.

#### SCHOLARSHIPS AND FELLOWSHIPS.

Few scholarships or fellowships of substantial value are available in the various departments of engineering. The Departments of Mining and Metallurgy have research and teaching fellowships worth about \$750.<sup>00</sup> per session. In the Department of Civil Engineering the John Bonsall Porter Scholarship, founded recently by one of our own graduates, Dr. Walter Colpitts, Science '99, is also open to graduates of other universities. The present endowment enables a scholarship of \$500.<sup>00</sup> to be offered in alternate years. Our graduates are also eligible for bursaries awarded by the National Research Council. Jenkins Bros. Ltd. and Babcock and Wilcox Ltd. have each established one scholarship for undergraduates, but up to the present no scholarships have been founded in the Graduate School by industrial concerns. The lack of open scholarships sufficiently valuable to attract the ablest of engineering graduates in the Dominion is a distinct handicap to research, and to the numbers entering the Graduate School.

LIBRARY FACILITIES.

There is a marked lack of library and reading-room space in the Departments of Mining and Metallurgy. This will be remedied when a new building is provided, but in the meantime the offices of the staff are used to house books and journals needed. Better facilities are provided in the Departments of Civil, Electrical and Mechanical Engineering, as the engineering books were transferred from the Redpath Library to the Engineering Building about two years ago. A librarian was appointed to supervise the reading-room and the issue of books. There is a small but steady accession of new books, and the journals of the leading engineering societies are available for reference. A proposal to make available the Engineering Index Service has been discussed, but it would require the co-operation of engineering firms in Montreal, and nothing definite has yet been done. The total cost would be about \$750.<sup>00</sup> per annum, and if it could be distributed so as not to bear too heavily on university funds, great good would result. Abstracts of recent papers in all branches of engineering from technical journals throughout the world would be available, not only for members of the university, but for industrial organizations and engineers in practice.

NUMBERS IN THE GRADUATE SCHOOL.

The conditions referred to above have limited the numbers of those taking graduate courses in the Departments of Civil, Electrical, Mechanical, Mining and Metallurgical

Engineering, but there are indications that the numbers are increasing, and as our facilities are extended, greater progress will undoubtedly be made. It is difficult to tabulate the numbers without risk of confusion with numbers in other lists. Graduates in Chemical Engineering, as already noted, proceed at present to the M.Sc. course or Ph.D. course in Pure Chemistry. Similarly, graduates in Mining Engineering proceed to higher degrees in Geology. Names are thus liable to be duplicated by being reported from the Departments of Engineering, Chemistry and Geology.

On the average, one or two students only have been studying at one time in the Graduate School in the specialized work of each of the engineering departments (excluding chemistry and geology, as noted above). Such numbers appear small, but limitations of staff and the difficulties encountered in adapting our resources to the needs of both undergraduate and graduate students are a severe handicap. Thoroughly sound work is being done, but no marked expansion can be looked for until our general facilities are extended.

#### FUNCTION OF DEPARTMENTS OF ENGINEERING IN RELATION TO GRADUATE STUDIES.

It appears that the work to be accomplished may be classified broadly under three heads:-

- (1) To continue and develop, as far as is practicable, the investigation of specific problems in industry, and to aid industrial research generally.

(2) To train men for work in industrial research.

(3) To provide new facilities for research both in buildings and personnel, so that the specific problems of industry, and the more broadly fundamental problems may be investigated.

In carrying out such a project, due regard should be paid to facilities existing elsewhere, as for example in the Laboratories of the National Research Council. The material and financial resources of industries will also be needed in some cases, as for example in tests of large structural members. Success will depend largely on the degree of co-operation which can be established, so that all facilities may be utilized to the best advantage.

Chairman of the Faculty of  
REPORTS OF DEPARTMENTS. Science.

Copies of reports of the Departments of Civil, Electrical, Mechanical, Mining and Metallurgical Engineering are submitted herewith. The Department of Chemistry serves several Faculties, and, as noted above, no provision is made at present for graduate study in Chemical Engineering. The report on graduate work in Chemistry has, therefore, been submitted independently of this report.

The reports contain little or no specific reference to appropriations needed for better provision for graduate work, the departments having deemed it best to discuss general policy

# ROYAL VICTORIA HOSPITAL

UNIVERSITY CLINIC

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MONTREAL

February 4,  
1931.

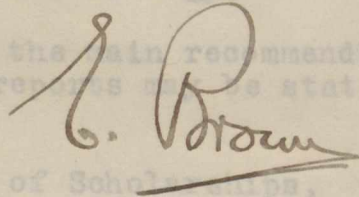
as being a more practical procedure at the moment than the listing of needs impossible of fulfilment in existing buildings, and with our existing financial resources.

My dear Professor Eyo,

I am herewith enclosing a number of reports submitted at our Committee meetings of the Principal's Survey Committee by different Departments, namely,

Department of Pharmacology,  
Department of Biochemistry,  
Department of Anatomy, and the  
Department of Bacteriology.

I may say that the main recommendations as synopsized through these reports are stated as follows:

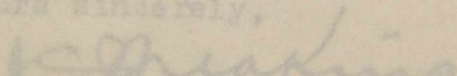


1. An increased number of Scholarships.
2. Increased library facilities, particularly of a research nature. Some recommend that these should be in the nature of departmental libraries, others increased general funds for the Medical Library. The latter, I may state, is the established policy of the Medical Faculty.
3. Increased personnel which varies from department to department, as for instance in Pharmacology appointment of an Organic Chemist to the Department; in Bacteriology, an increased number of teachers; in Surgery, the appointment of a full-time Professor of Experimental Surgery.
4. An increase in the room available in certain departments, while in others they are more inclined to concentrate on an increase in departmental appropriations.

March 25th, 1931.

They were all unanimous in the necessity of improving or raising in some way the scientific standard of the students who enter McGill. This, however, is a subject which the General Committee has already had under serious consideration, but I thought it of value to inform you that this was independently reiterated by the Head of practically every Experimental Department in the Medical Faculty.

Yours sincerely,



# ROYAL VICTORIA HOSPITAL

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## UNIVERSITY CLINIC

MONTREAL, February 4,  
1931.

DR:  
EAKINS, M. D., LL. D. (E).  
R. S. C., F. R. C. P. (E).

CONSULTATIONS BY  
APPOINTMENT.

Professor A. S. Eve, C.B.E., M.A., D.Sc., F.R.S.,  
Dean, the Faculty of Graduate Studies  
and Research,  
3564 University Street,  
M o n t r e a l.

My dear Professor Eve,

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Department of Pharmacology,  
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Department of Bacteriology.

I may say that the main recommendations as synopsized through these reports may be stated as follows:

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Yours sincerely,

*J. C. Meakins*

JCM/MRI.

*in reports -  
follow from*

# ROYAL VICTORIA HOSPITAL

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## UNIVERSITY CLINIC

MONTREAL, March 20,  
1931.

FOR:  
EAKINS, M. D., LL. D. (E).  
R. S. C., F. R. C. P. (E).

CONSULTATIONS BY  
APPOINTMENT.

### SUMMARY of the Present Status and Future Development of the Medical Departments concerned with Graduate Studies and Research.

On February 4th I submitted reports from the Departments of Pharmacology, Biochemistry, Anatomy, and Bacteriology, and at that time summarized their chief requirements. I am submitting herewith reports from the Departments of Medicine, Surgery, and Pathology. These reports do not add much to what I have already outlined except insofar as the Department of Surgery is concerned. Here it is quite obvious that a definite advance must be made in order to place Surgery upon a more satisfactory basis as far as the Faculty of Graduate Studies and Research is concerned. Much could be said pro and con as to the proper manner in which this Department should be developed within the means available by the University. This, however, is not a matter which concerns primarily the Faculty of Graduate Studies and Research but is more a matter to be decided between the Department concerned, the Medical Faculty, and the Finance of the University.

*J. Eakins*

JCM/MRI.



MACDONALD COLLEGESUMMARY.

by Dr. W. H. Brittain.

It is apparent from the foregoing departmental surveys that Macdonald College has, by reason of her geographical position, relationship with McGill, past achievements and prior position in the field, an excellent opportunity of developing into the leading institution in Canada for graduate instruction and research in the sciences related to agriculture. It is also apparent that all departments have been labouring under serious handicaps in attempting to develop their work in this field, among which may be mentioned heavy teaching schedules, low salaries, lack of adequate assistance, equipment and funds and absence of graduate assistantships and scholarships. A measure of relief in these respects is basic to future progress and, without it, the institution may lose the splendid opportunity that now presents itself. However, it is unnecessary to dwell on these needs here, since this aspect of the question is more fully dealt with in the report of the Faculty of Agriculture. If the recommendations contained in the latter report are put into effect, most of these difficulties will disappear, since the improvement will be reflected equally in the undergraduate and graduate field.

Even on the present basis important contributions have been and are now being made by certain departments. In other cases constructive proposals are put forward that entail a regrouping of personnel and a pooling of present resources, without large additional expenditures. In still other cases funds are already in sight for at least partially realizing projected developments.

With respect to past and present achievements, only the barest reference to some of the more significant features can be made. The Agronomy Department has originated a number of new and superior varieties of plants, have instituted improved methods of technique and played a part in the development of experimental methods in plant research. The Animal Husbandry Department have made contributions in the field of animal nutrition and towards the technique of nutritional experiments. In Chemistry, considerable work over a long period of years has been carried on with maple sugar, resulting in additions to our knowledge of the chemistry of this product, improved methods of analysis, etc. A cooperative project is going forward involving the Chemistry, Bacteriology, Agronomy and Plant Pathology Departments, in which the whole soil problem is being attacked on a more comprehensive scale than ever before in Canada. A method for diagnosing soil conditions has been devised and definite indications as to the types of problems to be attacked has been secured. In Plant Pathology contributions have been made to the problem of virus diseases and a consistent study of seed borne disease is being carried out. In the Department of Entomology fundamental work in the biology and control of certain vegetable insects has been carried out, an important part of the work in connection with the study of animal parasites has been attended to and the direction of a project financed by Federal funds dealing with the pollination of the apple has been engaged in. The Poultry Department have engaged in research in the field of nutritional and breeding problems of poultry. Bacteriological investigations

dealing with city milk supplies, discoloration of fish, the microbiology of soils, etc., have been carried out. In the field of Animal Pathology important contributions have been made in the field of genital diseases, animal parasites and other lines. *to here -  
the rest  
out*

In the next category comes the proposal to strengthen the fundamental work done in several existing departments by providing further genetics and plant physiology, through the cooperation of Professors Huskins and Scarth of the Department of Botany. Not only will this add to the value of the graduate work now being given in the Departments of Plant Pathology and Agronomy, but it enables us to institute work in this field hitherto untouched, viz., Animal Production and Horticulture, thus making it possible, for the first time, to present a symmetrical programme of graduate instruction to prospective students,

As indicated in the report of the Department of Entomology, we already have the means to make a beginning in the field of Animal Parasitology. Various helminth parasites are now recognized as one of the chief limiting factors to profitable production of all classes of stock. Macdonald College has been the first institution in Canada to realize the need and to undertake work in this particular field. With this project now at a stage where we can reasonably hope to see it develop into a Parasitological Institute, we may look forward to this institution serving as a centre for parasitological research and as a training ground for parasitologists. Obvious extensions of its activities would be (1) a study of the helminth enemies of plants, (2) a study of soil protozoa and (3) research in the field of insect parasitism.

Regarding the first two of these, nothing has been done in Canada and nothing is known as to how important the problems involved may be. Regarding the third, we have one government laboratory in Canada studying parasites of the European Corn Borer. Considering the growing importance of the biological control method as applied to injurious insects, the fundamental character of the work involved, and the need of training skilled workers in this field, it seems logical and desirable that McGill University should endeavour to be first in this field also and to develop this work to the limit of available resources.

The more general facts and recommendations that are brought out in this report may now be briefly summarized:

1. The work now underway has been indicated and proposals for new work to be accomplished by cooperation of several departments has been suggested. Two new courses have been tentatively outlined.
2. New needs have to do mainly with funds for strengthening present departments and research projects, the provision of additional scholarships, assistantships, etc., additional library facilities, special equipment and the like.
3. Additional course work that should be provided, not necessarily at Macdonald College but somewhere in the University, is biometrics and statistical analysis, the need of which has been stressed by practically all departments. Plant Ecology is another subject suggested. The provision of work in the field of Agricultural Economics in association with the corresponding department at

McGill is another suggestion.

4. The provision of special leave for members of the staff at suitable intervals is considered by many to be a pressing need. This is accentuated by the fact that the nature of the work carried on at Macdonald College requires the constant attention of the staff during the summer months. There is, therefore, not the same opportunity for travel and study that members of many other departments enjoy.

*Dept. of Classics*

Jan. 31, 1931.

## Report to the Department of Graduate Studies

The work of the Department of Classics in Graduate Studies depends upon that which is taken by students in undergraduate courses. And since for over fifteen years Greek has been practically excluded from the schools, it has been difficult to keep the standard of the Honour work in Classics as high as it should be. With the establishment of advanced courses in the First Year, however, it is hoped that that standard may now be definitely improved.

The Department of Classics has hitherto granted the degree of M.A. to students in Latin alone, in Greek alone, or in both Classical Languages. But I am personally opposed to the continuation much longer of a system which was due at the outset to the difficulty of obtaining Greek before entering McGill University. At the very least, no M.A. should be granted in Latin to a student who has no acquaintance with Greek.

Of the seventeen students who have taken work towards an M.A. in the Department of Classics during the last seven years, 7 have been graduates of McGill, and 10 have come from outside institutions. Though the number of students is small, at least three courses are called for every year from the department; and as there are only five members to carry on the graduate and undergraduate work combined ( a total of 65 lecture hours per week ), and as 6 more hours will be added to this weekly total next year, I feel very strongly that the Department cannot carry on without additional help.

There is a total lack of Graduate Scholarships or Fellowships in the Department, and it cannot be too strongly insisted that this should be remedied by the establishment of a few really valuable fellowships. They would be a splendid inducement to our own students to continue their studies, and to students from other Universities to come to McGill for their Graduate work.

Lassus

THE GRADUATE SCHOOL IN MEDICINE

The M.A. degree alone is given in the Graduate School by this Department, and it is of much more importance to improve the quality of the work for this degree and the facilities for pursuing it, than to introduce a Ph.D. The Library grant to the Department amounts to \$300 per annum, and this is supposed to cover the requirements in two languages and fill all needs in literary texts and commentaries, historical, philological, archaeological, philosophical, and other cognate works. It is impossible under the circumstances to keep anything like abreast of even new publications, much less to fill the gaps left in past years: and to procure a good library of theses and classical periodicals would entail a very large expenditure. Moreover the question of the Ph.D. in Classics demands serious thought. The practice of granting it, as is done in many institutions, to students whose substructure is of the flimsiest, and who know far less of Classical Literature with the letters Ph.D. after their names than the average Honours Graduate of Oxford or Cambridge, is utterly subversive of all good scholarship. We are not in a position, either as to staff or as to library equipment, to encourage the type of research which alone should be pursued for a real Ph.D. nor are we anxious to countenance the mechanical pursuit of useless research problems which so often satisfies the requirements for the degree in other institutions.

*H. D. Woodhead*

The department publishes monographs on Canadian economic topics under the title of National Problems of Canada. The latest of these was put out in Jan. 1951 under the title The Lubricator Industry in Canada, a copy of which is submitted herewith for reference. These publications are of real value, of real service. But as they are not partisan publications, and not journalistic or sensational, they cannot be sold on a commercial footing. At first the College took the entire cost. The deficit they created led the College to object. The

THE GRADUATE SCHOOL IN ECONOMICS

A Report to the Principal's Committee

Stephen Leacock.

In regard to the graduate school in Economics I desire principally to say that the school, within its scope and means, seems to me in an entirely satisfactory condition.

The number of students in the school each year is from ten to a dozen. Of these about six hold fellowships. The rest do not.

At present the regular work is carried only to the M.A. degree. Provision is made (see the calendar) for a Ph.D. degree but none yet has been granted. It is intended that the Ph.D. if and when granted, shall be a degree of high merit. It entails among other things the writing and publishing of a book on some subject of Canadian or imperial economic interest.

The students ought to have a great deal more personal help and supervision in their studies than we can now give them. For the present this is not possible. It would be desirable that some member of the staff should devote the major part of his time to the graduate students. This could not be arranged without an addition to the budget which I think should not at present be considered.

The department publishes monographs on Canadian economic topics under the title of National Problems of Canada. The latest of these was put out in Jan. 1931 under the title The Asbestos Industry in Canada, a copy of which is submitted herewith for reference. These publications are of real value, of real service. But as they are not partisan publications, and not journalistic or sensational, they cannot be sold on a commercial footing. At first the College took the entire risk. The deficit thus created led the College to desist. The



Macmillan Company then undertook to publish the volumes if the College would subscribe \$50. per monograph. This also failed. The Macmillans lost money and dropped out.

During the current year I am publishing the volumes through the Times-Packet Men under a contract which makes me alone responsible, and gives the surplus of profit to McGill. There will not be any profit. If there is a deficit, I cannot continue and the enterprise will come to a stop. This, in my opinion, would quite literally knock the bottom out of the graduate school. In economics the written word, the printed word, is the breath of life. It is not a science of discovery but of information and argument. No writer can argue from the pages of a MS. thesis buried in a library.

At present the college subscribes \$50. towards each monograph. There is in each, advertising, - which I fear is sympathetic rather than commercial, - from the Canadian Manufacturer's Association \$25., from the Royal Bank \$25., from the Canadian Pacific Railway \$12.50 from the Bank of Montreal \$12.50 and from the Sun Life Assurance Co.

The college kindly supplies the stationery.

The printer's cost per monograph is \$170. plus postage and incidentals such as notices and circulars, that brings the cost up to about \$225. per monograph.

This means that if the net sales receipts from subscribers and book stores (over commission) bring in about \$100. per monograph, the budget would balance. I hope it will.

. . . . .

I wish to repeat that in my opinion the circulation of printed matter, monographs, journals, etc. etc. is essential to a large national school

of economics. For this reason instead of being willing to drop our present monographs, I want to go further in the same direction.

As soon as ever the college dares consider a serious addition to the budget I want to propose the establishment here of an economic quarterly magazine, under such a title as The Canadian Economic and Political Quarterly. Such magazines exist at all great centres of economic teaching, - Harvard, Columbia, London, Paris, and at the German Universities. They supply an element of vital service to the life of the country, and they cannot be carried on on a purely commercial footing. Canada has nothing of this sort. The Queens and Dalhousie Reviews are literary and general, though greatly to be admired and envied in point of dignity and literary style. The Toronto University Monthly is used for home chat and for the ventilation of professors' quarrels.

It would be a pity if some one started such a review before McGill.

I am therefore submitting to those interested in taking up this matter when it can be considered a plan for such a magazine. I have obtained the necessary estimates of printer's costs, advertising and subscription receipts, commissions and incidental expenses. These documents I will place before the college in a separate form. I mention them here only for the sake of completeness in this report.

I wish to add that this is a personal report but that I have shown it to my colleagues and invited them to supplement it with any communications of their own in regard to any phase of the graduate work.

Feb. 6, 1931.

GRADUATE DEGREES IN EDUCATION

by Professor F. Clarke.

M.A. Degree

The present scheme for an M.A. degree in Education should be regarded as purely tentative and experimental. It has value as asserting the principle of taking the study of Education in a graduate year, and as affording a means whereby teachers working in the schools can advance their competence and increase their qualifications. Thus of thirteen students registered this year (1930-31), all but three are actually teaching, and of these three one (the holder of the Overseas Studentship) is doing some little teaching at Macdonald College. (N.B. Two other students began the year as full-time students and have since taken teaching posts).

Difficulty has arisen, and under present conditions must continue to arise, in assessing the eligibility of applicants to proceed to the M.A. degree. Education as an M.A. study is not in the same position as other subjects that figure prominently in undergraduate courses. It is therefore less easy to appraise the quality of a candidate for registration. Moreover, since Education should always be, in the main, a study to be taken up only at the graduate stage, some difficulty in this regard will always remain. Usually a candidate who has not reached a high standing in some subject or subjects of undergraduate study will not do good work in the graduate study of Education. But this will not be the case invariably. The subject itself is so diverse and the accidents and mischances of the undergraduate

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period may be so many, that good work may sometimes be done by a candidate whose undergraduate record appears only mediocre.

The truth is that an M.A. degree in Education can be put on a permanent and satisfactory basis only when training for the High School Diploma is arranged so as to be taken after graduation. (See my memorandum on the subject). It would then be possible to admit as M.A. candidates only those whose work during the training year had reached a good standard. Only a very exceptional candidate could take both the training and the Diploma in one year. (This opinion is strengthened by what is happening in the M.A. class this year. Of the thirteen members, only one - the holder of the Overseas Studentship - proposes to complete the course in one year). Two years, then, may be looked upon as the normal period of registration for the M.A. degree in Education, and I look forward to the time when, for students proceeding direct from graduation, the first of these two years will be spent in training for the High School Diploma.

I would not insist, in all cases, upon actual attendance at the University during the second year. Acting-teachers, in particular, might well devote this year to the completion of a satisfactory thesis.

#### Ph.D. Degree

Though I should be glad to see candidates coming forward for the degree of Ph.D. in Education, I do not feel prepared, as yet, to offer any suggestions. The immediate task before a Department of Education at McGill is to organize adequate courses of training for High School teachers and to press for such reforms in the schools as will guarantee scope and opportunity for

DEPARTMENT OF ENGLISH

February, 1931.

teachers thus trained. There is work enough here for at least a Five Years Plan.

This foundation will have to be secured and the Department will have to grow considerably in strength and resources before training for the Ph.D. degree can be undertaken without risk of pretentious make-believe.

The most likely possibility is that of a candidate who has already gained the M.A. degree wishing to continue his studies in some specialized direction. I should not hesitate to encourage such a candidate, who seemed to be of the right quality, but I feel that it would be unwise, and even a little absurd, to entertain, at this stage, large ambitions in respect of a Ph.D. degree in Education. We have too little, as yet, on which to ground it.

M.Sc. Degree

This degree has not, as yet, come within my preview and I do not anticipate that the Department of Education will ever have, directly, any great concern with it.

(Signed) F. Clarke.

To give courses leading to a Ph.D. degree of respectable or adequate standard would necessitate the appointment to our staff of two additional members of Professorial rank, and a largely increased library appropriation. It would also necessitate a

DEPARTMENT OF ENGLISH

February, 1931.

DEPARTMENT OF ENGLISHREPORT ON GRADUATE COURSES

In the Department of English, Graduate Courses leading to the degree of Master of Arts are given; courses may also be taken by students who already have the M.A. and who may wish to continue their studies at McGill. The degree of Ph.D. is not given in the Department. In the Report submitted in 1929 we stated that in our opinion it was not advisable to offer the Ph.D. degree at that time or for some time to come. The Department is still of this opinion. Our M.A. degree is a degree of high standard and is so regarded by other Universities. It is accepted by other Graduate Schools as representing the equivalent of one year's work for the Ph.D. degree. Students who have taken our M.A. degree and have then gone elsewhere for the Ph.D. degree have almost without exception completed in their Ph.D. dissertation the investigation carried on and presented in the M.A. thesis. The Ph.D. theses have been extensions on developments of the M.A. theses.

To give courses leading to a Ph.D. degree of respectable or adequate standard would necessitate the appointment to our staff of two additional members of Professorial rank, and a largely increased Library appropriation. It would also necessitate a

large grant for Scholarships and Fellowships. As a rule the best students are attracted to reputable Graduate Schools where large Fellowships are available. The field in Canada for men and women with a Ph.D. degree in English who wish to engage in University work is a very restricted field, and the small number of students going forward to this degree would not in our judgment warrant at the present time the greatly increased expenditure required.

We need more Assistants in the courses of the first two years, to enable Professors now giving these courses to devote more time to Graduate work. Fellowships and Scholarships are also urgently needed if we are to continue to attract the best students. We also need a small appropriation to pay the expenses of students whose investigations for the M.A. degree necessitate research work in other Libraries. It frequently happens that a student working on a Canadian subject, like, "The Rise of Journalism in Canada," or "The Informal Essay in Canada," or "Canadian Folk Songs," finds it necessary to examine source material in Toronto, Halifax, Ottawa, or at Harvard. At present he must do so wholly at his own expense or abandon the subject. degree, three in

Harvard. The resources of the Library for scholarly work in English have increased greatly during the past ten years. Files of journals and publications of various sorts have been completed, new works of importance have been acquired as they have appeared. But there are still serious gaps. Many works that are necessary whose purchase was neglected in the past are now very difficult to obtain and catalogues and sales have to be watched sometimes for years before such books appear on the market. In spite of

this the Department has been able each year to turn out meritorious Master's theses, sometimes with the kind assistance of other libraries. For instance, at the moment we have a student working on Newman who is finding the Loyola College Library very useful. Much help has also been given by the Widener Library at Harvard, and by other University libraries in the United States. The departmental library appropriation is comparatively small and seems to dwindle away and to disappear entirely long before the end of the Session.

In the eight years since the establishment of the Faculty of Graduate Studies and Research, 1923-1930, inclusive, the M.A. degree in English has been conferred on 51 students, - 29 men and 22 women. Of this number 60% were graduates of McGill and 40% were graduates of other Universities. Six students were from American Universities. Thirty-two of these recipients of the M.A. degree are in Canada and Newfoundland; fifteen are in the United States; one is in Switzerland; one in West Africa; one is a student in London, and one a student in Paris. Five of the number have received the Ph.D. degree from other Universities, and seven others are now proceeding to this degree, three in Harvard, one in Paris, one in London, one in Wisconsin, one in Northwestern; nine are teaching in Universities, and eleven are teaching in High Schools in Canada and the United States.

During the present session twenty-one students are registered in English in the Graduate Faculty.



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A list of students on whom the degree of M.A. has been conferred, 1923-1930, is appended. The list gives briefly a statement of the subsequent career and the present occupation of each.

1923

Winifred L. Birkett, (McGill); Montreal; now in Montreal.

Submitted by the Department of English.

Charles F. Davis, (McGill); St. John's, Newfoundland; now a Minister

in the United Church of Canada;

(Signed) Cyrus Macmillan.

E. D. McCrear, (McGill); Montreal; later awarded a Quebec Government

Chairman.

Travelling Scholarship - studied at the Sorbonne,

Paris, two years. Now on the Secretarial staff

of the League of Nations, Geneva.

Paul H. Moore, (McGill); Fredericton, N.B. B.A. of the Montreal

Co-operating Theological Colleges; later awarded

the Travelling Fellowship of Theological Colleges -

studied one year at Oxford. Now on the staff of

the University of Michigan.

Margaret Pichel, (McGill); Cowansville, Que. Assistant to the Warden,

Royal Victoria College, and Assistant in English,

two years. Later awarded Mayne Scholarship -

studied one year at Oxford and Berlin. Later

awarded Fellowship at Columbia University. Now

Lecturer in English and Secretary of the Extension

Department, Columbia University, New York.

1924

Richard C. Harris, (McGill); New Haven, C.C. now teaching in

British Columbia.

STUDENTS ON WHOM THE DEGREE OF M.A. IN ENGLISH WAS CONFERRED  
BY THE FACULTY OF GRADUATE STUDIES AND RESEARCH, 1923-1930

- Winnifred L. Birkett, (McGill); Montreal; now in Montreal.
- Charles F. Davis, (McGill); St. Johns, Newfoundland, now a Minister  
 in the United Church of Canada.
- E. D. McGreer, (McGill); Montreal; later awarded a Quebec Government  
 Travelling Scholarship - studied at the Sorbonne,  
 Paris, two years. Now on the Secretarial staff  
 of the League of Nations, Geneva.
- Dale H. Moore, (McGill); Fredericton, N.B. B.D. of the Montreal  
 Co-operating Theological Colleges; later awarded  
 the Travelling Fellowship of Theological Colleges -  
 Studies one year at Oxford. Now on the staff of  
 the University of Michigan.
- Margaret Pickel, (McGill); Cowansville, Que. Assistant to the Warden,  
 Royal Victoria College, and Assistant in English,  
 two years. Later awarded Moyses Scholarship -  
 Studies one year at Oxford and Berlin. Later  
 awarded Fellowship at Columbia University. Now  
 Lecturer in English and Secretary of the Extension  
 Department, Columbia University, New York.
- Richard C. Harris, (McGill); New Devon, B.C. now teaching in  
 British Columbia.

- Maxwell MacOdrum, (Dalhousie); Halifax, N.S. Assistant in English, McGill, two years. Later awarded Scottish Exchange Fellowship. Studies two years in Glasgow University - Ph.D. Glasgow. Later studied one year at Harvard. Assistant Professor of English, Dalhousie University, two years. Now Assistant Professor of English, Queen's University.
- Christian Edwards, (McGill); Montreal; now in Montreal. Mission
- Dorothy Matheson, (McGill); Montreal. Assistant in English, McGill, one year. Later awarded a Quebec Government Travelling Scholarship. Studied in France and Spain, two years. Ph.D. University of Paris. Assistant Professor in Queen's University, two years. Now Associate Professor in Trinity College, Toronto. Later awarded Scottish Exchange Scholarship 1925 Studied at University of Edinburgh.
- A. J. N. Smith, (McGill); Montreal. Assistant in English, McGill, one year. Later awarded a Quebec Government Travelling Scholarship. Studied in France and Spain, two years. Ph.D. University of Paris. Assistant Professor in Queen's University, two years. Now Associate Professor in Trinity College, Toronto. Later awarded Scottish Exchange Scholarship 1925 Studied at University of Edinburgh.
- Dean K. Burns, (Toronto), Pembroke, Ont. Now a lawyer in Toronto.
- Malcolm MacLennan, (Queen's), Glengarry, Ontario. Now a lawyer in Montreal.
- Mary Read, (Bishop's), Sherbrooke, Que. Teacher of English, Baron Byng School, two years - Now married in Montreal.
- Stanley Read, (McGill), Sherbrooke, Que. Assistant in English, McGill, three years. Later awarded Moyse Scholarship - Studied in France one year - Assistant Professor of English, Bishop's College two years. Awarded Fellowship in Chicago University - Ph.D. Chicago - Now Assistant Professor of English, Northwestern University.
- Richard C. Brown, (McGill); Montreal. Assistant in English, McGill, two years. Later awarded Moyse Scholarship - Studied in France one year - Assistant Professor of English, Bishop's College two years. Awarded Fellowship in Chicago University - Ph.D. Chicago - Now Assistant Professor of English, Northwestern University.
- Thomas R. Davies, (McGill); Montreal. Assistant in English, McGill, two years. Later awarded Moyse Scholarship - Studied in France one year - Assistant Professor of English, Bishop's College two years. Awarded Fellowship in Chicago University - Ph.D. Chicago - Now Assistant Professor of English, Northwestern University.

Harold White, (McGill), Ethel, Ontario - B.D. United Theological College - now preaching in Vermont.

Christian Edwards, (Vassar); St. John, N.B. Assistant to the Warden, Royal Victoria College, and Assistant in English, McGill, three years. Now book advisor in Book Department, R. H. Macy's, New York, N.Y.

Jean Gurd, (McGill), Montreal. Assistant and Lecturer in English, McGill, three years. Now teaching in Mission School, West Africa (Mrs. Ralph Collins).

Margaret MacLaren, (McGill), St. John, N.B. Assistant in the Library, Royal Victoria College, two years. Now on the Secretarial Staff of the Minister of Pensions, Ottawa.

A. J. M. Smith, (McGill), Montreal. Taught in Montreal High School one year. Later awarded Scottish Exchange Scholarship. Studied at University of Edinburgh, two years - Ph.D. Edinburgh. Now Assistant Professor of English, State Normal College, Indiana.

Harry L. Smith, (McGill), Charlottetown, P.E.I. Now Head Master in English, Victoria High School, Victoria, B.C.

George Preston, (Colgate), New York. Now in business in Montreal.

Proceedings 1927

Richard C. Brown, (McGill), Sarnia, Ont. - B.D. Diocesan College.

Thomas R. Davies, (McGill), St. Therese, Que. - Teaching in Montreal.

Art - Now Lecturer in Play Production, McGill.

- Ellen C. B. Hemmeon, (Mount Allison), Wolfville, N.S. Assistant in English, McGill, one year - Dean of Women and Lecturer in English, Mount Allison University, two years - awarded travelling Fellowship of the Federation of University Women - now in Lynn, Mass; married. *Cove, Newfoundland. B.D.*
- Maud M. Hutcheson, (Toronto), Toronto, Ont - now a Private Secretary, Toronto. *Methodist Church in Canada.*
- Bertram S. Murray, (McGill), Montreal - B.D. Diocesan College.
- Phyllis Murray, (McGill), Quebec, Que. - Assistant to the Warden, Royal Victoria College and Assistant in English, McGill, two years. Now in Quebec, Que. *University*
- Theodore F. M. Newton, (McGill), Sarnia, Ont. - Assistant in English, McGill, three years. Awarded Fellowship in English in Graduate School, Harvard University. Now Instructor in English, and Proctor, Harvard - proceeding to Ph.D. degree. *Teacher of English, Montreal High School 1928*
- Joseph Leon Edel, (McGill), Montreal - Assistant in English, McGill, one year - Awarded Quebec Government Travelling Fellowship for three years. Is now completing three years of study at the Sorbonne in Paris. Proceeding to Ph.D. degree. *N.B. Assistant*
- Leona Gray, (McGill), Montreal. Assistant in English, McGill, one year. Studied at the American Academy of Dramatic Art - Now Lecturer in Play Production, McGill.

- Isabel Hasley, (McGill), Montreal. Assistant in English, McGill,  
one year - now teaching English in Montreal.
- Samuel I. Hayakawa, (Manitoba), Winnipeg, Man. Awarded Fellowship  
in English in University of Wisconsin. Proceeding  
to Ph.D. degree, Wisconsin University.
- James C. Hudson, (McGill), Adam's Cove, Newfoundland. B.D.  
Presbyterian College, Montreal. Now preaching in  
the Presbyterian Church in Canada.
- Jessie R. Mullally, (University of Montreal), Montreal. Now teach-  
ing English, Catholic High School, Montreal.
- Mae F. Murray, (McGill), Montreal. Assistant in English, McGill,  
two years. Awarded Teaching Fellowship, University  
of Toronto, one year. Awarded Moyse Scholarship -  
Studied at the Sorbonne, Paris, one year. Now  
with an Advertising firm in Montreal, but intends  
to continue graduate studies.
- Eda M. Nelson (Dalhousie), Truro, N.S. Teacher of English, Montreal  
High School for Girls.
- Margaret O'Brien, (Syracuse), Montrose, Pennsylvania. Now Teacher  
of English in Girls' School, Philadelphia.
- Mary Eileen Scott, (University of Montreal), Montreal. Now teach-  
ing English in Montreal.
- Laurence L. Smith, (Mount Allison), Sackville, N.B. Assistant  
Professor of English, Mount Allison; awarded  
Fellowship in English, Northwestern University.  
Proceeding to Ph.D. degree.

1930  
1929

- James G. Brierley, (McGill), Montreal - B.C.L., McGill. Now a lawyer in Montreal.
- Norris Hodgins, (McGill), Ste Anne de Bellevue, Que. Now Assistant Professor of English, Macdonald College, and Editor of Quebec Journal of Agriculture.
- Helen L. Jahn, (Syracuse), New York - now in Secretarial work.
- Elsie B. Kiefer, (Kansas University), Boston, Mass. Lecturer in Play Production, McGill, two years. Now in Dramatic work in Boston, Mass.
- Irene J. Bittmann, (Syracuse), New York - now in Secretarial work.
- R. de Wolfe Mackay, (McGill), Montreal. Assistant in English, McGill, two years - A student in the Faculty of Law, McGill, final year.
- Louis J. Phelan, (University of Montreal), Montreal - now continuing graduate work in English at Harvard University.
- Rachel Chait, (McGill), Montreal - awarded Fellowship in Radcliffe College, Harvard University, where she is continuing graduate work in English - Proceeding to Ph. D. degree.
- Charles H. Dawes, (McGill), Ste, Anne de Bellevue, Que. B.D. Montreal Co-operating Theological Colleges. Now a Minister in the United Church of Canada.
- Harry Donald, (McGill), Montreal - Assistant in English, McGill, one year - Awarded Moyse Scholarship 1930. Now continuing his studies in English in the University of London. Intends to go to Harvard next autumn to proceed to Ph.D. degree.

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MONTREAL

1930

Roger W. Gough, (McGill), Elliston, Newfoundland. A Minister in the United Church of Canada.

Lloyd H. Jenkins, (Acadia), Charlottetown, P.E.I. Assistant in English, McGill, two years. Now on the Editorial staff, Ottawa Citizen, Ottawa.

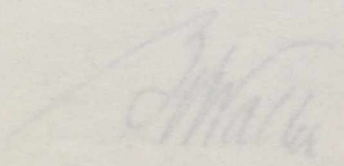
Gertrude R. Laurence, (University of Montreal), Montreal. Now teaching English in Montreal.

Irene J. Zitzmann, (University of Omaha, Omaha, Nebraska. Now teaching English in Nebraska, U.S.A.

While the individual members of the Department are handicapped in a variety of ways. Certain, although of obvious utility and, in many cases, necessary to university students is not taught in our High Schools and is moreover excluded from the list of subjects prescribed by the Education Council for the Teachers' Certificate. As long as such very unusual regulations are in force we cannot expect a supply of Honour undergraduates let alone Graduate students, from our own Province.

Our meagerly stocked Government library offers no attraction to students from outside the Province or from the States and in the few cases in which students from outside applied for admission to the Graduate School their application had to be turned down.

Yours truly





## MONTREAL

FACULTY OF ARTS  
DEPARTMENT OF GERMANIC LANGUAGES

January 23, 1931.

March 10th. 1931.

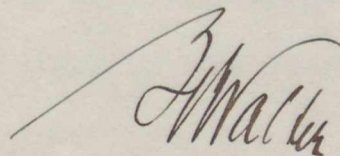
Dean of the Graduate Faculty,  
McGill University.  
Dear Sir.

The Department of Germanics need hardly be considered as coming within the purview of the present inquiry into the possibilities of extending the graduate work of McGill University.

While the individual members are well qualified to do graduate work the Department as a whole is handicapped in a variety of ways. German, although of obvious utility and, in many cases, necessity to university students is not taught in our High Schools and is moreover excluded from the list of subjects prescribed by the Education Council for the Teachers' Certificates. As long as such very unwise regulations are in force we cannot expect a supply of Honour undergraduates let alone Graduate students, from our own Province.

Our meagerly stocked Germanics library offers no attraction to students from outside the Province or from the States and in the few cases in which students from outside applied for admission to the Graduate School their application had to be turned down.

Yours truly



*Specially, note Dean Mackay's illuminating remarks in his 1929 Special Report  
all professors in History are specialists in the same Branch (European) - no specialist in Canadian History.*

COPY

DEPARTMENT OF HISTORY

January 28, 1931.

GRADUATE WORK IN THE DEPARTMENT OF HISTORY

The needs of the Department are few and great. Before stating them I should like to emphasise the fact that the needs of the Department as a unit in the Faculty of Graduate Studies cannot - and should not - be isolated from its needs as a unit in the Faculty of Arts. The primary condition of an improvement in our graduate work is an improvement in the quality of our undergraduates. The Department ought not to be under the jurisdiction of two Faculties. The M.A. degree should be controlled entirely by the Faculty of Arts. Work for the Ph.D. should be co-ordinated and regulated by a committee containing representatives of the Faculties of Arts, Science, and Medicine. I wish to make it clear, however, that I should like to see the Ph.D. abolished. Its existence in Canada is due to imitative admiration of the United States. Its existence there is due to a characteristic failure to comprehend the German system of higher education.

I assume, however, that for the present our existing arrangements for graduate work are to remain substantially unaltered. In that case, the Department has three urgent needs which may be brought to the notice of the Faculty of Graduate Studies.

Associate Professor.

1. If the Department is to extend and improve its graduate work, it must have a larger staff. The teaching of undergraduates alone gives the present staff more than enough to do; and its work with graduates is a very heavy burden upon it. I do not advocate the appointment of men for graduate work only. It is, to my mind, vitally important that every professor should be in touch with both graduates and undergraduates. But it is essential that the load of elementary teaching should be lightened, for the professors of the Department should have more time for the production of original work of their own. There is no reason in the nature of things why graduates of Oxford or Harvard should not come to McGill to study certain branches of History. But nothing will bring them except the presence at McGill of historians who are well-known and respected because of their published writings. And hitherto the literary output of McGill's professors of History has not been satisfactory. The main cause, I think, is lack of opportunity; their energy has been absorbed by the daily routine. Apart, however, from the question of the fecundity of professors, the Department could not accept a substantially increased number of graduate students unless it had a greatly enlarged staff to deal with them. At present there are four professors of History; to build up a fairly satisfactory school of historical research, I should want at least eight. Some of these might be - indeed, should be - young men holding the rank of Assistant or Associate Professor.

2. Perhaps even more serious than our lack of men is our lack of material. The Department is in dire need of more money to buy books for the Historical Section of the Redpath Library, which, it should be remembered, is our laboratory. The funds allotted to us do not even enable us to buy the new books that we require, and we can thus do very little towards remedying existing deficiencies. There are, in particular, a number of large and expensive collections of original sources which we either lack altogether or possess only in part, although they are essential to the pursuit of really effective research in the subjects with which they are concerned. What I should like is a sum of ten thousand dollars, to be spent on filling up gaps in the Library's historical section. Once this were done, we should be properly equipped for advanced work, and if our annual Departmental Grant were doubled, we could keep pace with the output of new books and subscribe to all the periodicals we require.

While on this topic, I may add that we are gravely inconvenienced and hindered by the inadequacy of the accommodation which the Library provides for graduate students and the teaching staff. What makes the present arrangements particularly annoying is the allocation of spacious quarters to the Library staff and the so-called Library School, to say nothing of exhibitions designed for the amusement of the general public. Furthermore, considering the apparent lack of money for books, one views with misgiving the expenditure

McGILL UNIVERSITY

of considerable sums on second-rate curiosities.

3. Historical Research of any value is generally expensive. It usually necessitates prolonged visits to places far from one's home. At present, to the best of my knowledge, there is only one graduate Fellowship or Scholarship, tenable at McGill, which is open to graduates in History, and for that they must compete with candidates from every Faculty. Our need and its remedy are alike obvious.

If the Committee would like me to explain or supplement what appears above, I should be glad to comply, whether in writing or by word of mouth.

(Signed) W. T. Waugh.

Kingsford Professor of History  
and Chairman of the Department.

## MCGILL UNIVERSITY

## MONTREAL

FACULTY OF ARTS  
DEPARTMENT OF MATHEMATICS

February 17, 1931.

Dr. A.S. Eve, F.R.S.,  
Dean, Graduate Faculty,  
McGill University.

Dear Dean Eve;

In re. graduate work, we deem it scarcely necessary to recount that portion of our report of less than two years ago (1929) which pertains to regulations of the Graduate Faculty; since the regulations finally adopted have not, so far as we are aware, been found deficient. We shall consequently confine our attention to those points which are essentially bound up with the establishment and maintenance of mathematical standards in the Graduate Faculty. These points are all included under the basic requirements of a Mathematical Department, viz.; Library facilities and personnel of Staff.

Four years ago at the request of the Department, the Principal initiated a modest policy of an increased annual grant to the Mathematical Library. We are now happy in being able to report that under the preferment accorded, the Mathematical Library has developed from a weak and ineffective instrument of learning to its present satisfactory state well along the highroad to becoming a first class aid to scholarship and research.

The personnel of the staff is, we (I) believe, excellent in quality, experience and training; but its numerical strength has by no means kept pace with the increasing demands on its efforts. Statistics are frequently misleading; and it might be inferred, since very few proceed to a degree beyond B.A. or B.Sc. in Mathematics, that the Department is only occasionally called upon to provide graduate instruction. No

conclusion could be more erroneous. The nature of the subject is such that the vast majority who pass through our Honour Course in Mathematics and Physics elect to meet thesis requirements in the latter. However the Department is annually required to provide graduate instruction for students proceeding to higher degrees in other subjects as well as for students who may elect their thesis work in pure mathematics. In fact, out of consideration of the number of students proceeding to higher degrees in Physics, the Department via Professor Gillson provides annually graduate instruction in Mathematics adapted to the immediate needs of those on the threshold of graduate training in Mathematics.

In our 1929 report it was pointed out that a Mathematical Library suitable for work of a Ph.D. standard, could not be built up in a few days by waving a wand. Such an achievement is a matter of careful selection and expenditure over a period of years; and this desired goal, as stated above, is being gradually attained. Our convictions in 1929 were that the demand for the Ph.D. in Mathematics at McGill was not such as to warrant us in recommending the high salaried additions to staff necessary to provide Ph.D. facilities even if the Library were adequate. We have not in the meantime found any reason whatsoever for changing our sincere beliefs in this respect. We are moreover of the opinion that phantom excursions into rainbow realms, and Yuletide yearnings for the spectacular, which ignore or overlook the primary importance of thorough undergraduate training, are fundamentally unsound.

We believe that students obtaining first class standing in our Honour Course have received a training in Mathematics equivalent (apart from thesis) to that required for the M.A. or M.Sc. degree in many of the leading universities on this continent. It is our desire that our Master's degree should possess a corresponding standard of excellence. In order that these high standards may be definitely secured and not in the future become paper perfection, it is necessary that our 1929 recommendations for certain additional junior help be implemented.

Finally we (I) cordially commend to your consideration the personal

observations appended to our 1929 report by Dr. Murray former Chairman.\*

Yours faithfully,

*U. J. Sullivan*

While the Peter Redpath Professor of Pure Mathematics.

\* From 1929 report.

"May I add a personal suggestion of a general nature. On account of my age, its adoption cannot affect myself. The suggestion is that when university expenditures are made on account of an increase of students and for further equipment, these should not be such as will prevent deserved and well-earned increases (and promotions) for existing members of the teaching staff. <sup>a</sup> Faculties and departments may sometimes be in fault in this matter. Too extravagant requisitions and demands on the part of some may result in disappointment, financial worry and anxiety to others."

Dr. Sullivan desires to give further consideration

The Department of Mathematics desires to give full

Cooperation with the Department of

Mathematics and the various Departments of Engineering, but greater

cooperation would make subjects of a more theoretical nature avail-

able to students taking the degree of B.Sc. or of B.Eng. Such

subjects of large degree would be of benefit upon courses of

work in the Mathematical Department.



The Mathematical Department while approving the general tenor of Dr. Sullivan's previous report, desires to add the following appendix to it.

I. IV. While the standard of work necessary for the degrees of M.A. and M.Sc. has been considered sufficiently high in the past, it is suggested that it would be beneficial to graduate students if they were required to take more topics than at present and so to come into closer contact with more members of the mathematical staff. It is proposed to forward recommendations embodying these changes to the Faculty of Graduate Studies at the beginning of next session.

Dr. Sullivan desires to give further consideration to this matter before committing himself definitely to it.

II. The Department of Mathematics desires to give full recognition to the mathematical doctrines incorporated in statistics, astronomy and all other forms of applied mathematics, and expresses its belief that such subjects should be more closely linked with the pursuit of pure mathematics.

III. Cooperation exists between the Department of Mathematics and the various Departments of Engineering, but greater cooperation would make subjects of a more theoretical nature available to students taking the degrees of M.Sc. or of M.Eng. Such extension to large degree would be contingent upon increase of staff in the Mathematical Department.

Department of Oriental Languages  
and Literature

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February 3, 1931.

REPORT TO THE DEAN OF THE GRADUATE SCHOOL

Dear Mr. Dean:

IV.

The Mathematical Department has previously

called to the attention of the proper authorities the extreme importance of the foundation of Fellowships in Mathematics. The foundation of at least one such Fellowship at the earliest possible moment seems imperative to the development of interest in higher study in mathematics.

Neil B. Maclean  
U. J. Sullivan

Department of Oriental Languages  
and Literature

February 2, 1931.

REPORT TO THE DEAN OF THE GRADUATE SCHOOL

Dear Mr. Dean:

As only occasional students apply for permission to take work in the Graduate School in connection with my Department, I do not feel that I have had sufficient direct experience of such work to enable me to make generalizations that would be likely to be of much use to you. Perhaps, however, I might make one or two observations on our students in general.

I have always felt it desirable that we should refrain from encouraging students to seek to enter the Graduate School who are not distinctly above the average. At the same time, I realize that we sometimes have students well fitted for such work who have not the type of mind that enables them to take high honours under undergraduate conditions.

I have felt for a long time that a larger number of undergraduates could be rendered fit for work in the Graduate School if they could only have a longer and more rigorous training in Logic. Personally, I should like to see success in Logic made an absolute condition for admission to the Graduate School in the case of all graduates of the Faculty of Arts who have not reached a high standing in Mathematics. It does not seem to me that it is of very much consequence whether a student comes to us with an extensive or even a limited knowledge of other Arts subjects, provided he has had the

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## DEPARTMENT OF PHILOSOPHY

kind of training that Logic alone supplies in the case of those who have no aptitude for Mathematics. For, in my judgment, no increase of library facilities, no extension of time that might be required for obtaining a higher degree, no intensification of routine, no amount of additional financial assistance, etc. can ever compensate for the lack of that capacity which nothing but a more rigorous training in the laws of thought is ever likely to bring out, a lack which is conspicuous by its absence among so many of our students.

Yours very sincerely,

(Signed) C. A. Brodie Brockwell.

1. Lack of Staff.

The Department is entirely occupied with the under-graduate curriculum. This consists of 8 courses. Four are fundamental to every college course of study: Introduction to Logic, Moral Philosophy, Greek Philosophy, and History of Modern Philosophy. These are general in character and ought to be available to students of every other department who may happen to be interested. There are four other courses of an advanced, and sometimes, special character, offered by the professors according to their own particular lines of research

DEPARTMENT OF PHILOSOPHY

January 31, 1931.

Professor W. D. Woodhead,  
Acting Chairman for Professors  
of Departments in the Arts Faculty.

Dear Professor Woodhead:-

The following is the report which it was agreed upon, at the meeting of Chairmen of Departments doing work in the Graduate Faculty, to have ready for submission on or before January 31st. I am making this report without having had the opportunity to go over it with the Professor of Logic, Dean Mackay, of the Faculty of Arts.

At present, the Department of Philosophy offers graduate work for the Master's degree only, and it cannot do even that satisfactorily, much less extend its activities in the direction of a higher degree. The reasons for this are several: Lack of Staff, Limitation in number of Courses, Absence of Students properly qualified to do advanced study or research in philosophy.

1. Lack of Staff.

The Department is entirely occupied with the under-graduate curriculum. This consists of 8 courses. Four are fundamental to every college course of study: Introduction & Logic, Moral Philosophy, Greek Philosophy, and History of Modern Philosophy. These are general in character and ought to be available to students of every other department who may happen to be interested. There are four other courses of an advanced, and sometimes, special character, offered by the professors according to their own particular lines of research

or interest: Political Philosophy, Logic & Metaphysics, Plato & Aristotle, and Contemporary Philosophy. The two last named are the only ones that might be designated as especially fitted for graduate study, but they have to be available for election by qualified undergraduates as well. No exclusively graduate course exists in the program of the Department. To take care of these eight courses there is a staff which may be counted as two and one-third instructing units, the reason for the fraction being the fact that Dean MacKay, who is Professor of Logic, is able to give the Department only three hours a week, in the Introduction & Logic. The other seven courses are handled by two professors on full time. This is too great a number of courses for a professor of a University. For he is expected to be a scholar in his own right, to be investigating, working upon new fields, writing and publishing, as well as to instruct in formal class or lecture work. If, however, he is obliged to devote 12 hours a week to teaching undergraduates, as in the present case, he is not only being prevented from research and writing and achieving a mastery in his field but also being invited to do careless lecturing or teaching. A comparison of the hours of teaching required in other institutions of learning that operate under much the same conditions as ourselves is instructive, so far as concerns the teaching of philosophy. The Universities of standing, such as Harvard, Yale, Columbia, Princeton, etc., require no more than eight or nine hours of

teaching, including in that graduate courses as well as undergraduate. It is only in small colleges such as Amherst, Swarthmore, Haverford, and in "State Universities", that as many as 12 or even 11 hours are required, and these institutions cannot pretend to full University standing, so far as philosophy is concerned, whatever be their status in professional education. Such comparisons indicate that for the undergraduate curriculum alone the Department even at present is undermanned, and that it cannot pretend to offer any graduate study no matter how much inclined the professors may be to undertake it. The addition of an instructor seems imperative if even undergraduate teaching is to be competently done; with such an addition, too, the Department can proceed to graduate work in earnest and not as a haphazard side-issue.

#### Limitation in the Number of Courses

The suggestion might be entertained that the Department reduce the number of courses for undergraduate instruction in order to be free to give graduate courses in their stead. This cannot be done without eliminating all Honours work in philosophy, which is a condition of having any students at all in the graduate faculty. With a smaller number of courses in the undergraduate curriculum the Honours student would have to do a larger proportion of his studies outside the department than is customarily allowed by other departments of the University. At present a student taking Honours in Philosophy (from which any possible candidates for advanced degrees must

really Honours in quality. To have taken Honours means for come) actually is required to take one full course each year in some other cognate subject. This outside requirement is made as a matter of principle not of necessity. But even so, any student for Honours would have on his record by the conclusion of his undergraduate years seven of the eight courses offered (one in Second Year, and three in each of the last two Years) and that leaves but one possible course for him to take for graduate study. In such a case the Department would have to provide a special graduate course ad hoc, which is not satisfactory from the student's point of view as well as that of the Department. It is, therefore, impossible to reduce the number of courses, and as they stand they are too limited in number to permit of graduate study adequately for even the Master's degree.

#### The Absence of Properly Qualified Students

The Honour students whom the Department might secure for graduate study are not likely to be of the quality requisite for genuinely advanced work. Two tendencies seem noticeable in regard to the undergraduate student. One is the imperfect cultivation of the student in the various branches of liberal knowledge, the other is his devoting himself rather exclusively to a single department, due, of course, to departmental policies which require the appropriation of all the student's courses. These are only tendencies, and they may have been imperfectly observed. But one thing seems clear that the Honours in a department are not

Yours faithfully,

(signed) C. W. Kendall.



really Honours in quality. To have taken Honours means for the most part that the student has simply concentrated upon one field - it does not signify that the student has felt any responsibility for relating the knowledge acquired in his courses to each other and to the whole subject. This responsibility will not be felt, nor action upon it ensue, until there is required for Honours degrees a comprehensive examination to test the whole of the last two years' accomplishment in the subject. A set of such general examinations would produce Honours students capable of going on to the Master's degree and beyond, either at McGill or at any other first-class university. In this connection it is important to recognise the value of competitive Fellowships and Scholarships. These act as inducements to promising students to think of a career of advanced study, and they raise up the ambition. If they were not limited to McGill or even to nationals they would surely provide a nucleus of first-rate students for the Graduate Faculty.

The Library facilities are adequate, provided that funds can be obtained when need arises. It may be necessary from time to time to secure the books for a certain particular line of research. The Department has made a survey of its books and is proceeding to build up a general library useful for all normal purposes of undergraduate study and study for the Master's degree.

This report I submit respectfully to the Committee which you represent.

Yours faithfully,

(signed) C. W. Hendel.  
Chairman.

COPYDEPARTMENT OF PSYCHOLOGY

February 19, 1931.

Dr. A. S. Eve,  
 Dean of the Faculty of Graduate Studies,  
 McGill University.

Dear Sir,

With reference to the matter of Graduate Studies in the Department of Psychology, I herewith submit the following points for the consideration of your committee:-

Graduate Studies

1. It is not too much to say that the Department of Psychology is numerically one hundred percent understaffed. We require at least two more full time professors in order to maintain progress and do effective teaching. One of the essentials in any good university is sound, adequate, and efficient teaching in the undergraduate departments. At McGill, the undergraduate work has developed faster than the staff increase. At the same time, there has been the added burden of rapidly developing graduate studies so that the duties to be performed are out of all proportion to the number on the teaching staff. I fear, and I speak honestly, that we have developed the graduate school at the expense of undergraduate thoroughness. Unless some relief is in sight, the Department of Psychology will be compelled to restrict seriously graduate studies.

2. The need of adequate scholarships and fellowships is imperative. This requires only to be mentioned and I do so to emphasize it.

3. More money is needed for equipment, for the upkeep of a Psychological Laboratory is not as it was in the old days. Instruments, tests, etc. cost money. Roughly at the present time we require \$1,000.00 per annum. That is a small amount considering the number of students we accommodate. If the Nursery School is included - and this is graduate work - then the need will be a minimum of \$2,000.00 annually. This does not include outlay for library, which would be something like \$300.00 additional.

4. There is need for a holiday from organization in University affairs. By the time one attends faculty meetings, committee meetings, makes out reports for all and sundry and also for the various deans, consults with students, etc., etc., there is not much time left for really fresh and stimulating teaching, to say nothing about that prostituted word "research", and reflective thinking.

I have not mentioned the part which the professor is supposed to pay in the community directly, a feature which is frequently overemphasized. There is a place in any university, or at least there should be, for the scholar who carries on his thinking quietly and without undue ostentation, but there exists a tendency both to forget him and to belittle him, for we sometimes ignore the fact that all really great contributions are the product of a single brain - not the work of a committee or organization. The more you organize education the more you kill it. We are not entirely guiltless. Much talk about education is not education.

January 28, 1931.

The amount of really original and constructive thinking going on in our universities to-day is less than we are willing to admit. It may be that education is not attracting men of parts because they can have more freedom and more financial reward elsewhere. Until university salaries are on a par which reward brains outside the walls then we shall continue to attract those who are not of the very highest quality. The whole matter of the graduate school can be summed up in one word - MONEY.

(Signed) W. D. Tait.

DEPARTMENT OF ROMANCE LANGUAGES

M.A. candidates, due principally to the January 28, 1931, is increasing rapidly, the work is assuming such proportions that it is impossible for Dr. W. D. Woodhead, the only member available at that time, to handle it all. For instance, no less than 15 theses have to be read next September, by the Department, in fact, by the Head of the Department, since he is the only member available at that time.

Dear Sir:-

The actual situation of graduate studies in French is as follows: There are two sources from which graduate students come, (1) The regular session, (2) the French Summer School - students taking four years in the advanced course at the School. The latter is the most important source. For instance, this year, of fifteen candidates for the M.A. degree ten are Summer School students. Students of the first category very often come from other Canadian or American Universities, and they have not the knowledge of spoken French that our honour students here possess, but since their titles are satisfactory it is impossible to refuse their application. I think it is absolutely necessary to demand from these students two years preparation instead of one, and to insert this rule in the calendar.

The other difficulties we find are (1) The lack of rare French books and manuscripts which make the choice of an original subject very difficult. (2) The inability of the members of the Staff to give sufficient time to the graduate students. As their time is already entirely occupied by undergraduates, they cannot devote much to graduate students, without neglecting the undergraduate work or overworking themselves. As the number of

M.A. candidates, due principally to the French School, is increasing rapidly, the work is assuming such proportions that it is next to impossible to handle it all. For instance, no less than ten theses will have to be read next September, by the Department, in fact, by the Head of the Department, since he will be the only member available at that time.

The remedy for the lack of Staff is obvious.

Yours faithfully,

The courses offered in the Department may be outlined as follows:

- 1.- General and theoretical.
  - (a) Introduction (Signed) R. du Roure.
  - (b) Social Origins, a study of pre-historic sociology.
  - (c) Social Theory and Methods of Research (Seminar).
- 2.- The Community.
  - (a) The Community (urban and rural).
  - (b) Immigration.
  - (c) Culture Areas in Canada (Seminar).
- 3.- Social Institutions.
  - (a) The Family.
  - (b) Modern Social Institutions (Seminar).
- 4.- Personal and Social adjustment.
  - (a) The Child, with special reference to the problem of juvenile delinquency.
  - (b) Social Movements.
  - (c) Social Pathology.
  - (d) Personality and Social Adjustment (Seminar).

#### (1) Personnel of the Department

The teaching of the Department is carried on by the following staff members who have taken their graduate degrees from the University of Chicago. The University has grown too large to have a large number of assistants, appointed each year to teach in undergraduate courses. The staff is small and the work is being well maintained in the face of such a large and rapidly increasing enrollment. Research studies are being carried on in the Department and the results are being published in various journals. The Department is well equipped and is being well maintained in the face of such a large and rapidly increasing enrollment.

Dr. Hughes is a capable and experienced scholar who has spent his entire life in the study of sociology in French and German. He has a wide touch with French and German sociology and is being well maintained in the face of such a large and rapidly increasing enrollment.

REPORT OF THE DEPARTMENT OF SOCIOLOGY

FOR THE PRINCIPAL'S SURVEY COMMITTEE OF THE GRADUATE FACULTY.

FEBRUARY 1931

In 1922, the authorities decided to organize a Department of Sociology in McGill University. In the course of two years a full honours course in Sociology was offered and Dr. W. E. Gettys was appointed Assistant Professor of Sociology. When he became head of the Department of Sociology in the University of Texas, his place was taken by Dr. E. C. Hughes, (1927).

McGill is the only Canadian university which offers an Honours Course in the subject of Sociology. Dalhousie has a professor of Sociology and many of the other colleges are giving a larger place in their curricula to this subject. At McGill we stand in a position of advantage and we wish to extend and maintain this position. *out*

The courses offered in the Department may be outlined as follows:

- 1.- General and theoretical
  - (a) Introduction to Sociology.
  - (b) Social Origins, a study of pre-literate society.
  - (c) Social Theory and Methods of Research (Seminar).
- 2.- The Community.
  - (a) The Community (urban and rural).
  - (b) Immigration
  - (c) Culture Areas in Canada (Seminar).
- 3.- Social Institutions.
  - (a) The Family.
  - (b) Modern Social Institutions (Seminar)
- 4.- Personal and Social Adjustment.
  - (a) The Child, with special reference to the problem of juvenile delinquency.
  - (b) Social Movements.
  - (c) Social Pathology.
  - (d) Personality and Social Attitudes (Seminar)

(1) Personnel of the Department.

The teaching of the Department is carried on by two instructors who have taken their graduate degrees in the Department of Sociology and Anthropology at the University of Chicago. *out* The teaching and research schedule at McGill University has grown too heavy for this small staff. The two graduate student assistants, appointed each year, help with the conference and research work in undergraduate courses. The organization of research work, its direction, and the writing for publication in addition to a regular schedule of teaching duties, place very great demands upon a small staff. In a field so new and relatively unorganized, research studies and their publication must receive a great deal of attention.

Dr. Hughes is a capable and industrious scholar. *out* (His academic record was excellent and is being well maintained in his work at McGill University.) His proficiency in French and German keeps him in close touch with French and

German sociological writings. Dr. Hughes is particularly interested in the study of modern social institutions and social movements.

Mrs. Hughes is a candidate for the Ph.D. degree in Sociology and Anthropology at the University of Chicago. (She is interested in the sociology of the newspaper and in various phases of the study of the community.) In return for a small nominal fee she is giving some of her time as research assistant at McGill University. She might receive a more important place in the research work of the Department if the university chooses to make this possible.)

Dr. Dawson is interested in community studies, immigration, and in studies of Canadian culture and social organization.

The Department is very much in need of an additional professor who would have as his special subjects Social Pathology, Criminology and Statistics as applied to sociological research. This would add much to the effectiveness of the Department as it would enable each of the other members of the Department to carry on the work for which he is best fitted. Such an addition to the staff would give each instructor more time, so essential in good teaching and effective research.

(2) The needs of the Department as regards equipment, space, etc.

We have one room for an office, in which the staff of the School for Social Workers, its secretary, and the staff of the Department of Sociology are crowded. The Department of Psychology has loaned us one of their small laboratory rooms, temporarily. We need a suite of rooms similar to those possessed by the other older departments. Our work is very much handicapped for lack of space.

We need \$500. a year for the purchase of research equipment.

We need \$2000. a year for the collecting of social facts, etc., in connection with our research projects. Some discussion of these research projects will appear below in this report. The point should be kept in mind that our money is not spent in a costly laboratory equipment but in machinery for gathering social facts outside the university.

(3) Scholarship needs.

A- Undergraduate: A scholarship of \$300. a year during the third and fourth years for the person who leads in the work of the Department during the sophomore year. This would stimulate more interest in the work of the Department and it would encourage an even higher grade of work on the part of the best students.

B- Two graduate scholarships of \$600. a year each to increase interest in our graduate work and enable us to train the personnel for our research projects. We have a new field for sociological study in Canada and it has been exploited hardly at all. Surely the study of Canadian social life, culture, etc., can have in time a very important practical bearing on the solution of social problems in Canada!

Publications.

Besides articles to Journals, two members of the Department have pre-



pared the following manuscripts:

Dr. C. A. Dawson and Dr. W. E. Gettys: An Introduction to Sociology. *in*  
 Ronald Press, New York.

Dr. E. C. Hughes: Real Estate. A study in social politics. Ready for the press.

(4) The status of Social Research in Canada and at McGill University.

The social sciences in Canada stand in need of a programme of research with a two-fold purpose. One of these purposes has its roots in the present comparative lack of Canadian research in the major problems. European and American research has developed a considerable body of theory, and this theory has been coordinated with the practice of social agencies to an extent that varies in different countries and in different fields of activity. It is not assumed that human nature and the problems of social adjustment are fundamentally different in Canada. But the major hypotheses of sociology in particular, have not been tested in Canada. For our own mental satisfaction we should apply the methods of study used in other countries. Public opinion on social questions is not swayed by findings based on materials extraneous to our own community. *in* Even the student in the classroom is not roused to intellectual enthusiasm by consideration of problems presented merely by analogy from other countries. In this respect our need is a pedagogical one. The movement for social science in Canada must gain momentum as any movement; namely, by intellectual enthusiasm on the part of a few, and a more moderate, perhaps, but widespread interest of the general public. A body of Canadian materials, not aping but testing the methods and hypotheses of social science, will promote these ends.

For example, the problem of immigration has been in the public eye of the United States for generations. A wide literature has been developed on the natural processes which accompany the transplanting of human beings from one economic, social and moral world to another. Some types of immigrant are resistant to the culture of the new country, others are quickly absorbed. Still others fit easily and quickly into the economic life, but are square pegs in a round hole in their social and political relationships. If this sort of study has progressed more rapidly in the United States, it is essentially because of a practical situation whose outward aspects every citizen could see on his daily journey of life. There is no such body of facts on hand concerning the economic and social fate of immigrants into Canada. *in*

Again, England has had to meet urban poverty and dependency as have few countries. In the last century the drift from country to city has become a stampede. From the days of Sir Robert Peel, the city poor have lain heavily on the pocketbooks of England. Poverty has been studied, reviled, preached about. In the process England has developed an extraordinary amount of practical intelligence, theory and objective description on this question. To be sure, the poor are with them yet. But so is disease with us yet, in spite of centuries of effort and perhaps one century of scientific research. Canada's situation differs in many respects from either of these countries. Our task is to put our Canadian problems through a Canadian crucible. The result will be, not a new social science nor an old one in new clothes, but a product like the Canadian himself - a variation of old stocks developed on Canadian soil. Such a social science will demand the respect of scholars, and those engaged in practical solution of problems, and will engage the curiosity of the public and the student. *in*

The other purpose is that of all investigation, namely, the advancement of knowledge and practice without regard to place or nation. But the first must precede; perhaps the first step lies in the survey method - spying out the land, collecting the results of work already done, and cataloguing the questions to be solved. *in*

(5) Research Projects, either proposed or being carried on.

1st - Population studies.

A - The metropolitan area of Montreal.

- 1.- Growth of the population as a whole; immigration and natural increase.
- 2.- Composition of the population, by age, sex, nationality, for the area as a whole. *in*
- 3.- Mobility and migration within the city.
- 4.- A comparative study of small units of the city with respect to composition and mobility of population. (To be used as a basis for correlations with such phenomena as delinquency, poverty, desertion).

B - The Province of Quebec.

- 1.- Age, sex, nationality, density; marriage rates and vital statistics.
- 2.- Population movements. *in*
  - (a) The urban movement.
  - (b) Colonization.
  - (c) Racial displacement.

2nd - Culture and Social Organization.

A - French Canada.

- 1.- The rural parish. (a) family organization, kinship and intermarriages (b) Local customs and fêtes (c) auxiliary social institutions (d) organization of communal services, according to Galpin's scheme (e) the impact of the outside world (f) education and the standard of living. *in*
- 2.- The French Canadian press. (a) the daily commercial press (b) nationalistic press (c) agricultural press (d) The circulation of these types of newspapers and of English press among French people (e) the selection of news as compared with the English paper (f) French-English relationships as presented in the press.
- 3.- Nationalist movements and organizations (i.e. the conscious and overt aspect of race relations).
- 4.- Evidences of cultural assimilation of French and English.
- 5.- The French-Canadian in Montreal. (a) Population data. (b) Occupations (c) Bi-lingualism (d) the city parish and city institutions.

- B - Culture and social organization of natural areas within Montreal. (To be correlated with population data.)
- C - Immigration and the assimilation of the immigrant.
- D - American cultural influence in Canada: to be studied chiefly in terms of the press.

3rd - Studies in the social problem's field.

- A - A study of juvenile delinquency in Montreal.
- B - A study of the population in our reformatories, gaols and penitentiaries.
- C - A study of divorce, separation and desertion in the Province of Quebec.
- D - A study of family dependency in the city and province and of the organized efforts to cope with it.
- E - A study of dependent children in the city and province and of the organizations established to take care of them.
- F - The care of the aged.
- G - Standard of living studies for the city and province.
- H - Study of the migratory homeless man in the city of Montreal and the organized attempts to cope with this problem.
- I - A study of social legislation and its administration in this province.

(6) Theses completed in past years.

While graduate work in this Department is but a recent thing, the following projects have been worked out:

- 1926 "The sociology of Rouville County, Province of Quebec, Canada.
- 1927 "The Montreal Young Men's Christian Association as a religious and social institution."
- "Mobility and boy behaviour".
- 1928 "The Slovakian community in Montreal".
- "The Montreal negro community".
- "A study of family disorganization in Canada".
- "Dufferin district; an area in transition.
- "The population expansion of the French in Canada".

1929 "The church in the changing city: types of urban churches associated with types of urban communities".

1930 "American and British influences on Canadian news content as shown by a study of two Montreal newspapers".

"The regional basis of news distribution in the prairie provinces of Canada."

(7) Theses under way (for completion in 1931 or 1932).

"The sociological aspect of some health problems. (This is an analysis of the records to be found in hospital social service departments.)"

"A sociological study of the characteristics of family dependents. (This is a study of family case work records in the Family Welfare Association of Montreal.)"

"A sociological study of the dependent child. (This is an analysis of the case work records of children's agencies in Montreal and Winnipeg.)"

"Employment and the standard of living in certain occupational groups in Montreal."

"Juvenile delinquency in Montreal."

"The British Immigrant family in Montreal."

"A study of Girls' organizations, with special reference to the C.G.I.T."

"Jewish immigrant areas in Montreal."

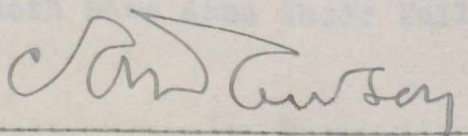
"Religious organizations in pioneer areas, with special reference to the Peace River."

"Religious organizations in pioneer areas, with special reference to Northern Saskatchewan."

"Rural social organizations."

"Pioneer standard of living in the Peace River area."

Respectfully submitted,



Head of the Department  
of Sociology.

ED. H. J.

REPORT ON THE DEPARTMENT OF BOTANYMCGILL UNIVERSITY.THE PAST.

When the present Macdonald Professor of Botany arrived on the Campus in 1912, the Department of Botany was housed in the top floor of the middle part of the Arts Building. The quarters were totally inadequate, but notwithstanding, they served for many years during the incumbency of Professor D. P. Penhallow as the Professor of Botany. The expansion of work following 1912 made it necessary to hold classes in the old Medical Building and later in the new Medical Building. During the period 1912-1918 inclusive, 25 original papers were published. Beginning at 1918, the personnel of the department consisted in Professor Derick and Professor Lloyd, with a small amount of assistance. We were now shortly to be housed in the new Biological Building and when that was achieved a form of expansion became necessary owing to the necessity of adequate management of the new laboratories on the first floor of this building. Shortly afterward, Professor George W. Scarth was added to the staff and he became interested in the lines of work which were being followed and ever since his appointment he has worked efficiently and harmoniously with the Macdonald Professor in developing research in the field of general physiology. Mr R.D. Gibbs and Miss Jane D. Spier later received minor appointments and both have done their full share

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in the work of the department. Some time after the retirement of Professor Derick, Professor C. L. Huskins was appointed Associate Professor of Genetics, so that the field previously represented by Professor Derick, in which she was an enthusiastic lecturer is now in the hands of a teacher and research worker of high standing.

The trends of work which have been followed in the department on the teaching side have always been those aspects of the science of botany fundamental in a general cultural training on the one hand and on the other fundamental to the training of academic botanists. We have therefore stressed the pure science aspects largely to the exclusion of applied botany. This was in harmony also with the presence of Macdonald College, the purpose of which has been to stress the applied botanical directions of work. We have furthermore laid great importance upon the prosecution of research and this research has been carried on largely in the field of physiology, but to some extent in other parts of the science, and occasionally as researches in applied botany in connection with the important questions of lake and river water levels and in connection with the culture of bananas and rubber. In addition, more recently, research in connection with the pulp and paper industry has been prosecuted chiefly by Professor Scarth and Mr Gibbs. This work seems to be highly appreciated by the people of the pulp and paper industry. The department has also had a measurable duty to perform in training advanced students for botanical work, and

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as a result as many professional botanists have been turned out as could be absorbed by the country. It has always been a guiding principle to keep in close touch with the Dominion Botanist in order to be informed as to the possible opportunities open for out students.

In order to afford an exact idea of the activities of the department in research and in the preparation of students for botanical work, we beg to submit a list of 83 publications which appeared during the period in question, and a list of graduate students, together with a statement of their present positions.

Publications by Professor F. E. Lloyd.

The Colloidal Properties of Certain Plant Mucilages as affected by Stains. Carnegie Inst. Wash. Dept. Bot. Res. Ann. Rep. for 1918. p.72.

The Mucilage of *Opuntia*, *Abutilon* and *Oenothera*. *ibid.* pp.71-2.

Water Content and Abscission in the Nuts of *Juglans Californica quercina*. *ibid.* p.76.

Colloidal Phenomena in the Protoplasm of Pollen Tubes: The effect of Potassium and Sodium on Hydration and Growth. *ibid.* pp.67-68.

The Origin and Nature of the Mucilage in the Cacti and in Certain Other Plants. *Amer. Journ. of Bot.* 6: 156-166, 1919.

Environmental Changes and their effect upon Boll-shedding in Cotton (*Gossypium herbaceum*). *Ann. N.Y. Acad. Sci* 29: 1-131, 1920.

The Changes taking place during the Ripening of Bananas. *Fruit Despatch* 6: 76-86, Jy.1920.

Growth in *Eriogonum nudum* in relation to environmental factors. *Trans. Roy. Can Inst.* 13: 211-224, 1921.

Abscission of fruits in *Juglans Californica quercina*, Babcock. Read before Sect.5, *Roy. Soc. Can.* 21st May, 1920. *Trans. R.S.C.* Ser.3. 14: 17-22, 1920.

On the Mutual Precipitation of Dyes and Plant Mucilages. Read before Sect.5, *Royl Soc. Can.* 21st May 1920. *ibid.* pp23-31.

The structure of Cereal Straws. *Pulp and Paper Magazine* 19: 953-4 S.15; 973-6, S.22; 1002-4, S.29; 1025-6, O.6; 1048-50, O.13; 1071-5 Oct.20, 1921.

Inheritance of Abnormal Flowers in *Diplacus*. *Ann Rep. Dept. Bot. Res. Carn. Inst. of Wash.* 1921 pp.74-75.

An Introductory Course in General Physiology (with Geo.W.Scarth). Privately printed Montreal 20th sept. 1921. 16pp.

The Occurrence and Functions of Tannin in the Living Cell. *Trans. Roy. Soc. Cac.* 3 ser. 16: 1-14, pl.1-3.



River Bank and Beach Vegetation of the St. Lawrence River below Montreal in relation to Water Levels (with Geo. W. Scarth). Trans. Roy. Soc. Can. III. 16: 49-50, 1922.

The Bog Forests of Lake Memphremagog; their destruction and consequent successions in relation to water levels (with Geo. W. Scarth). Trans. Roy. Soc. Can. III. 16: 45-48, 1922.

The Mode of Occurrence of Tannin in the Living Cell. Journ. Amer. Leather Chem. Asscn. 17: 430-450, Sept. 1922.

Efforts to Obtain Super-Yielding Rubber Trees. Between U.S. (House Organ of the United States Rubber Co.) 9: 3-7, Dec. 1922.

The Cytology of Vegetable Crystals. Science II. 57: 273-274, 2nd Mar. 1923.

Fluorescence in the Cyanophyceae. Trans. Roy. Soc. Can. III. 17: 129-136, 1923.

The Fluorescence of Certain Lower Plants. Nature 112: 132-133, 28th July 1923.

A Method of Ultramicroscopy Whereby Fluorescence in the Cyanophyceae and Diatomeae may be demonstrated. Science II 58: 91-92, 3rd Aug. 1923.

Ultramicroscopically Observable Fluorescence. Science II. 58: 229-230, Sept. 21st 1923.

Concerning Exceptional Hailstones. Science n.s. 59: 17, 4 Jan. 1924.

Some Effects of Narcotics on Spirogyra. Anesthesia and Analgesia 3: 9-19. pl. 1, Feb. 1924.

The Fluorescent Colors of Plants. Science II. 59: 541-548, 14 Mar. 1924.

The Vegetation of Canada. Handbook of the B.A.A.S. 207-228, Toronto, 1924.

Publications by Professor F.E. Lloyd.

Conjugation in Spirogyra: preliminary summary. Trans. Roy. Can. Inst. 15: 129-134. pl.4, 1924.

The Cobalt Sodium Hexanitrite Reaction for Potassium in Plant Cells. Geobel Festschrift. Flora N.F. 18-19: 371-385, pl.5 1925.

Maturation and Conjugation in Spirogyra longata. Trans. Roy. Can. Inst. 15: (part 2) 151-193. pl.1-4, 1926.

The rôle of the Wall in the Living Cell as Studied by the Auxographic Method. I. The Effect of Concentration of the Medium on the Stipe Tissue of Postelsia palmaeformis, Rupr. Trans. Roy. Soc. Can. III. 20: 45-73, Jan. 1926. (With V. Ulehla).

Studies on Spirogyra I. Additional Studies on Conjugation. Trans. Roy. Soc. Can. III, 20: 75-99, 1 plate, Jan. 1926.

Studies on Spirogyra II. Adhesions and Genticulations. Trans. Roy. Soc. Can. III.20: 101-111, 1 plate, Jan. 1926.

Sexual Reproduction in Water Silk. The Scientific Monthly 22: 330-340, April 1926.

Some Features of Structure and Behavior in Vampyrella lateritia. Science II. 63: 364-365, April 2, 1926.

The Origin of Vacuoles (with G. W. Scarth). Science II. 63: 459-460, April 30, 1926.

Some Behaviors of Vampyrella lateritia and the Response of Spirogyra to its Attack. Mich. Acad. Sci. 7: 395-416, 1926.

Cell-Disjunction in Spirogyra. Mich. Acad. Sci. 7: 275-286, 1926.

A New Tensiometer and Osmometer for Class Work (with G. W. Scarth). Science II. 64: No.1654, pp.253-254, Sept. 10, 1926.

Plantation Rubber, its Source and Acquisition. The Scientific Monthly, Sept. 1926. pp.268-278.

Abscission in General and with Special Reference to Curtailment of Fruitage in Gossypium. Mem. Hort. Soc. of N.Y. 3: 195-207, July 1927.

Publications by Professor F.E. Lloyd.

(Jointly with Geo. W. Scarth)

The rôle of Kinoplasm in the Genesis of Vacuoles. Science 65: No.1694, 599-600, 1927.

Further Observations on the Behavior of Gametes during Maturation and Conjugation in Spirogyra. Protoplasma 4: 45-66, pl.1, 1928.

Studies in Periodic Precipitation (with V. Moravek). Plant Physiology 3: 101-130, 1928.

The Contractile Vacuole. Biological Reviews 3: 329-358, Oct.1928.

Colloidal Aspects of Botany. A chapter in "Colloid Chemistry, Theoretical and Applied", New York, 1928.

The Mechanism of the Water-tight Door of the Utricularia Trap. Plant Physiology 4: 87-102 1929.

The Pulsatory Rhythm of the Contractile Vesicle in Paramecium (with J. Beattie). Biological Bulletin 55:, No.6, Dec. 1928.

The Behavior of Vampyrella lateritia, with special reference to the work of Professor Chr. Gobi. Archiv f. Protistenkunde 67: 219-236, 1929.

The Problem of Excretion with especial reference to the Contractile Vacuole. Proc. Internat. Cong. Plant Sciences, Ithaca 1926, 2: 1163-1168, 1929.

Some Uses of the Dark-Field Condenser. Microscope Record, No.20, pp.3-5, May 1930.

The Range of Structural and Functional Variation in the Traps of Utricularia. Flora 125 (2): 1931. (In press)

Utricularia capensis. (In press).

Impressions of Africa. McGill News Supplement No.1: 2-9, Mch.1930.  
McGill News 2: March 1930.

Further Studies in Periodic Precipitation (with V. Moravek). Journ. of Physical Chemistry (In press)

(With G. W. Scarth) An Elementary Course in General Physiology.  
Part I. Principles and Theory by G.W. Scarth.  
Part II. Laboratory Exercises by F.E.Lloyd and G.W.Scarth.  
John Wiley & Sons, New York, 1930.

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An Introductory Course in General Physiology (with F.E. Lloyd).  
Privately printed in Montreal, Sept. 1921.

An Elementary Course in General Physiology (with F.E. Lloyd).  
Part I. Principles and Theory by G. W. Scarth.  
Part II. Laboratory Exercises by F.E. Lloyd and G.W. Scarth.  
John Wiley & Sons, New York, April 1930.

RESEARCH PAPERS.

The Bog Forests of Lake Memphremagog; their destruction and consequent successions in relation to water levels (with F.E.Lloyd).  
Trans. Roy. Soc. Can. III.16: 45-48, 1922.

River Bank and Beach Vegetation of the St. Lawrence River below Montreal, in relation to water levels (with F.E.Lloyd).  
Trans. Roy. Soc. Can. III: 16: 49-50, 1922.

A Study of Induced Changes in Form of the Chloroplasts of Spirogyra and Mougeotia. Trans. Roy. Soc. Can. Sect.V:51-53;1922

Adhesion of Protoplasm to Cell Wall and the Agents which Cause it.  
Trans. Roy. Soc. Can. III.17: 137-143, 1923.

Colloidal Changes associated with Protoplasmic Contraction.  
Quart. Journ. Exp. Physiol. 14: 99-113, 1924.

The Action to Cations in Protoplasmic Contraction and Viscosity in Spirogyra. Quart. Journ. Exp. Physiol. 14: 115-122, 1924.

The Toxic Action of Distilled Water and its Antagonism by Cations.  
Trans. Roy. Soc. Can. III.18: 97-104, 1924.

The Elasticity of Gelatin in relation to pH and Swelling.  
Journ. Physical Chemistry 29: 1009-1022, 1925.

Can the Hydrogen Ion Concentration of Living Protoplasm be Determined? Science LI. 60: 431-432. 1924.

The Penetration of Cations into Living Protoplasm.  
Amer. Journ. Botany. 12: 133-148 (no.3) 1925.

Publications of Professor G.W. Scarth.

The Origin of Vacuoles (with F.E. Lloyd). Science 63: 459-460, April 30, 1926.

The Mechanism of Accumulation of Dyes by Living Cells. Amer. Journ. Plant Physiol. I, no.3: 215-229, 1926.

The Influence of External Osmotic Pressure and of Disturbance of the Cell Surface on the Permeability of Spirogyra for Acid Dyes. Protoplasma Zeitschrift no.2 Band I: 204-213, 1926.

A Surface Tensiometer and an Osmometer for Class Work (With F.E. Lloyd). Science 64, no.1654: 253-254, Sept. 10, 1926.

The Rôle of Kinoplasm in the Genesis of Vacuoles (with F.E. Lloyd). Science 65, no.1694: 599-600, 1927.

The Structural Organisation of Plant Protoplasm in the Light of Micrurgy. Protoplasma 2, no.2: 189-205, 1927.

Stomatal Movement; its regulation and regulatory rôle -- a review. Protoplasma 2, no.3: 1927.

The Structure of Wood and its Penetrability. Paper Trade Journ. April 26, 1928.

The Sinkage of Logs -- its cause and prevention. Printed by the Canadian Pulp and Paper Assocn., Woodlands Section, Montreal, 1928.

Studies of the Cell Walls in Wood -- 1. The structure of the cell wall and the local distribution of the chemical constituents (with R.D. Gibbs and Jane D. Spier). 2. The effects of various solvents upon permeability of Red Spruce Heartwood (with Jane D. Spier). Trans. Roy. Soc. Can. III. 23: Sect.5, 269-288, 1929.

Distribution of Wood, Air and Water in Trees in relation to the Sinkage of Logs (with R.D. Gibbs). (Presented at the Ann. Meeting of the Woodlands Sect. Can. Pulp and Paper Assocn., Jan.27-28, 1930.)

The Influence of H-Ion Concentration on the Turgor and Movement of Plant Cells with special reference to Stomatal Behavior. Proc. Internat. Cong. Plant Sciences 2: 1151-1162, 1929.

Sinkage Studies I. The mode of Penetration of Water into Logs: Preliminary field experiments (with Edwin C. Jahn). Can. Journ. of Research 2: 409-424, 1930.

Publications by Professor G. W. Scarth.

Sinkage Studies III. Changes in the Water-Gas system in Logs during Seasoning and Flotation (with R.D. Gibbs). Can. Journ. of Research 3: 80-93, 1930.

Sinkage Studies IV. The Mechanism of the Absorption of Water by Wood Blocks. Can. Journ. of Research 3: 107-114, 1930.

(with G. W. Scarth and Jane D. Spies).  
Trans. Roy. Soc. Can. Ser. 3, Sect. 4, 23: 259-273, 1927.

The Trap of Utricularia. Torreya, 29: 88-94, 1927.

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Can. Pulp and Paper Assoc., January 1920.

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Can. Journal of Research 2: 425-439, June 1930.

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Distribution of Wood, Air and Water in Relation to the Sinkage  
of Logs. (with G. W. Scarth).  
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Gas in Trees.  
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Sinkage Studies, III. Changes in the Water-Gas System in Logs  
during Seasoning and Flotation (with G. W. Scarth).  
Can. Journal of Research 3: 80-93, July 1930.

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Chief Mycological Investigator, Australian Govt.

Assistant Pathologist, Govt. Experimental Farm,  
Ottawa.

Lecturer, Dept. of Botany, McGill University.

REGISTERED FOR HIGHER DEGREES -- BOTANY AS MAJOR

1927 Ph.D.

EMERITUS PROFESSOR

Chairman, Dept. of Biology, University of New  
Brunswick, Fredericton, N.B.

POST-GRADUATE DEGREES GRANTED (MAJOR IN BOTANY)1918 - 1929.

Fritz, Clara W.	M.Sc.	1918.	
Symons, Jennie L.	M.Sc.	1921.	Ph.D. 1925.
Moe, George G.	M.Sc.	1921.	
Godwin, Kathleen F.	M.Sc.	1922.	Ph.D. 1929.
Spier, Jane D.	M.Sc.	1922.	
Dickson, B.T.	-	-	Ph.D. 1922.
Macrae, Ruth	M.Sc.	1926.	
Gibbs, Ronald D.	M.Sc.	1926.	

PRESENT OCCUPATION.

Fritz, Clara W.	Timber Pathologist, Forest Products Laboratories, Ottawa.
Symons, Jennie L. (Mrs Simpson)	Assistant Professor, Hunter College, New York City, U.S.A.
Moe, George G.	Professor of Botany, University of British Columbia, Vancouver, B.C.
Godwin, K.F. (Mrs. Arthur Terroux)	Moyses Travelling Scholarship 1927, Canadian Club Scholarship 1928 (Cambridge) Research at Cambridge University 1929-30.
Spier, Jane D.	Instructor in Botany, McGill University.
Dickson, B.T.	Chief Mycological Investigator, Australian Govt.
Macrae, Ruth	Assistant Pathologist, Govt. Experimental Farm, Ottawa.
Gibbs, R.D.	Lecturer, Dept. of Botany, McGill University.

REGISTERED FOR HIGHER DEGREES -- BOTANY AS MAJOR.

Argue, C. W.	1927	Ph.D.
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PRESENT OCCUPATION.

Argue, C.W.	Chairman, Dept. of Biology, University of New Brunswick, Fredericton, N.B.
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## THE FUTURE.

It is, we believe, generally true that the developments of a department will normally follow an asymptotic curve, unless in the course of events one or more disturbing factors enter in. Such disturbance occurred after the close of the **Great War**. During the period following until the present moment a new curve of growth has been followed. It would seem that we now face a possible additional crisis in affairs which may have the effect of starting, not only in this department but in its sister departments in McGill University, still another curve of growth. It has seemed wise to ask the various departments to face this possibility and to ask them to present their views of future possibilities of development, say, for the next ten years.

### I. GENERAL DEVELOPMENT.

The growth of this, like other departments, depends on (1) the careers to which a study of the subject is necessary and (2) the personnel of the staff. The general trend of development is first discussed under the heading of different careers.

1. High School Teaching. The majority of students taking advanced botany in most universities do so with a view to science teaching in schools, but of this body of students a few take honors and specialize for academic posts. Up to now this inducement has been lacking at McGill University since no botany is taught in the high schools of the Province of Quebec.

It seems possible that this will be rectified in the near future with advantage to the department (see suggestions 2 and 3).

2. Agriculture. Most of the technical posts in agricultural botany come under pathology or genetics but plant physiology is an essential subsidiary to these as well as to agronomy and horticulture and should be a subject of greater study and research by agricultural students. Arrangements are in progress whereby the staff of McGill University and students of Macdonald College come into contact both in physiology and genetics (see suggestion 4).

3. Forestry. In view of the close association of McGill University with the pulpwood industry and of the work now being carried on in relation to woodland problems (viz. research in tree physiology, wood structure and log sinkage) it has been suggested by the secretary of the Woodlands Section of the Canadian Pulp and Paper Association that the paper companies might send some of their foresters to McGill for post-graduate study and research if some further facilities were offered. The appointment of a mycologist who would specialize in forest pathology would seem to be the most useful first step in this direction (see suggestion 5).

4. Botanical Survey Work. Though no careers at present offer in this field, the need for the work and the interest shown by the Research Council suggest that something may develop (see suggestion 6).

## II. SPECIFIC SUGGESTIONS.

1. Botany 1 and Botany 1M might be made one class. With little if any sacrifice of efficiency this would save teaching time. It is assumed that the amount of laboratory work would not be reduced for 1M but increased for 1.
2. Teaching of Advanced General Botany including Taxonomy:  
 If the present proposal to teach biology and/or botany in the Protestant High Schools of the Province of Quebec comes into effect, an increase would result in the number of students, especially prospective teachers, who would wish to learn more than the mere introduction to the subject given in the half-term course in elementary botany. The present full-course Botany 2 could be developed as a more general course than at present but still specializing in morphology, taxonomy and evolution. This is also a good cultural course for Arts students in general.
 

*see page 26.  
We does not rec. at present*
3. Summer Course in Botany: If the summer school for teachers at Macdonald College (now proposed) is decided upon, the McGill University staff are prepared to teach botany, and have offered to do so.
4. Cytogenetics and Plant Physiology for Students from Macdonald College: It is by the Macdonald College authorities proposed that genetics and cytology and plant physiology at McGill University be included in the curriculum of graduate students of plant science (field crops, horticulture, plant

4.

pathology) at Macdonald College, both as a minor and, in some cases, as a major subject.

5. Mycology and Forest Pathology: A good mycologist is needed at McGill University. At present there are no facilities for a Ph.D. course in mycology or pathology, either at McGill University or Macdonald College. To avoid overlapping with Macdonald and for the reasons given in paragraph 3, a mycologist who would specialize in forest pathology is suggested.

6. Ecology including Taxonomy.

(a) Botanical and Soil Surveys: A great field of research almost untouched in Canada is the relation of vegetation to soil. Botanical as well as chemical experts should be engaged on soil survey work. Indicative plants (species which indicate the various soil types) should be worked out as they have been in Europe.

(b) Botanical Analysis of Grasslands: The principal crop of Quebec is grass. Experiments on its improvement by the use of suitable seed mixtures and by manuring requires botanical analysis of the herbage.

(c) The appointment to the staff of an expert taxonomist with ecological interests would be necessary if the above lines of research were to be carried out.

See page 26

The above lines of research are indicated as being those directions of study which will probably be of the greatest importance in the future and which this department might legitimately interest itself in. The carrying out of this program would, as has been seen, involve the appointment of two additional major members of the staff, namely (a) a mycologist who would have his principal interest in forest pathology and (b) a taxonomist-ecologist. These are the two elements of personnel which would round out the organization of the department, making it sufficiently complete and well-balanced for the full development of the academic aspects of botany without excluding certain important lines of practical botany of use to the community. It must not, however, be overlooked that the appointment of such additional members to the staff would involve an increase of the secondary personnel, probably of at least two minor appointments.

We believe that such appointments would be justified on the ground of research which should be done -- research which is of practical as well as theoretical importance and which is not being carried out at present in Canada. In view of the rather meager opportunities for earning a livelihood in the field of botany in Canada at the present time, we are not justified in being too optimistic in regard to the number of students which would be attracted. The development of governmental research and its correlations aside, this condition can be improved only if botany as a part of biology is made a requirement of the high school curriculum, not merely as a preparation for entrance into college but as a vital part of the preparation of high school students for

life. It should be emphasised here that the economic outlet for graduates trained in botany in other countries has been found in this direction.

#### FELLOWSHIPS AND SCHOLARSHIPS.

Recalling the arguments of the late President Eliot of Harvard University, we are of the opinion that the arguments applied by him to medical education are applicable to-day to the higher education of biologists. It is, we believe, necessary to regard graduate students seriously preparing themselves for the profession of teaching as working apprentices; that is to say, they should be studying not only their subject but should also be participating in teaching and receiving pedagogical training by way of preparing them for development in the field of teaching. We accordingly emphasise the acceptance of this principle, in which case it becomes evident that such students should receive a modest compensation for their work. This is the more important in view of the fact that it is very rarely that a man who is going forward to the higher degrees in biology has any resources of his own. If the principle is not admitted, it must be seen that the preparation for teaching and research in biology occupies the long period of at least seven years, and more probably eight or nine years. That a man should be unable to earn a modest living after he has completed his bachelor's course seems to us unreasonable.

The practical inference is that there should be provided a reasonable number of teaching fellowships for those proceeding

to the Ph. D. degree and small scholarships for those proceeding to the M.Sc. degree. Having due regard to the economic outlet this department should at the present have not more than three such teaching fellowships and two or three scholarships. The teaching fellowships should be worth \$1,000.00 apiece, assuming that the summer is to be devoted to research work -- an important consideration in the field of botany. The scholarships for those proceeding to the master's degree should be from \$250.00 to \$500.00 according to circumstances, namely, the standard of scholarship already attained and ability to take part in demonstrating and in the other work of the department.

We further believe that such appointments should be made with the same sort of care as is used in making other appointments in the department -- only the very best candidates should be appointed, people of that type of mind and character who would make academic persons of a high order.

#### MATERIAL EQUIPMENT.

When the plans of the Biological Building were being discussed, the Chancellor of the University asked the question as to whether the building as planned would be ample for the next twenty years' development. The answer which was given was in the affirmative. Half of the period has now elapsed and, contrary to expectation, the Biological Building is crowded to capacity. It would be scarcely possible to accommodate more people in this department than we have at present, except by using some available space in the basement; even so, the condition would remain on the

verge of congestion. We therefore make the suggestion of additional members to the staff realizing at the same time the material difficulties involved. It is also the fact that other departments find themselves crowded and are clamoring for more space. The difficulty can be got out of, we fear, only by additional building. Thus, for example, an institute for biochemistry would make additional space available in this building, namely, the space of one floor. The building of an institute for biology in the normally accepted sense, namely, zoology and botany, would release two floors.

#### SUGGESTIONS FOR IMPROVEMENT OF FACILITIES.

Regarding the proposal for the building of an aquarium on the site north of the greenhouse, this department strongly urges that this scheme if carried out, should be considered in relation with the needs of the greenhouse. It is suggested that the new aquarium and the present greenhouse could be linked together by an additional greenhouse unit constructed for the better growth and care of larger plants. This could be carried out for a not very great additional cost and would make the greenhouse and aquarium more useful, both for teaching and from the point of view of the public. This idea is agreeable to the department of zoology and has been fully discussed inter nos. Incidental to this is the desirability of a tunnel communication between the biological building, greenhouse and aquarium.

The management of a greenhouse in this climate offers great difficulties owing to the very low relative humidity of the



air in winter time. We have had much trouble from this condition. Such difficulty can be overcome to a large extent, we believe, by the installation of humidifiers at a cost of \$1,000.00 to \$2,000.00.

The greenhouse is unfortunately exposed to the public to such an extent that in the summer time when we put some of our plants out of doors in order to allow them to recuperate we are troubled with raiding. The only way in which this can be stopped is by the erection of a proper fence. This will probably be necessary for the aquarium also and would permit us to beautify and make more useful for teaching purposes the small area of ground which will be occupied by these buildings if the aquarium materialises.

We are in need of a constant temperature and physiological dark room and of a storage room for tubers, and these could be provided by excavating a cellar below the floor of the greenhouse laboratory.

The above plans involve the following expense:-

Two Professorships .....	Yearly	\$ 10,000.
Two Assistants .....	max. "	3,000.
Greenhouse development .....		\$10,000 or \$15,000
Annual Budget increase (for apparatus and supplies) to .....	minimum	\$4,000
	maximum	\$5,000.

aside from minor expenses.

*J. B. Jones*  
*for the Dept. B. B. H.*

REPORT OF DEPARTMENT OF CHEMISTRY.

This department is responsible for the instruction of students registered in three faculties; Engineering (formerly Applied Science), Arts and Science (formerly Arts) and that of Graduate Studies and Research. A small amount of teaching is also done for students of the Department of Pharmacy, the School for Graduate Nurses and the School for Physical Education.

FACULTY OF ENGINEERING

The numbers of students taking Chemical Engineering in each year for the past ten years is shown in Table I. The greatest number (73) attended during the session 1920-21. This large number was a consequence of the war. After 1923-24 the numbers have been fairly uniform, average 19.

It has been felt for some time that the curriculum for students in Chemical Engineering should be revised. To that end a small committee of the department has given careful consideration to this question and its recommendations are to be made shortly. Last spring the Principal agreed, with certain reservations, to add to the staff Dr. J.B. Phillips, a graduate in Chemical Engineering and a Ph.D. in Chemistry, now at the Massachusetts Institute of Technology. His appointment will it is hoped take place in the fall.

The applications of engineering to chemical problems have, we believe, not been adequately taught in the department in the past. With the help of Dr. Phillips we thus hope to remedy a serious defect in the present teaching of Chemical Engineering.

In the year 1932 and after Chemistry will be compulsory for entrance to the Faculty of Engineering. This change will greatly help in improving the curriculum, not only for students in the faculty generally, but particularly for those intending to take up Chemical Engineering as a profession.

#### FACULTY OF ARTS AND SCIENCE

In many universities the number of students taking elementary chemistry is large. This is also the case at McGill. Since 1920-21 the number of such students has only twice been less than 300. This session it is 436.

The number of students reading for an Honours Degree in Chemistry has never been large. Since 1920-21 the minimum has been 8 (1923-24) and the maximum 17 (this session). The training offered by the curriculum for the Honours Degree is probably the best preparation for students intending to pursue post-graduate work in pure chemistry, or for those intending to follow chemistry as a profession. Students begin the required courses in the second year. Since a high standing in the first year examinations is required for entrance, only those well trained before entering McGill, or possessed of ability above the average, are qualified to undertake the required work. The number of such students is therefore small.

#### FACULTY OF GRADUATE STUDIES AND RESEARCH

Dr. Maass has prepared the following report covering the years 1920 - 1930.

REPORT ON THE GRADUATE SCHOOL IN CHEMISTRY  
AT MCGILL COVERING THE YEARS 1920 to 1930.

This report is of a statistical nature and is designed to give an idea of the number of students in the Graduate School in Chemistry, the number receiving degrees, the positions held after the receipt of degrees, and certain details such as the number with Ph. D. degrees who remain in Canada. Besides this the question of National Research Council Scholarships is discussed as showing the place McGill University occupies as a Graduate School in Chemistry when compared with other Canadian Universities. Table II shows that the number of students in the Graduate School has increased in a more or less continuous manner reaching the maximum number in the present session. The term maximum is used advisedly since it is probable that with the present facilities a much larger number cannot be accommodated advantageously.

Before 1919 only four candidates had received the Ph. D. degree during all preceding years, so that this year may be taken in a sense as being the starting one as far as the Graduate School in Chemistry is concerned. It was about that time that it became recognised that four years of undergraduate work was inadequate to equip a student for the chemical profession, either in University work or in an industrial position involving research. Since 1919 sixty-four candidates have received the Ph. D. degree in Chemistry at McGill. The number per year is indicated in Table II, and a large part of the remainder of this

report is concerned with the subsequent careers of these men.

Table III indicates the nature of the positions held at present by these men. It is a matter of some pride that fifteen of them are now permanent members of the staffs of Canadian Universities, and six of American Universities, so that a third of the Ph. D. graduates hold University positions. Previous to 1919 the Chemistry Departments of the Canadian Universities had no McGill Ph. D. graduate on their staff. The Canadian Universities who now have one or more McGill Ph. D. on their staffs are the University of British Columbia, University of Alberta, University of Manitoba, Western University, Queens University, McGill University, Mount Allison, University of New Brunswick and Dalhousie University.

Another fourteen of the students under consideration are employed in laboratories of the Canadian Government, and most of the others are distributed in research positions in Canadian and American industrial corporations. In this connection, the fact that twelve are in the United States, and thirteen in Canada is due to the larger number of industrial research organizations in the United States. Added to this is the fact that only recently, that is within the last few years, have Canadian industries realised the necessity of engaging experts on their research staff. Several American corporations have signified their willingness to take McGill Ph. Ds. on their permanent staff at any time, provided they have the proper recommendations, a compliment to the McGill Graduate School, but one which, if followed, would mean the loss of specially trained men to the country. Of the twelve men now in indus-

trial work in the United States most have been engaged before 1927.

Of the fifty students in the Graduate School at present only ten percent are McGill graduates, the rest having obtained their undergraduate training elsewhere. The popularity of the Graduate School at McGill among students in Chemistry is indicated by the fact that in all branches of Chemistry over fifty percent of the National Research Council Student Scholarships (awarded since 1916) have been awarded to students who elected to hold these at McGill. The growth of the popularity is indicated by the fact that of twenty-four scholarships awarded in 1930 to students in Chemistry throughout Canada, twenty-two were granted to students of other Universities who elected to come to McGill.

Table IV shows the positions held at present by those of the sixty-four Ph. Ds. under consideration who held National Research Council Scholarships. This table indicates the positions held at present by these men.

It has been erroneously stated that these highly trained men find their way to the United States resulting in a loss on account of the money spent by the University in their training, and a loss to the Government in the case of students holding scholarships. Table V shows that relatively few, in fact only about twenty percent, have found their way to the United States, and as has been indicated before the majority of these obtained their Ph. D. degree before 1927. Five students were Americans who naturally would return to the <sup>United</sup> States. With regard to post-graduate scholarships the 1851 Exhibition has not been

popular among the students in the Graduate School in Chemistry. Having once started on their course towards the Ph. D. degree they showed a preference to continue here till the end rather than elsewhere. Since the large majority of those in the Graduate School come from other Universities this attitude has not been criticised by the staff of the Department. On the other hand scholarships available subsequent to the Ph. D. degree have been in great demand. In this connection the Ramsay Memorial Scholarship, open to applicants from any part of the Dominion, has only been held by members of the Graduate School at McGill since the foundation of that Scholarship in 1919.

Higher degrees have not yet been given in Chemical Engineering. With the addition to the staff of a qualified Chemical Engineer it should be possible to offer courses and research leading to such a degree. Certain facilities may have to be provided, but these are of such a nature that we can see no serious obstacle in attaining our objective in this direction.

As indicated by Dr. Maass in his report the recognition of the value of research in industry is fairly recent, that is by the industries themselves, although its value has always been recognised by those with scientific training. The growth of the graduate work in chemistry at McGill is similar to that in many of the better American Universities, but quite exceptional in Canada. The extent to which expansion may be looked for or provided for requires consideration.

A development which we believe would aid the chemical industries of Canada is one which has already been successful at certain American Institutions, e.g. The Massachusetts Institute of Technology.

Students who have obtained a higher degree, preferably the Ph.D., can in many cases spend another one or two years in research on fundamental problems of value to particular industries. Such students should be supported by the industries interested, and their work carried out under the direction of a member or members of the staff. The value of such work lies, not so much in the research accomplished as in the increased value of the research worker to the industry directly concerned.

Attention is drawn to the fact that during the last ten years one hundred and forty-nine papers have been published by the staff and students in the Graduate School in Chemistry.

In connection with the development of graduate work in this department mention should be made of the Pulp and Paper Research Institute.

The first practical step towards the creation of the Institute was taken in 1920. The Institute was finally completed and formally opened in the fall of 1928. The Pulp and Paper Research Institute represents a cooperative effort of the Pulp and Paper Division of the Forest Products Laboratories of the Dominion Government, the Pulp and Paper Association, and McGill University.

The fundamental research carried out in the Institute forms an integral part of the post-graduate work in chemistry. Since the session 1926-27, nine to fifteen students have been engaged in researches in the organic chemistry related to cellulose, and in the present session an additional number of ten students are engaged in problems related to the physical chemistry of cellulose.



In view of the great importance of the pulp and paper industry in Canada, the value of post-graduate training along these lines cannot be over-estimated.

STAFF

TABLE

Session	1920 -21	1921 -22	1922 -23	1923 -24	1924 -25	1925 -26	1926 -27	1927 -28	1928 -29	1929 -30	1930 -31
Professors	1	2	2	2	4	4	5	5	4	5	4
Assoc. "	3	3	3	3	1	1	1	1	1	-	1
Ass't "	2	2	2	2	2	2	2	2	2	1	3
Lecturers	1	-	-	-	-	-	-	-	-	1	1
<b>Total</b>											
Senior Staff	7	7	7	7	7	7	8	8	7	7	9
Demonstrators	8	9	10	9	9	9	10	10	10	11	13
<b>Total</b>	15	16	17	16	16	16	18	18	17	18	22

The figures in the above table are of interest when taken with the figures in tables I and II showing the numbers of undergraduates and graduate students.

In ten years the senior staff has increased from 7 to 9, i.e. less than 30%. In the same period the increase in number of undergraduates has been from 499 to 626, i.e. about 26%.

The increase in senior staff has therefore been approximately in proportion to the increase in undergraduate numbers. When the number of graduate students is considered it is seen that

the relation is quite different, since such students have increased 500% in number. To meet this situation more undergraduate lectures are now given by the younger men, thus allowing those chiefly interested in research to devote themselves more particularly to such work.

It should be understood that the researches on which our graduate students are engaged are of a type considered suitable for the training of such men. The work though of scientific value is thus limited in scope.

Another type of research, more uncertain in its results but of greater scientific interest and possibilities, is thus excluded. Such work is however most desirable from many points of view, and could be made available by the appointment of one or more paid assistants or technicians of the type met in European Universities.

ACCOMMODATION, EQUIPMENT, ETC..

A considerable portion of the elementary teaching in chemistry is carried on in the older part of the Biological Building. This work could be done more effectively if space were available in the Chemistry Building to provide an elementary laboratory for 250 students. Several research students also carry on their work in the Biological Building. This work could be done to better advantage in the Chemistry Building.

Space is desirable for small experimental units for the teaching of Industrial Chemistry and Chemical Engineering.

Special rooms should be available for gas analysis, water analysis and micro-analysis. An optical room is also desirable. Office room for even the present senior staff is quite inadequate.

The shelf room of the Baillie Library has been increased recently. It is suggested that a library, common to both the departments of Physics and Chemistry, would have definite advantages. This could be accomplished by the construction of a suitable annex common to both buildings. In order to develop the teaching of the history of Chemistry a library to that end should be developed.

The Chemistry and Mining Building is now over thirty years old and cannot be expected in its present condition to satisfy modern requirements. Much of the electric wiring is of the old type and a source of fire hazard; the water pressure is insufficient on the upper floors; drainage, in some places, is inadequate; wooden lockers in the basement present a fire hazard; ventilation from hoods and elsewhere is quite insufficient. A building devoted largely to chemistry can hardly be too well ventilated and the Chemistry Building probably is one of the worst equipped in this respect in the University. A common room suitably furnished would have great advantages particularly for our graduate students. Such a room where students could meet and discuss their work with each other, and possibly with members of the Staff would be of great value to our Graduate Faculty work.

It is therefore recommended that:-

- (a) The present Chemistry and Mining Building be devoted to chemistry only.
- (b) Alterations to be made in the building to provide:-
1. A large elementary laboratory.
  2. More research space.
  3. Space for small experimental plant.
  4. Improved library facilities.
  5. Rooms for special analytical work.
  6. Rooms for members of the staff.
  7. Proper ventilation.
  8. A common room.
- (c) The Building be rewired where necessary.
- (d) Water pressure and drainage be increased.
- (e) Wooden lockers be replaced by metal lockers.
- (f) Certain laboratories be remodelled.
- (g) A small refrigeration plant be installed.

GENERAL.

There are many obvious developments which would be welcomed by this department when funds are available.

Chemistry is becoming more specialised daily, and while this department largely confines its work to what are generally considered to be the fundamental branches of chemistry, certain other branches such as electrochemistry, photochemistry, etc. might with advantage be considered in the future.

This department would like to make it clear that its suggestions involving financial expenditure are made with a keen realisation that many other departments have similar needs. For this reason such suggestions have been purposely limited. It must be a matter of extreme difficulty to decide whether this department or that has the greater need.

It is respectfully suggested therefore that the appointment of a permanent small University Committee be made. The duties of such a committee would include the formulation of policies concerning the aims of McGill and the making of decisions consistent with such aims.

It is believed that a university with a definite objective has a greater chance for success than one in which Faculties and Departments each strive for their own welfare, more or less regardless of that of others.

Only those matters largely peculiar to this department are considered in this report. Subjects of broader interest such as: school training; scholarships; Sabbatical year; honours degrees; etc., are, it is believed, better considered in reports from Faculties.

TABLE I.  
UNDERGRADUATES  
TAKING COURSES IN CHEMISTRY

COURSE	SESSION										
	1920 1921	1921 1922	1922 1923	1923 1924	1924 1925	1925 1926	1926 1927	1927 1928	1928 1929	1929 1930	1930 1931
CHEMICAL ENGINEERS III YR	39	28	18	8	9	11	14	7	8	9	8
IV YR	34	33	31	16	9	7	8	10	9	9	7
TOTAL	73	61	49	24	18	18	22	17	17	18	15
ELEMENTARY CHEMISTRY (all faculties)	362	360	345	345	332	348	262	330	262	384	436
HONOUR STUDENTS IN ARTS	12	11	14	8	11	13	13	12	12	11	17
CHEMISTRY I, II, III, IV, (other than engineers and honour students)	37	32	41	44	57	135	121	133	147	160	140
ADVANCED COURSES (other than engineers and honour students)	15	11	22	15	12	16	16	27	20	17	18
TOTAL	499	475	471	436	430	530	434	519	458	590	626



TABLE III.

Positions held at present.	Specializing in Physical Chemistry	Specializing in Organic Chemistry	Total
Permanent member of staff in a Canadian University	12	3	15
On staff of Government Laboratory in Canada			
(a) Forest Products	3	1	4
(b) Research Council	2	6	8
(c) Biological Station	1	1	2
On Research Staff of a Canadian Industry	4	9	13
Further study at foreign University holding scholarship with intention to return to Canada	1	3	4
Permanent member of staff in an American University	4	2	6
On the Research staff of an American Industry	5	7	12
	32	32	64



TABLE IV.

Ph. D.'s who held National Research Council Scholarships.

Positions held at present.	Specializing in Physical Chemistry	Specializing in Organic Chemistry	Total
Permanent member of staff in a Canadian University	12	2	14
On staff of Government Laboratory in Canada			
(a) Forest Products	2	1	3
(b) Research Council	2	6	8
(c) Biological Station	1	1	2
On Research Staff of a Canadian Industry	4	7	11
Further study at foreign University holding scholarship with intention to return to Canada	1	3	4
Permanent member of staff in an American University	1	1	2
On the Research staff of an American Industry	5	5	10
	28	26	54

T A B L E V.

TABLE SHOWING DISTRIBUTION OF PH. D.'S  
BETWEEN CANADA AND THE UNITED STATES.

Specializing in Physical Chemistry  
Specializing in Organic Chemistry

	<u>Permanent position in Canada</u>	<u>Permanent Position in U. S. A.</u>	<u>Permanent Position in Canada</u>	<u>Permanent Position in U. S. A.</u>	<u>Permanent Position in U. S. A.</u>	
Ph. D.'s	23	9	23	9	9	Johnson
Ph. D.'s who held National Research Council of Canada Scholar- ships.	22	6	20	6	6	Ruttan Whitby Hatcher Hibbert
						Total
						15

TABLE VI.

TABLE VI.

Positions held at present.	Maass	Johnson	Ruttan	Whitby	Hatcher	Hibbert	Total
Permanent member of staff in a Canadian University	9	3	2	1			15
On staff of Government Laboratory in Canada							
(a) Forest Products	2	1		1			4
(b) Research Council	1	1	2	3		1	8
(c) Biological Station	1					1	2
On Research Staff of a Canadian Industry	4			3	4	2	13
Further study at foreign University holding scholarship with intention to return to Canada	1			2		1	4
Permanent member of staff in an American University	4			1		1	6
On the Research staff of an American Industry	5		1	4		2	12
	27	5	5	15	4	8	64

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THE DEPARTMENT OF GEOLOGICAL SCIENCES.

The department of Geological Sciences includes the following sciences each of which has become so broad that it includes a number of specialties in itself,-

- STRATIGRAPHY including Sedimentation.
- PALEONTOLOGY including Vertebrate and Invertebrate Paleontology, Paleobotany, and the Basis and Control of Organic Evolution.
- PHYSICAL GEOLOGY including Dynamic Geology and Structural Geology.
- PHYSIOGRAPHY including Human Geography and Economic Geography.
- MINERALOGY including Crystallography and Optical Mineralogy.
- PETROLOGY including Petrography and Mineralography.
- ECONOMIC GEOLOGY including Mining Geology Metallics and Non-Metallics; Coal Geology; Oil Geology; Engineering Geology; Water Supply; and Agricultural Geology.

Although these sciences have made enormous strides in the last two decades McGill had not the teaching facilities, the necessary space, nor the requisite staff to undertake more than the teaching of some elementary courses, and to supervise the work of an occasional student for an M.Sc. degree. Upon the resignation of Dr. Bancroft in 1929 the Governors decided that something must be done to bring this department into line with modern requirements, and directed that a strenuous effort be made to modernize its teaching equipment, and to build up facilities for advanced study and research which would enable students to obtain in Canada that training which hitherto could only be secured in foreign universities.

A preliminary survey of the department showed that its equipment was ample and modern about twenty five years ago, for undergraduate work, and for an occasional graduate student, but that for modern teaching all the courses would have to be reorganized and correlated to insure efficiency and prevent overlap; new courses would have to be built up to provide for the advances in the sciences, and, especially, provision for much laboratory work would have to be arranged to supplement the lecture courses. One Assistant Professor was appointed in 1929 and another 1930 and the Professors of Geology, Mineralogy, and Paleontology all working to same end have practically accomplished this part of the program as well as provided advanced courses leading to the Ph.D.

The teaching equipment of diagrams, charts, sections, geological and topographical maps, lantern slides, fossil collections, mineral collections, rock collections, thin sections of rocks, collections of ores, polished sections of ores, etc., has been thoroughly overhauled and arranged for ready use where needed.

Much of the material had to be discarded as useless, many duplicates had to be boxed and stored; the valuable material was rearranged but much of it is not properly labelled in a permanent way and is not catalogued. Glaring gaps occur in all the collections, and especially are the diagrams, charts, etc. much out of date or thoroughly dilapidated. Much new and modern material is urgently needed for the graduate and research work.

Space requirements have been met temporarily by combining laboratories, by using Professors' offices for seminar and some practical courses; and by clearing out an old store-room of the Mining and Metallurgical departments to provide accommodation for nine graduate students.

The department realizes that no appropriation can be expected under the present condition of University finances, which could meet the greater part of its needs; the gaps in specimen equipment in all branches will be closed gradually, and even the instrument equipment needed for the graduate and research students must be obtained gradually, but it respectfully submits that at least the undergraduate equipment necessary for lecture illustration should be provided without much delay. Much of this material can not be purchased outright but must be prepared under the direction of the lecturer, and could be so prepared by graduate students working part time. It is estimated that it will require approximately eight student-years to accomplish this work, that is, one student working about 10 hours per week for eight sessions; two students for four sessions; or four students for two sessions. For this type of work students assistantships or research assistantships of the value of about \$500. net, should be provided.

The department has nine graduate students at present, one writing his Ph.D. thesis; three completing their second year of the Ph.D. course; and five working for their M.Sc. degree. There are also four graduates from the department of Mining Engineering taking special work or full Minors in this department. Seven other applications have been received so far for entry into the graduate school next session, but six of these require financial assistance which is not at present available; some of the students at present here will also require assistance to complete their courses.

Having due regard to all circumstances the department requests that provision be made for the required teaching fellowship at \$750., and two research assistantships at \$500. each, to be available for next session.

Forty-seven students primarily interested in Geology, attended McGill from 1920 to 1930. Twelve of these did not take further graduate work in Geology; twenty-eight went to foreign universities for further graduate work; and only seven did further work at McGill, of whom three are here at present.

Of the 28 students who went to foreign universities 22 received Fellowships, Scholarships, or Assistantships; 4 were unassisted; 2 doubtful.

The following pages deal with the graduates of the department; the present status of the different branches; and the material requirements for subjects taught at present. A chart is included to show the range of subjects peculiar to each branch and to point out the large part of the field of geology which can only be cursorily treated under present facilities.

In regard to space requirements little has been said because this subject has been fully treated and recognized in the promise of a new building in the near future. One point should be mentioned here in that connection; the department has always been separated, one part being housed in the Redpath Museum together with the main mineral collections and the paleontological collections. The only reasons for continuing a separation, which has many disadvantages, seem to be that there is no other immediate use for the Redpath Museum and that it does not seem feasible to provide sufficient new space to house the complete department in one building. Much of the teaching material for General Geology, Physiography, Stratigraphy, Practical Geology and Mineralogy is interchangeable and should be centralized for the sake of economy and efficiency, and the teaching accommodation in the Museum is very antiquated and unsatisfactory as the building was designed primarily as a museum.

Chemistry  
Structural  
Dynamical  
Metamorphic  
Stratigraphy  
Geology of the Earth  
Oil Geology  
Coal Geology  
Engineering Geology  
Applied Geology  
Geology of Water



The Department of Geological Sciences

SALIENT POINTS:

1. Principal divisions of the department (see chart):-

General Geology  
 Historical Geology  
 Physical Geology  
 Mineralogy  
 Petrology  
 Economic Geology

2. Staff:-

3 Professors,- of Geology, Mineralogy, Paleontology  
 2 Assistant Professors,-  
 1 Teaching Fellow

3. Branches untouched or slightly touched at present:-

Vertebrate Paleontology  
 Micro-Paleontology  
 Paleobotany  
 Organic Evolution  
 Paleogeography  
 Glacial Geology  
 Sedimentation - research in petrographic correlation  
 Geo-Chemistry and Geo-Physics  
 Structural - laboratory experimentation  
 Dynamical - " "  
 Metamorphic - " "  
 Petrography - " "  
 Geography - lectures or laboratory

Economic Geology is the application of all the Geological sciences to economic uses. There are several branches of which Metal Mining Geology is the only one to receive adequate attention at present. Those receiving inadequate attention are:

Geology of the Nonmetallics  
 Oil Geology  
 Coal Geology  
 Engineering Geology  
 Agricultural Geology  
 Geology of Water Supply

Harrington Fellow      Assistance Required      to help out the  
teaching; this may not be in      in      1931-32, and if it  
is available      Department of Geological Sciences

---

General Geology Laboratory.-

- A. Assistance for at least ten hours per week by a well qualified graduate student, demonstrating and preparing, and correcting laboratory exercises.
- B. Assistance in preparation of charts and diagrams, etc. estimated to require about twenty hours per week for 2 years, of a competent graduate student. After that 3 or 4 hours per week.  
2 graduate students for 2 sessions.

Physiography.-

- C. Assistance in preparation of charts and diagrams, etc. and in handling and filing of the maps used in laboratory work. 1 graduate student 10 hours per week for 2 years; after that 4 hours per week.

Mineralogy and Petrology.-

- D. Assistance in Determinative Mineralogy laboratory, and in preparing minerals for class.  
1 Graduate student 9 hours per week.
- E. Assistance in classifying and arranging minerals, rocks; thin sections, and in preparing diagrams and charts.  
1 Graduate student 10 hours per week through at least 1 year - part time thereafter.

Economic Geology and Ore Deposits.      Undergraduate and Graduate.

- F. 1 Graduate student 8 hours per week preparing diagrams and sections and preparing suites of specimens for illustration purposes and for exhibition.

Summary.- The Department really needs the services of three graduate students at 8-10 hours per week all the time.

In addition at least 3 other graduate students could be kept busy for two sessions in helping to bring the teaching equipment up to date. Much has been done in the last year by the staff along this line but it means a complete modernization of the facilities and involves much tedious and detailed work which could readily be undertaken by advanced students.

The Department has but one teaching Fellowship, the "Leroy" - worth \$700, and this year the Department of Mining loaned us the

Harrington Fellowship, of similar amount, to help out the teaching; this may not be available in 1931-32, and if it is available its value will be reduced.

Provision for one teaching Fellowship of \$700. and four student assistantships at \$500 each would be decidedly useful for the next two years; two of the latter, and perhaps three, could be dropped after two years if found necessary.

For a graduate school entering into serious competition for students, these assistantships would be of great value in helping to get established. It has been found necessary to inform five qualified students so far that we could give them no monetary assistance here for next session, but it may not be too late to secure some of them and others will no doubt apply. There are at present nine graduate students registered in Geology.

Instruments for Field Geology -		
3 Brunton compasses		\$ 30.00
5 Fifteen-inch plane-tables		\$100.00
2 telescopic alidades		\$100.00

Course on Map Interpretation -		
300 Geological Map Sheets		\$ 50.00
Foreign Map Sheets		\$ 25.00

Structural Geology -		
Simple laboratory apparatus		\$ 10.00
Lectern slides for lecture purposes		\$100.00

MINERALOGY & ORE DEPOSITS -  
The outstanding need is for better models of typical mining districts and of specific cases to illustrate the geology and the occurrence of ore bodies in three dimensions, and similar models to illustrate engineering problems and water supply. The cost of such models would be too large to be considered at present.

The teaching collections are deficient in some of the and associated rocks from some of our most important Canadian districts. Much of this can be secured from larger mines by paying the cost of collection and the freight charges, but such costs are not to be exactly met. The best method is for a member of the staff to be sent out by the university for this purpose.

SUMMARY OF EQUIPMENT REQUIRED 1931-1932

## PALEONTOLOGY:- STRATIGRAPHY:-

Teaching material for laboratory in micro paleontology..	\$200.00
Specimens and thin sections for work in Sedimentation ..	\$100.00
1 microscope for use in both courses.....	\$250.00
	<u>\$550.00</u>

The library is very deficient in monographs, reports, and other publications in general which deal with these important sciences. It is estimated that it would require about \$2000 to bring it up to date, and that \$100 per year would be necessary to keep it properly abreast of the literature.

+++++

## PHYSIOGRAPHY: PRACTICAL GEOLOGY: STRUCTURAL GEOLOGY,-

Sets of topographic maps for Physiography laboratory ...	\$ 60.00
Lantern slides " " lectures .....	\$100.00
Relief models for physiographic forms, exhibition & class	\$200.00
	<u>\$360.00</u>

+++++

## Instruments for Field Geology,-

3 Brunton compasses .....	\$ 90.00
2 Fifteen-inch plane-tables .....	\$100.00
2 telescopic alidades .....	\$150.00
	<u>\$340.00</u>

## Course on Map Interpretation,-

300 Geological Map Sheets .....	\$ 60.00
Foreign Map Sheets .....	\$ 75.00
	<u>\$135.00</u>

## Structural Geology,-

Simple laboratory apparatus .....	\$ 50.00
Lantern slides for lecture purposes .....	\$100.00
	<u>\$150.00</u>

+++++

## ECONOMIC GEOLOGY &amp; ORE DEPOSITS,-

The outstanding need is for relief models of typical mining districts and of specific mines to illustrate the geology and the occurrence of ore-bodies in three dimensions, and similar models to illustrate engineering problems and water-supply. The cost of such would be too large to be considered at present.

The teaching collections are deficient in sets of ores and associated rocks from some of our more important Canadian districts. Much of this can be secured from larger mines by paying the cost of collection and the freight charges, but such sets are apt to be sketchy. The best method is for a member of the staff to be sent out by the university for this purpose.

ECONOMIC GEOLOGY & ORE DEPOSITS (cont'd)

Unrepresented ore occurrences, foreign .....	\$200.00
Sets from Canadian districts.....	\$250.00
	<u>\$450.00</u>

Mineralography Laboratory,-

1 petrographic binocular microscope for the estimation of relative percentages.	\$300.00
3 mineralographic microscopes.....	\$600.00
Mounts, reagents, polishing material, etc.	\$ 50.00
N.B. (This work was started this year at the request of the Department of Mining, and is also essential for graduate students)	<u>\$950.00</u>
+++++	

MINERALOGY AND PETROLOGY.-

For undergraduate teaching (12 students as a basis),-	
Crystal models.....	\$100.00
Atomic structure models.....	\$ 50.00
Crystal specimens, and oriented sections of crystals.....	\$200.00
Repairs and changes on 10 old models of microscopes.....	\$250.00
Increase in hand specimens and thin section collections, and preparing manuel.....	<u>\$250.00</u>
	<u>\$850.00</u>

For graduate work (6 students on advanced petrography)	
3 better type student microscopes.....	\$750.00
Additions to the library of bibliographies, tables, optical mineralogies, and reference classics.....	<u>\$100.00</u>
	<u>\$850.00</u>

For thesis investigations and general research,-	
1 good chemical balance.....	\$200.00
2 improved Joly balances (specific gravity determinations of minerals).....	\$100.00
1 set of immersion oils.....	\$ 75.00
1 electric hot-plate.....	\$ 50.00
1 monochromator and spectrometer.....	\$225.00
Apparatus necessary for separating ores and minerals electrostatically, and for the determining of constants....	\$300.00
1 microsclerometer.....	\$125.00
1 comparison microscope, made from two discarded petrographic models by combining them and obtaining necessary parts.....	\$100.00
Solid models of phase diagrams of petrologically important systems.....	\$ 50.00
1 electro-magnetic separator.....	\$350.00
1 set of graded screens.....	\$ 25.00
Draughting equipment for crystal drawing	\$ 50.00
1 research model petrographic and mineralogic microscope with equipment.....	\$1250.00
1 crystal refractometer (and liquids)...	\$ 500.00
	<u>\$2900.00</u>

## Department of Geological Sciences

Graduates

The first geologist to be granted a degree by McGill University was Sir William Logan, organizer and first Director of the Geological Survey of Canada, who received an honorary LL.D. degree in 1856. In the following year a similar degree was conferred on Sir William Dawson, Principal and Vice-Chancellor of the University, who, as the first Professor of Geology at McGill (1855-1899), may be aptly termed the Father of the Department.

The first geologist to actually graduate from the University was Robert Bell, destined to become a noted explorer and Director of the Geological Survey of Canada, who received the degree of B.A.Sc. in 1861. To further equip himself for his exploratory work, Dr. Bell also took the medical course at McGill, obtaining his M.D., C.M. degree in 1878, and in 1901 he was granted the D.Sc. degree.

T. Sterry Hunt, Professor of Mineralogy and Chemistry at the University, was the recipient of an honorary LL.D. degree in 1865. While at McGill, he did much field-work in geology, and he was the first to advance the now generally accepted 'anticlinal' theory to account for the formation of natural oil reservoirs.

From this time on, a steady stream of geologists graduated from the University. Brief reference is made below to some of

those who graduated prior to 1900.

Bernard J. Harrington (B.A. '69, M.A. '95, honorary LL.D. '99) was for some years on the staff of the Geological Survey, but is best remembered for his long connection with McGill, which extended over a period of thirty-six years. He was appointed Lecturer in Mineralogy in 1871, and later became Professor of Chemistry and Mineralogy. It was only after his death in 1907 that Mineralogy was transferred to the Department of Geology.

Robert W. Ellis (B.A. '72, M.A. '75, honorary LL.D. '87) devoted his whole life to work on the staff of the Geological Survey, and over a period of some thirty years accomplished much important pioneer work, especially in the Eastern Townships of Quebec and the Maritime Provinces.

Frank Dawson Adams (B.Sc. '78, M.Sc. '84, D.Sc. '02, honorary LL.D. '21), after some years with the Geological Survey, returned to McGill and later succeeded Sir William Dawson as Head of the Department. Later he became Dean of the Faculty of Applied Science and also of the Faculty of Graduate Studies, and Vice-Principal of the University. Although Dr. Adams relinquished these academic positions in 1924, he still maintains a close connection with the Department <sup>and is</sup> as actively interested as ever in geological research work.

Richard George McConnell (B.A. '79) was for many years an outstanding geologist and explorer on the staff of the Geological Survey of Canada and occupied the position of Deputy Minister of Mines from 1914 to 1920.

Wm. Fleet Robertson (B.Sc.'80) was engaged in geological work for some years after graduating and then was appointed Provincial Mineralogist for British Columbia, succeeding Wm. A. Carlyle (B.Sc.'87). Mr. Robertson retired from this position in 1921 and was succeeded in turn by another McGill graduate, (B.Sc.'11).

Albert P. Low (B.Sc.'82) joined the staff of the Geological Survey of Canada and devoted many years to valuable exploratory and geological work for that body, culminating in his appointment as Director of the Survey (1906-1908) and Deputy Minister of Mines (1908-1910).

Henry Marc Ami (B.A.'82, M.A.'85, D.Sc.'07) became greatly interested in palaeontology and was for many years on the staff of the Geological Survey. In his later years he devoted his attention mainly to pre-history, and he was the founder and head of the Canadian School of Pre-history in France.

Alfred E. Barlow (B.A.'83, M.A.'89, D.Sc.'00) was for many years on the staff of the Geological Survey and later enjoyed considerable success as a consulting geologist. Another graduate of the same year was Donaldson B. Dowling (B.Sc.'83, M.Sc., D.Sc.'21) who devoted his life to work on the Geological Survey.

Wm. A. Carlyle (B.Sc.'87), already referred to, was appointed Provincial Mineralogist for British Columbia in 1897, being the first to hold that position. Walter F. Ferrier (B.Sc.'87), after some years on the staff of the Geological Survey, has practised as a consulting geologist and has also made a specialty of the study and collection of minerals.



-4-

In 1891, the honorary LL.D. degree was conferred on George M. Dawson, Director of the Geological Survey of Canada.

John A. Dresser (B.A. '93, M.A. '97) was for eight years Principal of St. Francis College, Richmond, Que. For some years he was on the staff of the Department of Geology at McGill, and later Geologist with the Geological Survey of Canada. In 1911 he became manager of the Lands Department of the Algoma Central and Hudson's Bay Railway and five years later entered consulting work, holding at the present time, among other positions, that of Consulting Geologist to the Quebec Bureau of Mines.

In or about the year 1895 Andrew C. Lawson, now head of the department of geology at the University of California, took courses in geology at McGill, under Sir William Dawson.

Theophile C. Denis (B.Sc. '97) after engaging for some years in field work for the Geological Survey of Canada was appointed Director of the Quebec Bureau of Mines and, more recently, Technical Adviser to the same department.

As shown in the attached list, the total number of graduates and past-students in geology is 83. Of these, 18 graduated or received their degrees prior to 1900; 18 between 1901 and 1920; and the remaining 47 between 1921 and 1930.

Classifying these 83 according to the branch of geology in which they later specialized, we have

6	primarily mineralogists
6	" palaeontologists
1	" stratigrapher
45	" economic geologists
25	" engaged in general field mapping.

Location at Present:

186 Deceased  
 413 Resident in Canada  
 1 " " Newfoundland  
 11 " " U.S.A.  
 1 " " Mexico  
 8 " " Rhodesia, S.Africa  
3 Residence unknown  
 83

Occupations:-

21 have been or are University Professors  
 15 now living (7 in Canada  
 (8 in U.S.A.)  
 27 have been or are on the Geological Survey of Canada.  
 4 were Directors of the Geological Survey.  
 2 were (one is) Chief Geologists of the G.S.C.  
 2 were Deputy Minister of Mines of Canada.  
 3 Provincial Mineralogists of British Columbia  
 1 " " " Quebec  
 1 is Director Bureau of Mines, Quebec.

The remainder were in commercial work, or dropped out of geology for some reason.

In Canada at present:-

7 University Professors  
 8 On government geological surveys  
 16 In commercial and consulting work  
 7 Whereabouts unknown  
3 Studying for a higher degree

Students from 1920 to 1930

- 1921 7 { 3 grad. degrees - proceeded to foreign universities  
4 B.Sc. " " " " " " " " " " " "
- 1922 1 M.Sc. - continued at McGill
- 1923 7 { 4 M.Sc. (1 to Columbia, 1 at McGill  
1 stopped; 1 died  
3 B.Sc. (1 to Geneva  
2 stopped
- 1924 8 { 1 Ph.D.  
7 M.Sc. (5 to foreign universities  
2 stopped
- 1925 7 { 3 M.Sc. all to foreign universities  
3 B.Sc. " " " " " "  
1 Failed - to Toronto
- 1926 3 { 1 M.Sc. stopped  
2 Ph.D. returned from Geneva and Columbia
- 1927 1 M.Sc. stopped
- 1928 8 { 4 M.Sc. - all to foreign universities  
2 Qualifying M.Sc. stopped  
1 Qualifying - returned to McGill  
1 B.Sc. - stopped. Gov. service
- 1929 5 { 3 M.Sc. (1 Foreign  
1 McGill  
1 stopped  
2 Qualifying M.Sc. returned to McGill
- 1930 5 { 1 M.Sc. - returned to McGill  
1 Qualifying " " "  
3 B.Sc. (2 to foreign universities  
1 " McGill

Of these 47 students:

28 went to foreign universities for further graduate work.

12 did not take further graduate work in geology.

7 did further graduate work at McGill, of whom three are at present at McGill.

Of the 28 students who went to foreign universities:

22 received Fellowships, Scholarships, or Assistantships.

4 were unassisted.

2 doubtful.

Only about one graduate student in ten carries on his work without some financial assistance from the university he attends. At present (1930-31) there are nine graduate students in Geology at McGill and only four of them receive any financial assistance - two have teaching fellowships and two have Research Council Bursaries.

Robt. W. - B.A. '75; Hon. M.L. '87; Geol. Surv. Can.

Frank D. - B.Sc. '10; M.Sc. '12; D.Sc. '19; A.A. M.D. '21; Formerly Head of Department at McGill, now Professor Emeritus. Ex officio Dean and Vice-Principal.

Richard D. - B.A.; Geol. Surv. of Canada, Deputy Minister of Mines '14-'20.

Wm. Platt - B.A. '09; Provincial Mineralogist, B.C., retired in '21.

List of Graduates and Past Students of  
Department of Geological Sciences.

1856

\*Logan, Sir Wm. E. - Hon. LL.D. Organizer and first Director of the Geological Survey of Canada.

1857

\*Dawson, Sir J.Wm. - Hon. LL.D. Principal and Vice-Chancellor of the University and Professor of Geology.

1861

\*Bell, Robert - B.A.Sc.; M.D., C.M., '78; D.Sc., '01. Noted geologist and explorer, for 50 years on the staff of the Geological Survey of Canada, of which he became Director.

1865

\*Hunt, T. Sterry - Hon. LL.D. Professor at McGill. First to suggest and apply the Anticlinal Theory to accumulation of natural oil.

1869

\*Harrington, Bernard J. - B.A.; M.A. '95; Hon. LL.D. '99; Professor of Chemistry and Mineralogy, McGill.

1872

\*Ells, Robt. W. - B.A.; M.A. '75; Hon. LL.D. '87; Geol. Surv. Can.

1878

Adams, Frank D. - B.Sc.; M.Sc. '84; D.Sc. '02; Hon. LL.D. '21; Formerly Head of Department at McGill, now Professor Emeritus. Emeritus Dean and Vice-principal.

1879

McConnell, Richard G. - B.A.; Geol. Surv. of Canada, Deputy Minister of Mines '14-'20.

1880

\*Robertson, Wm. Fleet - B.A.Sc. - Provincial Mineralogist, B.C., retired in '21.

\*Deceased

1882

\*Ami, Henry M. - B.A.; M.A. '85; D.Sc. '09. Palaeontologist;  
Pre-historian.

Low, Albert P. - B.A.Sc.; LL.D. (Queen's '07); Director Geol.  
Survey, '06-'08; Deputy Minister of Mines,  
'08-'10.

1883

\*Barlow, Alfred Ernest - B.A.; M.A. '89; D.Sc. '00; Geol. Surv.,  
Consulting Geologist.

\*Dowling, Donaldson B. - M.Sc. and D.Sc.; Geol. Surv. of Canada,  
chief of Division.

1887

Carlyle, Wm. A. - B.A.Sc. - Provincial Mineralogist B.C. '97.  
Consulting Mining Engineer and Geologist.

Ferrier, Walter J. - B.A.Sc.; Hon. D.Sc. (Alberta, '17) -  
Mineralogist and consulting geologist.

1891

\*Dawson, G.M. - Hon. LL.D. - Director Geol. Surv.

1893

Dresser, John A. - B.A.; M.A. '97; Geol. Surv. Can. '09-'11;  
Mgr. Lands Dept., Algoma Cent. Rys. '11-'15;  
Cons. Geol. '15-Present.

1895

Lawson, Andrew C. - Grad. Student; G.S.C. '82-90; Prof. Geol., Univ.  
Cal. '90-present.

1897

Denis, Theophile - B.A.Sc.; Formerly Director of, and now Technical  
Adviser to, the Bureau of Mines, Quebec.

1898

Young, George A. - B.Sc. App. Sci.; M.Sc. '01; Ph.D. (Yale '04);  
Chief Geol., Geol. Surv. Can.

1899

Reid, Lena MacKenzie - B.A.; M.Sc. '02; Petrog. Study of Tp. of  
Wollaston. (Mrs. John Edward Radford).

\*Deceased

- 1900  
Newson, Wm. Victor - B.A.; M.Sc. '01; Certain Gabbros and Nepheline Syenites of the Tps. of Monmouth and Glenmorgan, Ont. - unknown.
- 1901  
Graton, Louis C. - Graduate Student and Demonstrator in Geology '00-'02. Prof. Mining Geol., Harvard University.
- 1902  
\*LeRoy, Osmond E. - M.Sc. Formerly Chief Geologist G.S.C.
- 1908  
Allan, John Andrew - M.Sc.; Ph.D. M.I.T.; now Head of Dept. of Geol. Un. of Alberta.  
Graham, Richard P.D. - M.Sc.; D.Sc. Prof. of Mineralogy at McGill.
- 1909  
\*Drysdale, Chas. W. - B.Sc. Ph.D. (Yale). Geol. Surv. '12-17.  
Harvie, Jr. Robert - M.Sc.; Ph.D. (Wisconsin); G.S.C.; now Consulting Geologist.
- 1910  
Bancroft, J. Austen - Ph.D. Formerly Head of Dept. at McGill - now Geologist to Rhodesian Anglo American, Limited. (not completed M.Sc.) - stopped; Consulting Mining Engineer and Geologist.  
Campbell, Edward (not completed M.Sc.) - stopped - Mgr. Crowsnest Coal Co.  
Dick, William  
Hayes, Albert O. - M.Sc.; Ph.D. (Princeton '14); Prof. of Geology Rutgers Univ., New Brunswick, N.J. (not completed M.Sc.) - stopped - unknown.  
Merrill, Art.  
O'Neill, John Johnston - M.Sc.; Ph.D. (Yale).
- 1911  
Galloway, John D. - B.Sc.; M.Sc. Provincial Mineralogist  
B.C. '21-present.
- 1912  
Brunton, James S.L. - M.Sc. - stopped; Commercial work.  
Stansfield, John - M.Sc.; Ph.D. - Oil Geology.

\*Deceased

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- 1915  
Cockfield, Wm. Egbert - M.Sc.; Ph.D. (Princeton); G.S.C. '18-'31.
- 1916  
Howard, W.V. - B.A.; M.Sc. '22; Ph.D. '24; now Prof. of Geology Univ. of Illinois.
- 1921  
Armstrong, Paul F. - Arts; no graduate record; Ph.D. (Yale); Cons. Geol.  
Dart, Miss Doris J. - " " " Graduate work at Yale.  
Douglas, George V. - M.Sc.; Ph.D. (Harvard); Rio Tinto Co.  
Gill, James E. - B.Sc.; no graduate record - Ph.D. (Princeton);  
Professor at McGill.  
James, William F. - M.Sc.; Ph.D. (Princeton); G.S.C., then Cons. Geol.  
Mawdsley, James B. - App. Sci., Ph.D. (Princeton); Prof. of Geology  
Univ. of Saskatchewan.
- 1923  
Bain, George W. - M.Sc.; Ph.D. (Columbia); Prof. in U.S.A.  
Beckwith, Miss G.B.McL. - B.Sc. - stopped  
Carlyle, A.W. - M.Sc. - stopped - now in Rhodesia.  
Denis, Bertrand T. - B.Sc.; Ph.D. (Geneva) - Rhodesia 2 yrs - now on  
Que. Geol. Surv.  
\*Dolan, Everett P. - M.Sc.  
\*Erlenborn, Willi (M.Sc. Mining - 2nd Ph.D. Geology)  
Lummis, O.J. - B.Sc. - Teaching Geology Montreal Technical School.
- 1924  
Aylard, Clara M. M.Sc. Stopped  
Bishop, E. Gordon " 2 years at Columbia and presented Ph.D.  
thesis at McGill, '26. Now in Rhodesia.  
Buffam, B.S.W. " Ph.D. (Princeton) 3 years Rhodesia, now Canada.  
\*Finley, Fred L. " Graduate work at Princeton  
O'Heir, Hugh B. " Stopped. In Canadian work.  
Pelletier, Rene A. " Graduate work at Geneva and Paris, took Ph.D.  
at McGill, 1926. In Rhodesia.  
Squires, H.D. " Ph.D. (Wisconsin), now teaching in U.S.A.
- 1925  
Bostock, H.S. M.Sc. Ph.D. (Wisconsin); now Geol. Surv. of Canada  
Davidson, S.C. " Grad. work at Harvard, now in Mexico on Econ Geol.  
Paterson, P.G. (not granted degree) Went to Toronto  
Ree, Alex. B.Sc. To Cambridge on Scholarship I.O.D.E. - not known.  
Ross, S.H. " Ass. Prof. Geol. Syracuse Univ.  
Wilson, G. " Wisconsin 1 yr. - Roy. Sch. Mi., not known.  
Wilson, H.S. M.Sc. Ph.D. (Wisconsin) - with Nipissing Min. Co.

\*Deceased



1926

Ellis, D.H. M.Sc. Stopped - in Rhodesia.

1927

Riordon, C.H. M.Sc. Stopped - in Rhodesia.

1928

Basken, Olive B.Sc. To Min. Lab. Dept. of Mines, Ottawa  
 Burton, F.R. M.Sc. 1 1/2 yrs Wisconsin, then 1 yr McGill ('30-'31)  
 DePotter, V.H. (not completed) Failed - not known.  
 Holbrooke, G.L. M.Sc. Continued 1 yr. Wisconsin, then demon. 1 yr.  
 (not completed) McGill - Int. Nic. Co. of Can.  
 Stopped; - Rhodesia  
 Howe, R.W. (not completed) Chief C.P.R. Nat. Resources, Winnipeg.  
 Hutt, G.McL. (27-'31) M.Sc. To Harvard - for Palaeontology.  
 McGerrigle, H.W. M.Sc. To Princeton - Ph.D. Work in Newfoundland.  
 Snelgrove, A.K. M.Sc.

1929

Bray, A.C. M.Sc. Continuing McGill  
 Gerson, H.S. M.Sc. Grad. work at Columbia  
 Hopper, R.V. M.Sc. Stopped; - Asbestos Corp. at present.

1930

Banfield, A.F. B.Sc. Arts To Univ. of Manitoba  
 Grimes-Graeme, R. B.Sc. " " McGill  
 Hutchins, F.M. B.Sc. " " Harvard - for Palaeontology  
 Williamson, J.T. M.Sc. " McGill

The Department of Geological Sciences

Present Equipment and Future Requirements

General Geology, Paleontology, Stratigraphy and Field Work

(Report by Professor T. H. Clark)

GENERAL COURSE - GEOLOGY I

There is no lack of material for use in this course that cannot be filled by the ordinary process of collection and occasional small purchases. Three most desirable changes suggest themselves to me, after having had charge of this course for two years,-

First: the single hour lab. work per week is absolutely inadequate, not only in total time expended on this phase of the course but also in the length of each individual meeting. Our term is short - seven months at the most. We do not actually get more than twenty-six weeks of work. This means twenty-six hours of lab. work. I do not know of any institution where Geology is taught in any way that resembles the thoroughness with which we approach the subject that would be satisfied with twenty-six hours. Two hours a week for thirty weeks is usual, three hours a week is demanded by some institutions, and four hours a week throughout the year is not unusual. McGill cannot pursue a policy of laissez faire in this respect. If we have never had more than one hour a week in the past, then the past has been at a disadvantage. We must make the lab. period one of two hours, increasing the effectiveness of the course for all, and laying a sure foundation for those using it as a stepping stone for advanced or graduate work. The paramount objection will be voiced by the Applied Science Departments concerned. Any additional hour for their students must apparently be conjured from the sky. But the need is there, and must be met. Ways and means form another's problem.

For such a change the laboratory space is adequate, and no new specimens need be provided. We must, however, see that lab. assistants be provided in a way that will be permanently satisfactory. The Leroy Fellow, if no other work be assigned to him, is abundantly able to handle all of the work of the lab., which should not require more than ten hours work a week. In this connection, I consider it grossly unfair to expect a man to devote ten hours to teaching, no matter what the stipend be, and at the same time carry on his work in competition with, and along side of, students not thus hampered.

Secondly: there is a crying need for modernization of the lecture room. To stand and deliver a lecture there conscientiously and fairly, that is, to take in the whole of the audience with eye and voice, requires a kind of occipital gymnastics which turns the speaker into a mild physical wreck. And speaking in the lecture room is second in discomfort only to sitting on the seats and listening. No doubt in 1882 the structure was considered good. So, too, was the gas light with which the building was furnished. That it has stood so long is no encomium: that it was stood for at all is a marvel. I speak thus frankly from bitter experience as both speaker and listener here.

Thirdly: there is a great need for up-to-date charts and diagrams. I make many of my own, particularly those concerning fossils. But for the greater part of the course, i.e., Physical Geology, we have practically nothing but those drawn by Sir William Dawson, or at least in his time. The excellence of those is on a par with that of the gas used here during Sir William's incumbency. I draw most of my diagrams on the board, a procedure wasteful of time in the long run, but one for which under the pressure of work there is no alternative. An advanced or graduate student could, working, say, two days a week satisfy all our requirements in two years, leaving future prudence to keep a collection of charts so made up-to-date.

STRATIGRAPHY

I have been occupied the last two years in working up a course on Stratigraphy. We are fairly well provided with specimens of sedimentary rocks. We need an abundance of thin sections of rocks, and an adequate microscope for lab. use. A moderate expense of say, twenty or twenty-five dollars should cover the purchase of any additional specimens not now in our collection. Fifty dollars would suffice to provide our teaching material with an initial stock of slides.

potential expense should be first secured. As an all-around first step, a McGill. or joint expedition to the St. Lawrence River region to bring back a few more would be well worth the effort and at the same time of great scientific interest. Stimulating the flow of funds for the further solidifying of the exhibits along these lines.

Undergraduate teaching in Paleontology is well provided for. Graduate studies in this subject are dependent partly upon the relative material of a well stocked museum, and partly upon the collections made by the students themselves. Fortunately, we can congratulate ourselves upon having a good number of collections and most of the subdivisions that one may want of Canadian localities which may be tabulated as follows:

	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Maritime</u>
<u>Triassic</u>	Four	-----	Good	-----
<u>Jurassic</u>	Five	-----	-----	-----
<u>Cretaceous</u>	Four	Good	Good	Good

The average rating is higher than a percentage basis would indicate, for no institution has as good a representation of the collection of Paleocene fossils from the West. It would appear therefore that further reinforcement of our collections in terms of purchase, except as indicated below, can only be desired in the light of a library. Collections are substantially being donated, important ones containing material worthy of exhibition or reference specimens in our museum.

To our McGill. in the future, we hope to attract students, and provided with the same for their studies. We are confident that there is a great need for such material in the West. In our opinion, a collection of this kind is a valuable asset to any institution of higher learning. We are sure that the material will be well used.

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PALEONTOLOGY

The collections of fossils in the Redpath Museum are altogether adequate in two departments -- Paleobotany and Invertebrates. Vertebrate Paleontology, however, is miserably represented. To stock the Museum with adequate vertebrate material would necessitate an expenditure of thousands of dollars, which at present hardly seems to be justified. Vertebrate Paleontology is so highly specialized a subject that were this step contemplated advice and suggestions from a competent expert should be first sought. As an alternative, or possibly a first step, a McGill, or joint expedition to the Red Deer River region to bring back a dinosaur would be both spectacular and at the same time of great scientific interest, stimulating the flow of funds for the further upbuilding of the exhibits along those lines.

Undergraduate teaching in Paleontology is well provided for. Graduate studies in that subject are dependent partly upon the reserve material of a well stocked museum, and partly upon the collections made by the students themselves. Fortunately, we can congratulate ourselves upon having a good reserve collection of most of the subdivisions that one may make of Canadian fossils, which may be tabulated as follows:-

	<u>Western</u>	<u>Central</u>	<u>Eastern</u>	<u>Maritimes</u>
Cenozoic	Poor	-----	Good	-----
Mesozoic	Fair	-----	-----	-----
Paleozoic	Poor	Good	Good	Good

The average rating is higher than a percentage basis would indicate, for no institution has as yet a good representative collection of Paleozoic fossils from the West. It would appear therefore that further reinforcement of our collections by means of purchase, except as indicated below, can only be considered in the light of a luxury. Collections are constantly being donated; important ones containing material worthy of exhibition or reserve space coming in once a month on the average.

In case McGill is fortunate enough to attract graduate students, some provision must be made for room for them to work. At present there is no possible place for them. Such place must be made here in the Museum. If no change is contemplated in the seating arrangement of the lecture room, cubicles can be built there which will in no way impede progress through the room nor

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disturb lighting arrangements.

The Paleontology shelves in the Library are far from complete, or even satisfactory. It would be fatuous to build up a satisfactory library of this kind in any other way than by seizing valuable opportunities to purchase books or by filling needs as they arise. Both require a fund of considerable elasticity. We might have to spend one hundred dollars this year, and five hundred next. From what I have seen of this part of the Library, I should say that in order to put the collection there into reasonably good working order would entail an outlay of at least two thousand dollars, with an annual expenditure over and above any contribution levied at present of at least one hundred dollars.

One department of Paleontology is scarcely provided for at all -- I speak of Micropaleontology, whose application is the basis of almost all search for oil the world over. Collections of slides and material illustrating this phase must be bought. Two hundred dollars would amply stock the laboratory with everything we need.

FIELD WORK

Elementary course. The field work carried on at McGill is, in my opinion, altogether inadequate. The elementary class goes out for five Saturday mornings, which is all we can, and probably all we should, give them. There is little opportunity, on account of the weather, to provide field work for them in the Spring, in spite of the fact that at that time the value of field work would be multiplied a hundredfold. Lacking that opportunity, however, we must consider that the elementary students are as well provided with outdoor experience as possible.

Higher courses. With, here and there, a brave exception, it is no falsehood to state that students in courses beyond the elementary course have had no opportunity for directed or original field work during the college year. To be sure, we have co-operated with the Mining Department in assisting the third year miners, but that is outside our department. I thoroughly believe that every course in the department, except one or two such as Optical Mineralogy, should have some field work as an integral part of it. On three occasions I have taken my class in Paleontology on an all day trip to New York, and to various localities hereabouts. Last October, I required two whole days field work in Stratigraphy. In every case obvious advantages accrued. I intend to continue this practice, and would rather expand the field work than contract it. Objections to field work during term time do not come from the students, in spite of the moderate expense involved, but from the staff, both of our department and of others. We frequently do not think we have the time to devote to a day's field work. We forget that for a whole day, six, eight, or ten hours, we are with our students instead of the one formal lecture period. From the point of view of the advantage to the students, there can be no question of the desirability of such work, and therefore all other departmental considerations should be made subservient. Objections also come from other departments whose arrangements are slightly thrown out of gear by the absence of so many students at once. Such objections are really neither more nor less selfish than our own objections on the basis of lack of time. The reason that field work will tend to make courses in the Geological Department more popular is an unworthy one, but a moment's reflection will show that popular courses, as long as they are not snags, owe their popularity to inherent advantages which students are sometimes quicker to sense than the staff.

Throughout my experience here I have felt very strongly on this point. I deplore the lack of field work for its own sake, but I also deplore the helplessness of advanced students when they first reach the field, their inability to apply textbook knowledge. The ability to think in terms of the outcrop can be built up through a student's undergraduate course to a degree, which, though short of perfection, will enable us to consider our graduates well rounded out -- which condition, I feel, is far from attainable today.

Outline of requirements in Physiography, Structural  
Geology and Practical Geology.

— Dr. Gill.

A. UNDERGRADUATE COURSES

Physiography

The great need of this course is illustrative materials to stimulate the student's interest and to provide practice in applying the methods of study and interpretations dealt with in the lectures to specific areas of the earth's surface. The provision of a laboratory period and purchase of maps this year has been an important step forward, but further improvements are necessary. The following are suggested:

1. More maps should be purchased. Additional copies of certain sheets now used are needed and sets of some new sheets will be required to round out the collection. Estimated requirement: 300 sheets at a cost of about \$60. Many of these may be used in connection with Geology 1.

2. Many new lantern slides are needed, especially to illustrate Physiography of Canada. It should be noted also that a number of excellent motion picture films are available at reasonable cost or for rental. These should be made available by providing funds for rental or purchase. Estimated cost: \$100.00 plus \$10.00 annually.

3. Numerous charts are desirable.

4. Relief models of certain districts, which may be purchased or made would be a valuable addition and could also be used for museum display.

Practical Geology

Surveying equipment for use in this course is now borrowed from the Department of Surveying and Geodesy and is not well adapted to geological mapping. Purchase of the following instruments is desirable:

- 3 Brunton compasses
- 2 15 inch plane tables
- 2 Telescopic alidades

For class work charts are needed.



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## B. GRADUATE COURSES

### Physiography and Map Reading

In connection with work in the regular courses in these subjects about 300 new maps will be needed: Estimated cost \$50.00. In addition, steps should be taken to complete, as far as possible, the collection of Canadian and U.S. maps now in the library and to acquire an extensive collection of foreign maps. This collection will provide a basis for research work in the field of Physiography and for courses in Geography, which should be given eventually.

### Structural Geology

Certain simple pieces of laboratory apparatus are needed to illustrate the development of folds, faults and other structures in rocks. Estimated cost: \$50.00.

Charts and lantern slides are needed.

Time should be provided for field work, if possible.

### General

All maps used frequently in the laboratories should be linen backed.

The purchase of a projector for 16 mm. motion picture film should be considered at this time. Many excellent films are available for use in connection with courses in General Geology, Physiography and Economic Geology.

### Economic Geology Museum.

While the museum at present contains a great amount of valuable material, there are certain important Canadian fields which are poorly represented and many well-known foreign fields not at all. Funds should be provided for acquisition of new collections. Large slabs for display and complete systematic collections to show the various phases of rock alteration and associated rocks are needed most urgently. The latter cannot ordinarily be purchased and for this reason it is suggested that funds be provided if and when possible to pay the expenses of a staff member on a trip or trips to various important mining districts for the purpose of

acquiring systematic collections as mentioned above. Collections of this kind, in addition to their general educational value for use in displays and in connection with regular courses, are raw materials for graduate research.

The acquisition of mine models and new cases for display and storage of specimens should be considered for use in the new museum. It is my opinion that some new cases for storage of specimens should be purchased in the near future and that the plans outlined for acquiring new collections be proceeded with at once, or as soon as possible.

Assistance will be needed for relabeling and for other purposes.

The Department of Geological Sciences

Present Equipment and Future Requirements

(Report by Professor R. P. D. Graham)

MINERALOGY AND CRYSTALLOGRAPHY

Mineral Specimens.- There is an abundance of material for lecture and demonstration purposes, students' working collections, and general class-work in blowpipe analysis, though it is necessary to purchase a certain amount of material from time to time for the latter purpose as stocks become exhausted.

There is, however, a pressing need for funds to maintain the systematic collection of minerals exhibited in the Redpath Museum. This collection is based mainly on a large and exceptionally fine collection which was purchased about 25 years ago, and at that time it was estimated that it included specimens of over 90 per cent of all known mineral species. Since that time upwards of 500 new species have been discovered in various parts of the world, and of these less than 50 are represented in the collection. It is true that there have been some additions to the collection, notably of the mineral collection of the defunct Montreal Natural History Society, but these have been in the nature of duplicates of species already represented in the collection. For maintaining the collection in newly discovered species, less than \$150 has been expended in the past 25 years. To bring the collection back to its former state of completeness would require an immediate expenditure of at least \$2,000, while for its proper future maintenance an annual appropriation of not less than \$300 is essential. (Estimate, \$2,000 and \$300/year)

Crystal Models.- The department possesses a good and quite adequate collection of crystal models in wood for both lecture demonstration and class work. A number of glass models are required, to replace breakages, and there is also need of several models to illustrate crystal structure. (Estimate, \$150 for both)

Goniometers and Accessories.- The department is well equipped with goniometers (for crystal measurement) for both undergraduate and research work. A set of drawing instruments, with set-squares, etc., is needed, those now in use being the property of the professor. (Estimate, \$35.00)

Optical Instruments, etc.- Equipment in instruments for determining the optical characters of crystals is fairly adequate. An immediate need is a refractometer (\$500). There are also required a number of oriented sections of crystals for optical examination (\$200). (Estimate, \$700)

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PETROGRAPHY AND MINERALOGY

Balances.- The department possesses one chemical balance which has been in use for 25 years and probably very much longer than that. A new one is required; also one or two improved Joly balances for determination of specific gravity. (Estimate, 1 Chemical balance \$200) \$300)  
 2 Joly balances 100)

This Section of Specimens.- What was said of rock specimens applies equally to thin sections. Systematic collections of all types of rocks are being arranged and thin sections of these must be made for their petrographic study.

Microscopes.- The department possesses one research model petrographical microscope, 3 better grade student microscope and 10 ordinary student models of older style. There are sufficient of the latter for present needs for the undergraduate work, but they should be repaired and supplied with modern equipment, but they should be repaired and supplied for graduate work at least at about \$25 each. These are also used for graduate work at present, but three more of the better grade are urgently required. (Estimate, 10 x \$25 = \$250; 3 x \$100 = \$300; total, \$550). There is immediate need for one or two additional research microscopes. (1 x \$1250 = \$1250). An extensive personal set of lenses for the microscopes available for the extensive personal use of members of the staff, and the one research model is indispensable used by students who require precision in their investigations of the material of their theses.

Besides the above, a number of instruments are required for research work; these are noted in the general list attached.

It should be noted that the equipment on the top floor of the Chemistry and Mining building for cutting, grinding and polishing rocks and minerals for study purposes is practically worn out so well as being antiquated. An item of \$1000 has been added to rehabilitate this equipment, but the proposed report is adverse to spending any large sum except to replace the equipment entirely.

PETROGRAPHY AND MINERALOGRAPHY

Rock Collections.- The collections of rock specimens for lecture and demonstration purposes are ample for present and immediately future needs; for advanced work and research we require to purchase sets of rocks from special localities and specimens of unusual rock types. (Estimate, a minimum of \$250 for specimens and thin sections required)

Thin Sections of Rocks.- What was said of rock specimens applies equally to thin sections. Systematic collections of all types of rocks are being arranged and thin sections of these must be made for their petrographic study.

Microscopes.- The department possesses one research model petrographical microscope, 3 better grade student microscopes and 10 ordinary student models of older style. There are sufficient of the latter for present needs for the undergraduate work, but they should be repaired and supplied with modern equipment at about \$25 each. These are also used for graduate work at present, but three more of the better grade are urgently required. (Estimate, 10 x \$25 = \$250; 3 x \$250 = \$750; total, \$1,000) There is immediate need for one or two additional research microscopes. (1 x \$1250 = \$1250). As matters now stand, there are no microscopes available for the exclusive personal use of members of the staff, and the one research model is of necessity used by students who require precision in their descriptions of new material of their theses.

Besides the above, a number of instruments are required for research work; these are noted in the general list attached.

It should be noted that the equipment on the top floor of the Chemistry and Mining building for cutting, grinding and polishing rocks and minerals for study purposes is practically worn out as well as being antiquated. An item of \$1000 has been added to rehabilitate this equipment, but the mechanics report is adverse to spending any large sum except to replace the equipment entirely.

The Department of Geological Sciences  
Equipment required for Mineralogy and Petrology

For Undergraduates. For 12 students.

	\$100.
1. Crystal models	50.
2. Atomic structure models	250.
3. Increase in hand specimen and thin section coll.	250.
4. Repairs and changes on 10 student microscopes	200.
5. Crystal specimens and oriented sections of crystals for measuring	

For Graduate work. For six students doing special petrography.

1. Number 3 of above list	750.
2. Three petrographic microscopes	
3. Addition to library bibliographies, optical mineralogies, tables, reference classics	100.

For research work by staff, graduates and undergraduates.

	500.
1. Crystal and liquid refractometer	
2. Research model microscope, petrographic and mineralographic, with equipment	1250.
3. Comparison microscope. Parts to be attached to two discarded petrographic models.	100.
4. Microsclerometer. Made to order	125.
5. Apparatus necessary for separating ores and minerals electrostatically, and for determining constants	300.
6. Monochromator and spectrometer	225.
7. Set of screens	25.
8. Electric hot plate	50.
9. Electromagnetic separator	350.
10. Restoring mineralographic mounting and polishing appliances	1000.
11. Solid models of phase diagrams of petrologically important systems	50.
12. Photographic equipment, microphotographic work	300.
13. Set of immersion oils	75.
14. Good chemical balance	200.
15. Two improved Joly balances (for measuring specific gravity)	100.
16. One set draughting instruments and accessories	50.
17. New minerals to bring Museum Collection up to date	2000.
	\$8400.

### Economic Geology

The application of geology to economic uses fundamentally requires a sound knowledge of all the geological sciences, and, depending upon the branch of economic geology selected, a more thorough knowledge of one or more of those sciences supplemented by a good background in chemistry, physics, mathematics, geometry (descriptive, solid, and analytical) and mining engineering.

Ordinarily the economic geologist specializes on deposits of the metals; on deposits of non-metals; on coal; on oil; on water supply; or on the geology of soils, fertilizers, etc. as applied to farming. Besides these, many economic geologists are primarily petrographers, mineralogists, structural geologists, physiographers, stratigraphers or paleontologists, and they apply their special knowledge in solving particular industrial problems of one or other of the industries.

The efficiency of the course or courses in economic geology depends to a large extent on the thoroughness of the instruction in the various branches of geology, as well as on training in the application of their knowledge to various economic uses; the equipment for teaching and research in every branch is, then, equipment in this branch also, and is utilized as such, since most students at present are more interested in the applied science than in any one of the pure sciences.

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The only branch of economic geology which is at present receiving adequate attention is Mining geology, and especially the geology of metallic deposits. It is planned to expand this to properly include non-metallics and to provide an adequate course in engineering geology as soon as space facilities and teaching materials are available. The geology and economic availability of coal, oil, and water supply are treated in only a few lectures at present, although there are many more geologists working on one or other of these for the United States Geological Survey than are on the whole staff of the Geological Survey of Canada, besides the host of geologists working for private companies.

The department at McGill must consolidate and thoroughly equip the courses it is able to offer under present conditions before tackling these other courses. In that connection the outstanding needs are for systematic collections of ores from typical mining districts for study and comparison; much of the material now available has been collected incidentally and merely represents the outstanding or conspicuous ores. A further pressing requirement is equipment for the study of polished ores. A start has been made in that work this year at the request of the department of Mining, but facilities for preparing the specimens, and microscopes, etc. for this particular kind of investigation are quite inadequate. This subject, mineralography, has only come into prominence during the last few years and this



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department has never been equipped to handle it, although it is very essential in the study of the origin of deposits and in the solving of milling and metallurgical difficulties incident to treating various ores.

The teaching equipment of charts, models, sections, diagrams, plans, lantern slides, etc. is entirely inadequate for undergraduate work as well as for graduate courses, and provision for gradually bringing this up to standard is made in the summary of requirements.

In all the branches of geology there are large and important gaps in the library which will probably have to be filled gradually.

## I. THE PRESENT ACTIVITIES OF THE DEPARTMENT OF PHYSICS

The present activities indicate clearly the need of extension.

### (a) In regard to Undergraduate Students Taking Ordinary Courses

The number of undergraduates from all faculties attending ordinary courses in Physics is at present about 500. The majority of these students are attending six courses, which are repeated in two or more sections and should be subdivided further for the best instruction. Seven further courses (primarily designed for advanced students) are also attended by certain ordinary students in small numbers. The services of four professors, two lecturers, and seven demonstrators are involved in these six larger classes. Numerous tutorial classes are given in addition to these.

### (b) In regard to Undergraduate Honours Students

The total number of honours students in the second, third, and fourth years has ranged recently from ten to fifteen per annum in number. This important group attends twelve courses in Physics, involving the services of nearly all the staff of the building.

In this group there have been seventy-four honours graduates since 1890, of which number twenty-two have graduated in the last five years. The majority of these are taking an active part in the scientific life of the country.

### (c) In regard to the Graduate Faculty

The number of graduate students proceeding to the higher degrees of M.A., M.Sc., or Ph.D. in Physics has ranged from ten to twenty per annum in recent years. This group is considered to be of special importance, and requires twelve more courses, involving the services of all

the senior staff. In addition, three regular colloquia for all, and numerous separate individual conferences are provided for this group by the staff.

Since 1895, sixty-five students have received their Master's degree (M.A. or M.Sc.) and twenty a Doctor's degree (Ph.D. or D.Sc.); eighty-five degrees in all, of which thirty-two have been obtained in the last five years. These eighty-five degrees have been taken by seventy students. During the last six years eleven of these students have come to McGill from other universities, usually as a result of the scholarships given by the National Research Council, which has also aided many of our own graduates.

(d) In regard to Research Work

This constitutes another major activity of the Department. Each year from ten to twenty investigations are in course of development, ranging from the lighter contributions of beginners to work of comparative importance performed by Ph.D. students and members of the staff. It has been the policy to provide opportunity and training for investigations in all the major fields of Physics rather than to concentrate on only one or two narrow fields. In addition to the seventy graduate students mentioned above, about twenty more have been engaged in physical research here; these include members of the staff (not included in the seventy above mentioned) and also investigators (1) who did not go up for a degree because they did not require it, and (2) those who did not reach the requisite standard in their work.

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These various activities are carried on in a building originally designed to take care of about 250 students, with a comparatively small

staff. The accommodation of double this number of students with the present staff of five professors, two associate or assistant professors, and nine lecturers or demonstrators, presents increasing difficulties in regard to the attainment of efficiency.

## II. THE REQUIREMENTS OF THE DEPARTMENT OF PHYSICS

As has already been pointed out, the Macdonald Physics Laboratory was designed for about 250 students. With the large increase in number of students and consequent increase in staff, together with the development of a graduate school, the building is greatly overcrowded.

### Laboratory Space

Owing to the large number of students, the elementary laboratories must serve for instruction in four different courses. These classes require various types of apparatus to perform their experiments, which necessitates the shifting of instruments from the tables into cupboards, drawers, cases and on to shelves, between classes. The classes have overflowed into the corridors where extra tables have been placed and shelves built against the walls to provide space for the experiments.

The basement corridor has been pressed into service for a Properties of Matter laboratory, where classes are regularly held for undergraduate Honour students.

The unfinished attic is also used for an optical and astrophysical laboratory. This room provides space for storing apparatus from the elementary laboratories. The graduate students' workshop finds space in the same attic. In this crowded and open room, one of our lecturers has to find office space.

The advanced light, advanced heat and electrical measurement

laboratories are the only laboratories in the department which at present can carry their load without crowding.

### Lecture Rooms

Certain undergraduate lectures require to be repeated owing to lack of a lecture room of sufficient size to take the whole class at once. In some cases, further subdivision of the classes would be desirable in the interests of efficient teaching. This would require still more rooms.

Lectures have to be held in laboratories or in Professors' private offices in three courses.

Tutorials have often to be held in other buildings and at inappropriate hours in order to find space. This lack of lecture-room space renders timetable adjustments with other departments exceedingly difficult.

### Rooms for Staff

There are not sufficient rooms to provide an office or provide research room for each member of the permanent staff.

### Requirements

In view of the facts stated above we need with the present student population the following additional space; with any increase in the numbers, this requirement will become imperative.

One large lecture room

One small " "

One elementary laboratory

Two rooms for Professors and Lecturers

One room for stenographic work

One further suite of rooms for research is badly needed, some of our graduate students working at present in the laboratories which are used by the honour classes in light, heat, and electrical measure-

ments. This often causes interruptions and unnecessary delays.

We strongly recommend that room be kept for an addition to the Physics building between the present site of Macdonald Physics Laboratory and University Street. Should our numbers increase, extra building space will become essential if the work of the department is to be maintained at the desired standard.

### III. EXTENSION OF COOPERATION WITH OTHER DEPARTMENTS

In view of the overlapping and inter relation of other scientific subjects it is becoming ever more important, if not indeed essential, that closer cooperation between the several scientific departments of the University should be developed. In particular we are especially desirous of having a very close cooperation with the mathematics, chemistry and engineering departments. Modern physics requires a sound, well directed training in mathematics. Without adequate mathematical training of the proper kind, advances in physics become difficult, if not impossible. There has always been a close connexion between mathematics and physics, the mathematics and physics honour course being one of the oldest at McGill. This union should continue with even more cooperation where possible, so that our students in physics will obtain early in their university career, the necessary mathematics to enable them to cope with the physics which the modern undergraduate must have early in his course. In this connexion we would suggest that frequent joint meetings between the senior members of these departments should be held.

### IV. GENERAL REMARKS

#### (a) Scholarships

We think that every effort should be made to increase the number of scholarships as soon as it is financially feasible. Many able stud-

ents are lost to us as a result of the inadequate number and small size of the majority of our scholarships. A very good case could also be made for a limited number of bursaries for needy men of good promise.

(b) Prematriculation training

This department believes that the standard of prematriculation training in the Province of Quebec as far as physics is concerned should be raised to include elementary electricity, magnetism and light. More extensive mathematical training is also desired in the case of all students intending to specialize in science at the University. More drill in Arithmetic and Algebra should be given in the schools. Memory methods are too prevalent.

(c) Matriculation standard

This department considers that an honours matriculation should be instituted and that in time it should replace the senior matriculation for all students intending to take honours. The honour matriculants would take four full years. The standard of the ordinary matriculation should also be raised but not until the schools are in a position to meet a further demand of this kind. Attention is called to the fact that time can be gained in the lower school rather than in the high school.

(d) Honours in First Year

In physics it is essential that advanced classes in mathematics and physics should be attended by all students intending to take the honour course. Exemption of the student from one subject in order that more mathematics may be done by prospective physics honour students is recommended.

(e) Loans to Students

This department is in favour of such a policy provided it would

not cripple any existing activities.

(r) Extension of University Activities

Outside lecturing and attention to industrial research should be maintained but this department is strongly opposed to any embarkation into <sup>new</sup> fields of activity until the present activities of the University are raised to their full measure of efficiency.

List 2:-

List of Honour and Graduate Students in Physics,  
1850-1930.

List 3:-

List of Research Workers in Physics,  
1890-1930.

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APPENDIX TO REPORT FOR  
PRINCIPAL'S COMMITTEE.

March, 1931

- List 1;- List of Members of Senior Staff in Physics,  
1890-1930.
- List 2;- List of Honour and Graduate Students in Physics,  
1890-1930.
- List 3;- List of Research Workers in Physics,  
1890-1930.

NAME	SENIOR DEMONSTRATOR	LECTURER	ASST. PROF.	ASSOC. PROF.	PROFESSOR
Barnes, H.T.		1902-	1903-06	1907	1908-1910 1910-1919 (Director)
Barnes, W.H.		1929-30 (Sessional)	1924-29		
Bieler, E.S.			1913-		
Boyle, R.W.	1908-09				
Bronson, H.L.		1908-09	1910-11		
Callendar, H.L.					1895-1898
Cox, John					1891-1893
Cooke, H.L.	1903				1893-1909 (Director)
Day, F.H.		1910-12	1913-16		
Douglas, A.V.		1927-30			
Eve, A.S.		1905-06 (Maths.) 1909-13 (Phys.)	1907-08 (Maths.)	1909-14	1914-1919 (1917-1919 on active service) 1920-1930 (Director)
Foster, J.S.			1924-28	1929	1930
Gillis, N.R.		1911-			
Gillson, A.H.S.				1922-30	
Gray, J.A.		1914-15	1916-19 1917-19 (on active service)	1920-23	

NAME	SENIOR DEMONSTRATOR	LECTURER	ASST. PROF.	ASSOC. PROF.	PROFESSOR
Henry, Violet	1922-23				1890-1903
Johnson, Alexander					1929-1930
Keys, D.A.	1901	1912-13	1923-26	1927-28	1922-1930
King, L.V.	1902, 1906-07		1914-16	1917-21	
King, R.O.					
McClung, R.K.					
Patterson, A.L.	1900	1928 (Sessional)			
Pitcher, F.H.					
Reilley, H.E.		1916-18	1919-26	1927-30	1899-1907
Rutherford, Ernest					
Schenk, C.C.	1904-05				
Scott, A.A.	1915-21				
Shaw, A.N.		1911-			
Tory, H.M. (Rev.)	1897-99	1895-03		1919-27	1928-1930
Watson, H.G.I.		1929-30 (Sessional)		1904-08	
Wheeler, N.E.	1912-14	1915-18	1919-21		
Wilson, H.A.					1910-1913

1890 - 1930

List 2.

YEAR	B.A.	B. SC.	M.A. and M.Sc.	PH.D.	D.Sc. and LL.D.
1890	Tory, H.M. (Medal)				
1891	- - - -				
1892	Wood, Arthur B. (Medal)				
1893	- - - -				
1894	Smith, Alistair (2nd)				
1895	Howard, E.E. (Medal)				
1896	Robertson, J.C. (Medal) Hutchinson, Margaret (1st)		Tory, H.M. (M.A.) Barnes, H.T. (M.Sc.)		
1897	Mackay, Malcolm (1st) Cameron, Mary T. "		Pitcher, F.H. (M.Sc.)		
1898	Brooks, Harriet (Medal)		King, R.O. (M.Sc.)		Callendar, H.L. (LL.D.)
1899	McClung, R.K.		Robertson, J.C. (M.A.)		Johnson, A.
1900	Johnson, J.G.W. (Medal) Radford, E.A. (2nd) Cooke, H.L. (1st hon. mental and Moral Phil.)		Coker, E.G. (M.Sc.) Owen, R.B. " Rutherford, E. (M.Sc.)		Barnes, H.T. (B.Sc.)
1901	Barrington, F.H. (Medal)		Brooks, Harriet (M.A.) McClung, R.K. " Duncan, G.R. (M.Sc.) Fraser, I.W. "		
1902	- - - -				

YEAR	B.A.	B.SC.	M.A. and M.SC.	PH.D.	D.SC. and LL.D.
1903	Lundie, E. Helen (Medal)		Cook, H.L. (M.A.)		Tory, H.M. (D.SC.) Owens, R.B. (D.S.C.)
1904	Sheldon, E.W. (Medal) Simpson, Edith (1st)		Lundie, E. Helen (M.SC.) Gill, J.L.W. (M.SC.)		
1905	King, L.V. (medal)		Sheldon, E.W. (M.A.)		
1906	Rorke, Mabel (2nd)		Boyle, R.W. (M.SC.) Cole, G.P. "		McClung, R.K. (D.SC.)
1907	Bates, F.W. (2nd) James, A. Ethel (2nd)		Rorke, M.L. (M.A.) Eve, A.S. " Shearer, G.W. (M.SC.)		Rutherford, E. (LL.D.)
1908	Gillis, N.R. (Medal) Shaw, A.N. (1st) Boyle, G.M. (2nd)		Day, F.H. (M.SC.) Gillis, N.R. " Vipond, W.S. "	Boyle, R.W.	Eve, A.S. (D.Sc.)
1909	Hatcher, A.G. (Medal) McGoughan, A.G. (1st)		Hatcher, A.G. (M.A.) Bates, F.W. (M.SC.) Shaw, A.N. " Sullivan, C.T. "		Cox, J. (LL.D.)
1910	Mabon, J.B. (Medal)		Wheeler, N.E. (M.SC.)		
1911	Paterson-Smyth, Marjorie (Medal) Maass, Otto (1st) Scott, A.A. (2nd)		Paterson-Smyth, Marjorie (M.SC.)		
1912	James, C.B. (2nd)				

YEAR	B.A.	B.SC.	M.A. and M.SC.	PH.D.	D.S.C. and LL.D.
1913	Miller, I.A. (Medal) Silver, B.J. (1st) Lariviere, Rose de L. (2nd)	Reilley, H.E. (3rd)	Scott, A.A. (M.SC.)		
1914	Henry, E. Violet (Medal) Macphail, J.B. (2nd)		Reilley, H.E. (M.SC.)		
1915	Bieler, E.S. (Medal)	Moran, J. (1st)	James, C.B. (M.SC.) Miller, I.A. "		King, I.V. (D.S.C.) Shaw, A.N. "
1916	- - - - -	- - - - -	Henry, E. Violet (M.SC.) Moran, J.		
1917	Bourke, G.W. (Medal)	- - - - -	- - - - -		Sullivan, C.T. (D.S.C.)
1918	- - - - -	- - - - -	- - - - -		- - - - -
1919	- - - - -	- - - - -	- - - - -		- - - - -
1920	Douglas, A.V. (Medal)	- - - - -	Bieler, E.S. (M.SC.)		
1921	McPherson, Anna I. (1st) Thornton, J.M. (2nd)		Douglas, A.V. (M.SC.) Smith, L.A. "		
1922	Tuffy, M.E. (3rd)	- - - - -	McPherson, Anna I.		
1923	Johnson, D.M. (1st) Perry, F.H. (1st)	Adney, F.G. Patterson, A.L. (2nd)	Patterson, A. L.		
1924	- - - - -	- - - - -			
1925	Chalk, M.L. (1st)	Watson, E.E. Terroux, F.R. (1P. 2M.)	Hachey, H.B. Home, M.S.		

YEAR	B.A.	B.Sc.	M.A. and M.Sc.	Ph.D.	D.Sc. and LL.D.
1926	-----	White, T.N. (1st.) Langley, A.J.G. (1P., 2M.) Brodie, (2nd.)	Chalk, M.L. (M.Sc.) Priestman, B. " Rowles, W. " Terroux, F.R. " Watson, E.E. "  Lane, C.T. Press, A. Watson, H.G.I. White, T.N.	Douglas, A.V.	
1927	-----	MacLeod, M.D. (1st.) McRae, D.R. " MacDonald, J.K.L. " Young, J.M. " Henderson, J.T. (2nd.) Kurie, F.D. " DeBlois, M.E. "  Helwig, H.V. Dobridge, R.W.	Crowe, M. (M.Sc.) Davies, F.T. " Henderson, J.T. " MacLeod, M.D. " McRae, D.R. " Young, J.M. " MacDonald, J.K.L. "	-----  Chalk, M.L. Rowles, W. Patterson, A.L.	
1928	-----				
1929	Gold, S. (Medal)	Katzman, J.	Dobridge, R.W. (M.Sc.) Helwig, H.V. " Harkness, H.W. "	Lane, C.T. Priestman, B. White, T.N.	
1930	Craig, C.	Osborne, D. Johnson, E.H. (Medal) Louis, B.I. Thornton, R.L. Butlin, C.M. Ross, W.B. Dunn, W.K.	Katzman, J. (M.Sc.) Heard, J.F. (M.A.)	Currie, B.W. Harkness, H.W. Langstroth, G.O. McRae, D.R.	

LIST OF RESEARCH WORKERS IN PHYSICS  
1890 - 1930

- (1) All those enumerated in list of senior staff (List 1.)  
 (2) All M.Sc. and Ph.D. students as listed (List 2.)  
 (3) The following additional names:-

<u>YEAR</u>	<u>NAME</u>
1902	Owens, B. Soddy, F.
1905	Godlewski, T. Rummelin
1905-06	Kahn, Otto
1906	Levin, M
1912	Pomeroy, J.C.
1921-23	Nichols, L.H.
1922-23	Quayle, W.C.
1924	Adney, G.
1926	Langley, A.
1930	Tobin, J.C.
	and others.



COPYREPORT ON THE DEPARTMENT OF ZOOLOGY

The Department of Zoology has maintained its undergraduate courses, leading up to postgraduate studies, with unimpaired success up to the present time. Most of the students continue their postgraduate work in other departments, because the opportunities for obtaining appointments in the zoological field have not been very frequent.

In 1925 the curriculum was temporarily interrupted by the death of Dr. Joseph Stafford, associate professor, which took place on March 24th of that year. He had been in the department for twenty-five years and had published many papers, chiefly on parasitology in which subject he was a recognized authority.

Dr. Lancelot T. Hogben was appointed Assistant Professor on June 9th, 1925, and remained here until January, 1927, when he left in order to take up the Professorship of Zoology at the University of Cape Town, South Africa. He advanced the work of the department on the experimental side.

In 1927-28, Dr. M. Notkin was given the provisional appointment of Assistant Professor of Medical Zoology.

In 1928-29, Dr. N. J. Berrill was appointed Assistant Professor of Zoology. He had previously held a special appointment in the Department of Physiology at the University of Leeds, England. As holder of a Rockefeller Fellowship he had visited and done research work at several marine biological stations in England, Scandinavia, United States and Canada. His published work is of high quality

In 1930-31, Mr. V. C. Wynne-Edwards, B.A. (Oxon.) was appointed Lecturer in Zoology, having previously held an appointment in the University of Bristol, England. He has published papers on the mass-movements of birds which have gained for him an assured position in the field of ornithology. He is an accomplished draughtsman and is a most useful addition to the staff.

Miss Jean T. Henderson was appointed to the Philip Carpenter Fellowship in 1922 and became Lecturer in Zoology in 1923. She took her M.Sc. degree at McGill in 1926, the title of her Thesis being "Lethal Temperatures in Lamellibranchiata". This was published later in Contributions to Canadian Biology and Fisheries, vol. IV, No. 25, 1929. Miss Henderson was appointed Instructor in Biology at the Washington Square College, New York University, in 1928, and remained there for two years, returning to McGill for the session 1930-31.

Mrs. Kathleen F. Pinhey, M.Sc. (McGill) was awarded the Philip Carpenter Fellowship in 1923 and was re-appointed for the two following years, becoming Lecturer in 1926-27. She wrote a valuable report on the Plankton of the Belle Isle Strait Expedition (1923), which was published in two parts in the Contributions to Canadian Biology and Fisheries in 1926 and 1927. She took up Experimental work in conjunction with Dr. Hogben, two joint papers being published in the British Journal of Experimental Biology, for December, 1926. In 1927 she was awarded a Moyse Travelling Scholarship, proceeding to England where she remained for two years. She returned to McGill in 1929 and obtained the Ph.D. degree in May, 1930.

During the two years 1926-27 and 1927-28, the Philip Carpenter Fellowship was held by Dr. J. K. Breitenbecher, a noted geneticist who had fallen into ill-health from which, unfortunately, he failed to recover. During his stay here, he published one paper in the Transactions of the Royal Society of Canada (vol. 20, 1926).

During the two sessions 1928-29 and 1929-30, the Philip Carpenter Fellowship was held by Mr. B. W. Taylor, who took his M.Sc. degree in May, 1930. Mr. Taylor now holds the appointment of Biologist and Superintendent of Hatcheries in the Department of Colonization, Game and Fisheries, Province of Quebec.

Miss Josephine Johanna Mary Kamm took her M.Sc. degree in May, 1929, with the Thesis: "Comparative Anatomy of the Great Horned Owl and Whistling Swan." The owl had been kept alive in the laboratory for some time and the swan was one of those which had been swept over the Niagara Falls. Miss Kamm is now a student of medicine at Edinburgh University and has written letters appreciative of her course at McGill.

Dr. Camille Lherisson came to McGill from Haiti on a Rockefeller Scholarship. He obtained his M.Sc. degree in May, 1930, on the Thesis: "Experimental Culture and Reactions of Paramecium." Observations had been made on the behaviour of this infusorian in the spring of the year three or four years previously and had been held in reserve for such an occasion as this.

In September, 1930, Miss Kathleen E. Carpenter, Ph.D., who had been engaged by the Biological Board of Canada to make an expert analysis of the water that was being supplied to the tanks and ponds

at the Atlantic Biological Station at St. Andrews, N.B., was appointed to the Philip Carpenter Fellowship. She was strongly recommended by Dr. Babkin and has indeed proved to be a very valuable auxiliary to the staff. Dr. Carpenter is giving a course of lectures and demonstrations on Animal Ecology, upon which subject she has written a book. These are highly appreciated by the students attending the course. Her special line of research at present is the oxygen consumption of fishes, in pursuance of which she has set up an ingenious equipment. This is a question of importance in connection with the re-stocking of inland waters where the fishing has been exhausted.

Professor N. J. Berrill has recently devised a feasible project for the establishment of an Aquarium above the greenhouses. Preliminary plans have been drawn up by Professor P. E. Nobbs and interest has been aroused in influential quarters. An aquarium, such as the one in contemplation, would have twofold value: for the University and for the Public. It would provide an addition to the amenities of Montreal and material for biological research. X

During my period of service at McGill (from 1910), I have made a number of expeditions in and out of the country, all of which have been followed by publication of results. For one of them, involving a voyage by canoe and portage to Lake Mistassini in the summer of 1924, I was partly assisted by a substantial grant from the University. About that time, (I have forgotten the exact date and have mislaid the diploma), I received notification, unexpectedly, of my election as a Corresponding Member of the

Zoological Society of London, England. Before the war I made three winter trips to obtain material for the study of the fetal development of the beaver. The first paper on this subject was published by request in the Festschrift for Professor J. W. Spengel of Giessen; the second paper in the Quarterly Journal of Microscopical Science.

In 1920, I accompanied Dr. Huntsman on a journey to the Quill Lakes, Saskatchewan, which are somewhat alkaline, to examine the fishery resources, including the food of young fishes. A small crustacean species was found, for the first time on the American continent, which had originally been discovered by a French explorer in a saline pool in Algeria. In 1922 I collected the same form in Lake St. John, together with another interesting species in spawning array. It was in consequence of these determinations that it seemed worth while, if it could be arranged, to push farther north to Lake Mistassini, beyond the Watershed. During the latter trip in 1924, while trying to help the men to pole the canoe round a projecting point of rock, I fell into thirty feet of water without being carried away.

In 1923, at the May meeting of the Royal Society of Canada, I served as President of the Biological Section. In October, 1927, at the request of Sir Gregory Foster, Provost of University College, London, of which I am a Fellow, I represented the College at the Centenary Celebration of the University of Toronto. I spent the summer of 1927 at the Bermuda Biological Station for Research; the first part of the results was published in the Annals and Magazine of Natural History for July, 1930. In September, 1930, I attended

the eleventh International Congress of Zoology at Padua, Italy, and presented a paper which will appear in the Proceedings of the Congress.

Within the past thirty years, the theory of natural selection, Charles Darwin's great contribution to natural history, has been the object of much destructive criticism and, as I think, of unnecessary disparagement. The revival and extension of Mendel's earlier experiments on the selective breeding of plants caused a reaction to set in to the detriment of the position gained by Darwin's life-work. With a desire to arrive at a fair understanding of the involved situation thus created, I released, at the end of 1930, a small volume entitled Lectures on Darwinism, through the publishing house of Richard G. Badger (The Gorham Press), Boston, Mass.

For the past five or six years I have been a member of the Central Executive Committee of the Biological Board of Canada, and have just completed for the Board a report on the Plankton of Hudson's Bay in the interests of fishery administration. Hudson's Bay has been described as a Desert Sea from the standpoint of the fishing industry. A knowledge of the physical, chemical, biological and hydrographical conditions in the Bay may be expected to throw light upon the reasons for its barrenness. In the material examined by me, comprising many hundreds of specimens, a small crustacean species, which occurs elsewhere in immense swarms, is conspicuous by its absence. This species (Temora longicornis) is a favourite ingredient in the food of the herring, which is also absent from the Bay, and with it the common codfish and the Atlantic salmon.

There is room for expansion in the field of economic entomology, where Government appointments are open to candidates. Hitherto the instruction offered at Macdonald College has been held to cover the ground. Some years ago an entomological exhibit was installed in the Redpath Museum under the terms of the Lyman Bequest. This might form the basis of a course of instruction under a special appointee at a future date.

The relation existing between the University and the Biological Board of Canada requires special consideration. Marine biology, with all its affiliations, is one of the avenues of biological research in physiology, biochemistry, botany, and zoology. At present the Board is placed under the obligation to carry out industrial researches bearing upon commercial fisheries and to furnish answers to numerous questions which arise therewith, often requiring special researches to be instituted at short notice. This provision would appear, on the face of it, to close the door to pure science irrespective of its applications, although the Atlantic Biological Station at St. Andrews, N.B., of which Dr. A. G. Huntsman is the Director, is equipped for such researches.

Twenty years ago the Biological Board was still in the pioneer stage of its existence. Since the war its activities have expanded very greatly, and it is now thoroughly established as a going concern, subject to certain regulations which limit and define its functions under Government control. The Board does not, as a general rule, undertake to pay the expenses of those who are not engaged in industrial research but, if space permits, they are allowed to make use of the facilities provided at the Station,

if their expenses can be covered in other ways than by the Board.

There are Canadian professors and their assistants (graduate students) who wish to avail themselves of the privilege of working at St. Andrews during the summer months and who also desire to have their travelling and boarding expenses defrayed.

The expenditure sanctioned by the Board is open to the criticism of members of parliament and the fishing industry. It would seem therefore that the time has arrived when a new understanding between the University and the Biological Board should be arranged, and it is submitted that this could be effected through the Graduate Faculty acting in conjunction with the new Faculty of Science.

In connection with the re-appointment of new Committees to carry on the work of the new Faculty, involving the resignation of existing Committees, I would suggest that these changes should react upon the representative of the University upon the Biological Board, bringing about his resignation automatically, in order that a new start may be made under changing conditions.

There is another matter, though of minor import, which deserves to be mentioned. The annual Somerville Lecture on Natural History which was revived at the University four years ago and carries with it an honorarium of \$100.00 for visiting lecturers has not yet been placed upon a sound footing as regards the nomination of the lecturer. Those who have come here to give it during the past four years have regarded it as an honour to receive the invitation, extended through the Department of Extra-



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Mural Relations. The lectures, held in the Moyses Hall, have been well attended, the usual and most satisfactory hour for the public being 8:30 p.m. It would be appropriate that in future the nomination for the lectureship should come from the Faculty of Science.

(Signed) Arthur Willey.

31. I. '31.

REPORT ON GRADUATE WORK IN THE DEPARTMENT OF CIVIL ENGINEERING AND APPLIED MECHANICS.

COURSES OFFERED.

In the Faculty of Graduate Studies courses offered by the Department of Civil Engineering and Applied Mechanics are grouped under the subdivisions of Theory of Structures, Hydraulics and Highway Engineering, and lead to the degree of Master of Engineering. They are normally completed in one academic year of full time work. In one special case, within the past ten years, a student studied for three years and obtained the degree of Ph.D., but there is practically no demand for such a course in this Department, and at the present time none is offered. All instruction and supervision of experimental work is carried on by members of the staff of the Department in addition to their regular undergraduate work, which necessarily absorbs the major portion of their time. Only passing reference need be made to the lecture courses of the curricula, which are described in the announcement of the Faculty. During the past ten years this lecture work has been carried on by the late Dean MacKay, Professor Brown, Dr. Batho, the late Professor H.M. Lamb, and Professor Jamieson. At the present time the work is being given by Professor Brown and for the measurement of stress by the photo-elastic method, and

Professor Jamieson. The original research work required for the preparation of theses submitted by candidates for degrees has in the past been supervised by the late Dean MacKay, and by Professor Brown. Since Dean MacKay's death, early in the present session, his part of this work has been taken over by Professor Jamieson.

been found that specimens required for the various investigations undertaken in recent years have been readily designed LABORATORY EQUIPMENT.

The laboratories of the Department are well equipped for the carrying on of certain types of experimental work for graduate students. Strength of Materials Laboratory.

The materials testing laboratory contains machines of capacities ranging from 10,000 lbs. to 210,000 lbs. Each of these machines will test up to capacity either in tension or in compression, and most of them can also be used for tests of beams under transverse loads. Strain measuring equipment includes extensometers of the Unwin, Ewing and Martens types, Howard and Berry strain gauges, etc. The Martens type extensometer will readily measure deformations of 1 in 200000, and owing to its extreme simplicity and to the fact that it can be used with facility on specimens of almost any shape or size, this type is extensively used by our graduate students. The laboratory has recently acquired by donation from Mr. C.M. Morssen, a complete and most up-to-date equipment for the measurement of stress by the photo-elastic method, and

Macdonald Engineering Building were made possible by the a set of a new type of extensometer by Hugenberger.

Our students usually have about three months available for experimental work and the preparation of the thesis. The scope of any one investigation in the structural field must therefore be limited to what can be accomplished in that time. It has been found that specimens required for the various investigations undertaken in recent years have been readily designed under the limitations imposed by the capacities of our testing machines.

Investigations of the behaviour of structural specimens of large size can only be made with machines of a capacity far greater than that usually found in a university laboratory. Such machines are being installed in the new laboratories of the National Research Council at Ottawa, and the experience of our department in the use of testing equipment was placed at the disposal of Dr. Boyle in planning these laboratories. The training provided in our structural course for the Master's Degree develops men who are well qualified either for positions in the field of structural design, or for the experimental work such as will arise in the testing laboratories of the Research Council.

#### Hydraulics Laboratory.

For many years the department was handicapped by a laboratory which was entirely inadequate even for undergraduate work in hydraulics. Certain rearrangements of space in the

Macdonald Engineering Building were made possible by the removal of the laboratories of the Department of Electrical Engineering, and a hydraulic laboratory more in keeping with the importance of this subject in Canada, was established in the space so vacated. The new laboratory provides facilities for research investigations of some hydraulic problems in which flows of not over 10 c.f.s. are sufficient. Even this amount of water, however, involves the costly method of recirculation by pumps, as the city mains cannot furnish a supply at that rate. There are, of course, many important hydraulic investigations which require greater supplies of water, but our present equipment, while planned primarily for the teaching work of the undergraduate courses, can be adapted at relatively small expense to meet most of the requirements likely to arise in handling graduate students. It may be noted that by the co-operation of the engineers in charge of the design of the Montreal Island Power project which was recently completed, provision was made in the dam so that hydraulic testing could be undertaken at that site either by the company or by the university, should future conditions make it desirable. A large supply of water would be available under natural river flow conditions, and many investigations could be carried out there, which would be impossible in the laboratory. In studying the hydraulic features of the above project, the facilities of our laboratory were utilized to advantage by the engineers in charge, in the making of tests on models of the proposed structures.

### Highways Laboratory.

Good facilities are provided for experimental work on the problems of highway engineering, but comparatively few students, as yet, have taken the municipal option in the fourth year course in civil engineering, and none have proceeded to the Master's Degree in the subject of highways.

### NUMBERS OF STUDENTS AND LIMITATIONS IN WORK.

The numbers of students taking graduate work are limited. Each student in structural work requires the use of a testing machine for extended periods, and his work must be fitted in with that done in undergraduate courses in which the same machines are used. In the tests, he is occupied with making the observations, and not infrequently requires a laboratory assistant to operate the machine. Probably not more than two or three such students can be accommodated at one time.

Similar restrictions apply to work in hydraulics. It is indeed sometimes difficult to arrange a suitable research in hydraulics for a single student on account of the necessity of taking several simultaneous observations, as this may require greater assistance than can be given by the laboratory staff.

A thesis dealing in critical manner with alternative proposals for an engineering project of considerable magnitude, or with some special phase of engineering work requiring original power of analysis, may be submitted in place of a laboratory research, but this course is not usual.

SUBJECTS INVESTIGATED.

Broadly speaking, the subjects of investigation undertaken by our graduate students have been closely allied to contemporary problems of major importance in engineering. The failure of the first Quebec Bridge in 1907, materially a disaster of the first magnitude and a serious blow to the prestige of modern structural science, gave rise to many searching investigations including questions of secondary stresses in bridge trusses, strength of compression members, effects of pin friction, etc. More recently the technique of welding structural steel by means of the electric arc has been developed, and many problems have arisen requiring careful laboratory investigation and mathematical analysis. Although the actual amount of investigation possible at any one time is necessarily limited, continuity of effort has been secured by careful planning of the work in successive years. In this way considerable progress has been made in the study of secondary stresses, and of the fundamental laws governing the distribution of stress in riveted and welded joints. In this effort we have had the closest co-operation and assistance from the Dominion Bridge Company, both in the supply of specimens and in the planning of the tests. Similar conditions exist in hydraulic research, in which two students are engaged during the present session. It is expected that the laboratory facilities recently made available will stimulate further interest in hydraulic work.

Degree of The department feels that it is highly desirable to maintain and develop this correlation between contemporary problems and the work of our graduate students. To this end, the members of our staff maintain direct contacts with the industries involved. Mutual co-operation has proven to be of the greatest benefit, and it is our belief that the value of the graduate work in the department will be enhanced by a continuation of this policy.

LIST OF THESES SUBMITTED IN RECENT YEARS, AND  
PRESENT POSITIONS HELD BY GRADUATES.

The following lists indicate the working out during recent years of the general policy stated above, and show that those passing through our graduate courses are occupying responsible positions in both the academic and professional fields. It is not intended as a complete list of graduates.

Degree of Ph.D. "Secondary Stresses in Bridges", by Cecil Vivian von Abo, who entered our graduate school from the University of Capetown, and is now back in South Africa, where he holds the position of Chief of the Civil Engineering Department, South African Railways and Harbours, Johannesburg. This contribution to engineering science was published in the Proceedings of the American Society of Civil Engineers in 1924, and evoked great interest and much valuable discussion among bridge engineers throughout the world. So highly was it regarded that the Society awarded to Dr. von Abo the highest honour in their power to bestow, viz the Collingwood Prize for Junior Members.



Degree of Master of Science (M.Sc.).

1912. "Secondary Stresses in Bridge Trusses" - H. M. Lamb, (deceased) formerly Associate-Professor of Civil Engineering, McGill University.
1920. "Some Considerations of the Strength of Built-up Compression Members." - R. E. Jamieson, now Associate-Professor of Civil Engineering, McGill University.
1922. "The Water Factor in Concrete." - G. J. Dodd, now Assistant-Professor of Civil Engineering, McGill University.
1922. "Riveted Joints." - R. S. Eadie, now Assistant to the Chief Engineer, Dominion Bridge Company, Montreal.
1922. "The Distribution of Stress in a Riveted Plate Joint of Variable Section." - A. E. Macdonald.
1924. "Investigation of I-beams Haunched with Concrete, with especial Reference to Bond and Shear." - J. C. Trueman, now Structural Designer, Dominion Bridge Company, Winnipeg.
1925. "The Continuity of I-beams Haunched in Concrete." - G. E. Shaw, Bridge Department, Canadian Pacific Railway.
1926. "An Investigation of the Secondary Stresses in a Roof Truss having Unsymmetrical Members." - A. Campbell, now Sales Engineer, Dominion Bridge Company, Winnipeg.
1927. "The Effect of the Manner of Support and of Certain Details of Construction on the Secondary Stresses in a Roof Truss." - C. E. Morrison, now Assistant in the Department of Civil Engineering, University of Toronto.
1929. "The Distribution of Stresses in Welded Joints." - A. M. Bain, now in Design Office, Dominion Bridge Company, Montreal.
1930. "Further Investigations of the Distribution of Stress in Welded Joints." - R. M. Hardy, now Lecturer in the Department of Civil Engineering, University of Alberta.

high to attract and retain men of proper calibre.  
 Other graduates occupying prominent positions  
 will be required.  
 in the engineering colleges are:-

- (b) J. N. Finlayson, Professor of Civil Engineering,  
 University of Manitoba.
- R.S.L. Wilson, Professor of Civil Engineering and  
 Dean of the Faculty of Applied Science,  
 University of Alberta.
- H. K. Dutcher, formerly Professor of Civil Engineering,  
 University of British Columbia; now in private  
 practice.

There is now available in the department  
 only one FUTURE POLICY AND REQUIREMENTS.

Porter Scholarship - founded recently by Dr. Walter Colpitts  
 (Science '39). The income from the present endowment  
 enables us to offer a scholarship of \$500.00 in  
 alternate years.

The department feels that the policy outlined  
 above should be developed to meet the changing conditions  
 and increasing demands of industry for men trained in the  
 specialized work of the graduate schools of our universities.  
 The burden of undergraduate teaching and administration  
 carried by the present staff is a heavy one, and it is a  
 tribute to the work and influence of the late Dean MacKay  
 that so much has been accomplished with existing resources.  
 The measure of success is shown in the list submitted above.  
 To maintain the high standards attained in the past, and to  
 provide adequately for future development the essential  
 requirements are as follows:-

*True*

- (d) (a) The provision of at least one full-time  
 professor to devote the major part of his  
 time to research in accordance with the general  
 plan outlined above. Salaries sufficiently

high to attract and retain men of proper calibre, will be required.

(b) The establishment of open scholarships or fellowships adequate in number and amount to attract the best students, and thus make the most of our resources. Such scholarships may possibly be provided by the industries, as is done at present in some undergraduate courses. There is now available in the department only one open graduate scholarship - the John Bonsall Porter Scholarship - founded recently by Dr. Walter Colpitts (Science '99). The income from the present endowment enables us to offer a scholarship of \$500.<sup>00</sup> in alternate years.

(c) The provision of funds for the purchase of such new equipment as may be needed either for a specific research or to keep the laboratories abreast of the times in the matter of general equipment. In many cases the industries concerned would contribute largely to the provision of materials and equipment for special purposes, and such equipment, if of general value, would usually be donated to the laboratory.

(d) Funds for the proper upkeep of the engineering library, including both new books and the publications of the leading technical societies. In this connection,

25<sup>th</sup> 1931

GRADUATE WORK IN THE DEPARTMENT OF ELECTRICAL ENGINEERING.

The department offers -11- instruction in a number of

graduate courses for men wishing to proceed to the degree M.Sc. or M.Eng. but in many branches the laboratory equipment for graduate work is entirely inadequate.

The following courses are offered:-

- (a) Design of Electrical Machinery. Special problems of design. Professor Christie.
- (b) The establishment of the Engineering Index Service, which might perhaps be accomplished with the aid of industries and practising engineers in Montreal, would serve a useful purpose in providing abstracts of recent technical papers throughout the world in all branches of engineering science.
- (c) The protection of Electrical Power Systems. Professor Christie.
- (d) Stability of Electrical Systems under normal and transient conditions; determination of short-circuit currents; design of generators and excitation systems for maximum stability.
- (e) Inductive coordination of Power and Signal Systems.

(f) Electric Circuit Analysis. The general theory of electrical networks composed of No specific recommendations or requests for

advance funds are made here, in this report dealing only with general policy.

The Thesis may be in one of the following fields of investigation:-

- (a) Design of Electrical Machinery. Properties of Dielectrics and Electric Insulators, Electric Measurements, Protection of Power System Stability under normal and transient conditions.
- (b) Inductive Coordination of Power and Signal Systems.
- (c) Transmission Circuits, Radio-frequency Measurements, Low-voltage Measurements.

B. Brown

Research Problems:- Professor Wallace.

(a) Research in connection with transmission networks, - filters, Attenuation equalizers, phase distortion equalizers.

March 25<sup>th</sup> 1931.

GRADUATE WORK IN THE DEPARTMENT OF ELECTRICAL ENGINEERING.

The department offers instruction in a number of graduate courses for men wishing to proceed to the degree M.Sc. or M.Eng. but in many branches the laboratory equipment for graduate work is entirely inadequate.

The following courses are offered:-

- (a) Design of Electrical Machinery. Special problems of design. Professor Christie.
- (b) The protection of Electrical Power Systems. --Professor Burr.
- (c) Stability of Electrical Systems under normal and transient conditions; determination of short-circuit currents; design of generators and excitation systems for maximum stability. Professors Christie & Burr.
- (d) Inductive coordination of Power and Signal Systems. Professor Wallace
- (e) Electric Circuit Analysis. The general theory of electrical networks composed of constant circuit elements. Dr. Howes.
- (f) Advanced Wire Transmission Theory. Professor Wallace.

The Thesis may be in one of the following fields

of investigation:-

Design of Electrical Machinery, Properties of Dielectrics and Electric Insulators, Electric Measurements, Protective Devices, Power System Stability under normal and Transient conditions, Inductive Coordination of Power and Signal Systems, Telephone Transmission Circuits, Radio-frequency Measurements, Acoustical Measurements.

Research Problems:- Professor Wallace.

- (a) Research in connection with transmission networks, - filters, Attenuation equalizers, phase distortion equalizers,

Dean, M. McKeown, M.Sc., Professor  
Associate, H. Howes, M.Sc., Associate Professor

- (b) Investigation of influence of power circuits voltage waveform on interference induced in Communication circuits.

Dr. Howes.

- (a) Investigations in connection with radio-frequency circuits, in the rectification of high-frequency currents, generation and detection of ultra-short waves. Signal strength investigation.
- (b) Development of means of measuring directly velocity, pressure and energy in audible frequency sound waves.

*C.V. Thwait*

From investigations carried out, in many cases in the research departments of many of the firms themselves or in special research departments of Universities subsidized by Industry, the trend in heat power development is along the line of larger and larger units working at higher speeds or pressures or temperatures.

Such investigations require much expensive apparatus, much time and skilled and experienced observers. None of these are available at any University where the staff are giving the major portion of their time to Undergraduate work, possibly only the skilled observers available at any University not heavily loaded for research.

In the United States therefore many of the larger firms such as the General Electric, Westinghouse, Bell Telephone and General Motors, to mention only a few outstanding examples are their own research laboratories. Others provide funds to some University and ask the staff to plan and supervise the work.

## DEPARTMENT OF MECHANICAL ENGINEERING

MCGILL UNIVERSITY

MONTREAL

CHAS. M. MCKERGOW, M.Sc., PROFESSOR  
ARTHUR R. ROBERTS, M.Sc., ASSOCIATE PROFESSOR

THE GRADUATE SCHOOL AND MECHANICAL ENGINEERING.

During and immediately after the war a great impetus was given to Research in Industry and this has been reflected in the field of Mechanical Engineering.

The problem of efficiency in the production and utilization of power, and the investigations made to increase this efficiency have revolutionized the design and operation of boilers, furnaces, and auxiliaries of the power station. The problem of increased efficiency in transportation has revolutionized the locomotive, the motor car and marine propulsion.

From investigations carried out, in many cases in the research departments of many of the firms themselves or in special research departments of Universities subsidized by Industry, the trend in heat power development is along the line of larger and larger units working at higher speeds or pressures or temperatures.

Such investigations require much expensive apparatus, much time and skilled and experienced observers. None of these are available at any University where the Staff are giving the major portion of their time to Undergraduate work, possibly only the skilled observers<sup>are</sup> available at any University not heavily endowed for research.

In the United States therefore many of the larger firms such as the General Electric, Westinghouse, Bell Telephone and General Motors, to mention only a few outstanding examples have their own research laboratories. Others provide funds to some University and ask the staff to plan and supervise the work.

This is done at Purdue to cite an example.

In Canada most of the larger firms allied to Mechanical Engineering are either under license to, or the control of firms in the U.S. so that there is little or no reason to duplicate the work in this country.

With this background in mind, the question might be asked "What is the best course of training to give a graduate in Mechanical Engineering wishing to proceed to an M.Sc. degree?"

Courses of advanced study are offered in Thermodynamics, Machine Design, Industrial Engineering and Fuel Engineering. Their purpose is to give a broader and deeper insight into the subjects studied than was possible in the Undergraduate course. A thesis must be presented covering some definite new problem.

Owing to the fact that but one or two men are taking any one of the advanced courses at any one time, the scope of the problem to be studied is limited in part by the number of investigators available. The apparatus must be such that but one or two men are needed to operate it.

Further, the scope of the work is limited by the funds available for buying or making new apparatus, supplies and materials. This means that in most cases the apparatus already installed in the laboratories must be used. Further, the time this apparatus can be used is limited by the time it is available. Further, even the best of graduate students are not qualified to conduct any research unaided. Especially is this true when the apparatus is new or unusual. Time must be taken to learn the peculiarities of the equipment. When this has been accomplished there is frequently little time



for the conduct of the investigation. The consequence is that in many cases the investigation when submitted, is incomplete and the results obtained are inconclusive.

Any man taking the advanced course of study should, and many do, benefit by it.

In so far as original research is concerned in connection with graduates going forward for an M.Sc. degree, we cannot do much more than increase skill in the use of delicate apparatus and encourage more care and understanding in the conduct of experimental work over that which was possible in undergraduate work.

We do find out, however, those men who have a bent for research work. I have tried in these remarks to give a frank and true appreciation of the attitude of the Mechanical Department towards research work as it exists and what are our ideals and our difficulties in connection with the research work of the graduate student.

Though research work demands much time and energy, some of my staff have devoted and are devoting their spare time to carrying on some original work.

It would be very acceptable if it were possible to find a man and funds to be devoted wholly to this important work but it seems unlikely that these will be obtained in the near future.

*Per. M. McKelvey*

COPY

REPORT TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH ON  
THE DEPARTMENT OF METALLURGICAL ENGINEERING

Introduction

Metallurgy is an industrial art in which mechanical operations and chemical reactions are employed to obtain metals from their ores and to fit them for industrial use. The art of Metallurgy is always in a state of flux, as new methods of treating ores are continually being devised and new combinations of metals are discovered. In order effectively to advance the Art and Science of Metallurgy, the student must have a working knowledge not only of ordinary inorganic chemistry, but of the more abstruse branches of chemistry, such as thermo-chemistry, electro-chemistry and physical chemistry, together with a knowledge of the problems in metallurgy that await solution. In view of this, an advanced study of metallurgy forms a suitable subject for graduate study.

Metallurgical Research

In the field of metallurgy and ore-dressing the term "research" is applied to very different types of investigation. Some of these are quite simple and even mechanical in character while others are more abstruse and require a greater scientific ability. As an example of the former, a student may treat an ore of iron in a magnetic concentrator and find what degree of concentration can be obtained and how this is affected by the size to which the ore is crushed and by the other variable con-

ditions of the test. As an example of the latter, x-ray analysis may be employed to find in what way the atoms of the constituent metals are arranged in the molecule of a solid alloy.

In metallurgical investigations an immense amount of time and money has been wasted by attempting to build the superstructure before laying the foundation. In designing a new metallurgical process, it is best to begin with researches of a purely scientific kind to determine the exact conditions under which the desired chemical reactions and physical changes will take place, and only after this information has been gained should the main problem be attacked. A metallurgical laboratory should be furnished mainly with appliances for fundamental testing and scientific research, but it should also be equipped for operations on a somewhat larger scale to test the application of fundamental data to practical processes and for educational demonstration.

#### Equipment for Metallurgical Research

The laboratories in the Metallurgical Department were built and equipped more than thirty years ago and were quite unsuitable for metallurgical research. We have installed a number of modern scientific appliances but our work has always been seriously handicapped and we need new and well-equipped laboratories in which research work of a scientific type can be undertaken in a satisfactory manner.

Our equipment includes furnaces heated by gas or electricity in which ores, metals or other materials can be heated to moderate or very high temperatures in air or any desired gas. We have pyrometers for measuring and in some cases for automatically controlling the temperatures of these furnaces. We determine the fusibility of various materials and study chemical reactions at

of the openings for trained workers in this field, it is desirable high temperatures. We have equipment for the examination and that our laboratories and other equipment should be placed on a photography of the microscopic structure of metals and we are more satisfactory basis. installing an x-ray apparatus for testing metal castings.

As regards the staff, Mr. Sproule has a special interest in the modern subject of "physical metallurgy", taking up particularly the microscopic examination and the physical testing of metals. A high-frequency electrical equipment for heating and melting metals should be obtained, as this is now in use in all modern research laboratories and is particularly desirable for metallurgical special study of electro-metallurgy. It would be desirable to have an associate who could devote himself to the Department of hydro-metallurgy and who could carry out the chemical analysis but can make leaching and electrolytic experiments on a very small scale. We have a small laboratory for chemical analysis.

We are not well equipped for research in hydro-metallurgy but can make leaching and electrolytic experiments on a very small scale. We have a small laboratory for chemical analysis.

In addition to laboratories, graduate students need a reading room in which they can consult texts, periodicals and pamphlets dealing with the subjects of their theses. We have no suitable room for this purpose but I keep a working library and a classified file of papers in my own office to which the students have access.

### Students and Staff

An idea of the work carried on in the Department can be gathered from the titles of some papers published by members of Metallurgy in their undergraduate course, and as only a proportion of these take up post-graduate work the number of these students is small. I am arranging a short post-graduate course in physical metallurgy for officers of the Royal Canadian Air Force, but we cannot accommodate more than two or three graduate students. In view of the economic importance of metallurgical research and

of the openings for trained workers in this field, it is desirable that our laboratories and other equipment should be placed on a more satisfactory basis.

As regards the staff, Mr. Sproule has a special interest in the modern subject of "physical metallurgy", taking up particularly the microscopic examination and the physical testing of metals. I have given more attention to the theoretical side of physical metallurgy and of other metallurgical processes and have made a special study of electro-metallurgy. It would be desirable to have an associate who could devote himself to the department of hydro-metallurgy and who could carry out the chemical analysis that is so essential a part of metallurgical research. Mr. Roast gives instruction in one branch of metallurgical analysis but can only spare a small part of his time to the Department.

Apart from the Faculty of Post-Graduate Studies, research of an elementary character is carried out by each metallurgical student in his graduating year. More elaborate researches and a large number of investigations for industrial firms have been made by members of the teaching staff.

An idea of the work carried on in the Department can be gathered from the titles of some papers published by members of the staff:-

- The burning and overheating of steel.
- The constitution of copper-nickel mattes.
- Blast furnace slags containing titanium.
- The smelting of titaniferous ores of iron.

-5-

A graphical method of teaching the thermo-chemistry  
of high temperatures.

Equilibrium for the reaction  $2CO = CO_2 + C$ .

Electric furnaces as applied to non-ferrous metallurgy.

Possible economies in electric iron smelting.

An investigation of shrapnel bullets.

Arsenical bearing metals.

Bearing bronzes.

Design of a temperature controller for electric furnaces.

Diagnoses of the failures of metals.

Lead poisoning in bronze foundries.

Undulatory wear of tramway rails.

(Signed) Alfred Stansfield.

Department of Metallurgical Engineering,  
McGill University.  
March, 1931.

The following is reproduced from my report to the Faculty  
of Applied Science as it seems necessary in both reports.

We need a rearrangement of the equipment in our laboratory  
and new apparatus to bring the laboratory up-to-date. We are also  
badly handicapped by the lack of library and reading room space,  
but these conditions cannot be remedied until a new building is  
secured.

We attempt to serve the community in any way possible, but

REPORT ON THE DEPARTMENT OF MINING ENGINEERING  
MADE FOR PRINCIPAL'S COMMITTEE, GRADUATE SCHOOL.

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No work beyond the master's degree is attempted. For this degree the student is assigned a problem to fit in with general investigations being carried on in the laboratory except, of course, when he has some definite problem he wishes to work out. Students who expect to follow mining proper or geological work are permitted to write their theses on geological subjects, as we feel that this is much more valuable to them than any work they could do in our laboratory. The number of graduate students rarely exceeds two and we make no attempt to induce students to come into graduate work in our department, as we feel that it is questionable whether the time so spent is more valuable than a year in practical work supplemented by reading and study. Many students fail to keep on studying after graduation but, generally speaking, the students who are desirable in the graduate school do keep on studying if facilities are available.

The following is reproduced from my report to the Faculty of Applied Science as it seems necessary in both reports:-

We need a rearrangement of the equipment in our laboratory and new apparatus to bring the laboratory up-to-date. We are also badly handicapped by the lack of library and reading room space, but these conditions cannot be remedied until a new building is secured.

We attempt to serve the community in any way possible, but

pay particular attention to the following:-

1. Investigation of ore dressing problems in our laboratory.
2. Giving advice to prospectors and others who are interested in the development of mineral deposits.
3. Assisting in the work of the Canadian Institute of Mining and Metallurgy and other associations of mining and metallurgical engineers.

Most mining problems have to be investigated on such a large scale that work in a college laboratory is useless. During the past four years we have confined our efforts largely to a study of the flotation process. Our first work was on the separation of a complex copper-zinc ore from the Rouyn district. The second problem investigated was the possibility of applying flotation to the recovery of gold. In both cases the results obtained were encouraging and were given to the mining companies interested and to the Department of Mines in Ottawa. Graduate students were assigned certain problems in these investigations and the work was supervised and coördinated by Professor Bell. We are at present carrying out an important investigation on the settling of finely divided matter in the Dorr thickener. This gives promise of very important results. We plan, if we can secure the equipment, to investigate, in the near future, certain phases of fine grinding in ball and rod mills. This work should have great practical value and lies in a somewhat neglected field.



## DEPARTMENT of ANATOMY

## II. RESULTS.

## REPORT FOR COMMITTEE OF THE

## FACULTY OF GRADUATE STUDIES AND RESEARCH

(a) The Courses offered for the Degree of Master of Science in the Faculty of Graduate Studies have not been taken by anyone, since its inception two years ago.

This brief report is drawn up under the headings of Facilities, Results, and Comments.

## I. FACILITIES.

There are two sets of Advanced Courses offered:

(a) leading to the Degree of Master of Science, as set forth in the Announcement of the Faculty of Graduate Studies, pp.31 and 32, 1930-31, namely:

Advanced General Anatomy, by which teaching, lecturing and examination experience may be obtained, and specialization in either Embryology, Human Morphology, Physical Anthropology, or Neurology, together with a thesis.

(b) Advanced Courses not leading to a Degree, as set forth in the Announcement of the Faculty of Medicine, nos.6 - 11, on p.45, 1930-31, namely:

Elective special work in Anatomy, Ophthalmological Anatomy, Otolaryngological Anatomy, Physical Anthropology, Neurology, and Comparative Anatomy of the Primates.

There is also offered Advanced Anatomy for Dental Students.

The only note to be added is that material facilities have been added to and improved during the past Session.

(a) As regards the absence of any applicants for the degree of M.Sc., it may be pointed out that the stipulation that candidates must hold the degree of B.A. with good honors, which is maintained by the Board of Examinations, has never been brought into operation.

II. RESULTS.

(a) The Courses offered for the Degree of Master of Science in the Faculty of Graduate Studies have not been taken by anyone, since its inception two years ago.

(b) In the Advanced Courses of Instruction not leading to a Degree, offered for Graduates of Medicine (or in one Course, open to Undergraduates), some positive results have been obtained.

i. The Special Courses in Ophthalmology or Otolaryngology have been taken by eighteen medically qualified graduates since 1922.

ii. The Course in Dental Anatomy has been taken by six qualified graduates.

iii. The Course in Comparative Anatomy of the Primates has been taken by three graduates and eight undergraduates, both medical and arts, since its inauguration in 1929, the number being nearly trebled this last Session.

Comparative experiments and results from similar courses offered in other Universities.

(b) Of the six Courses offered not leading to a degree, three have been utilised, namely, Ophthalmology, Otolaryngology and the Primates, and will be improved as far as possible. Those not utilised are Elective Work, Neurology, and Physical Anthropology.

The Course in Dental Anatomy has only been taken once, by a group of six graduates, in 1931. Possibly better arrangements may be given if by inclusion in the announcement of the Faculty of Dentistry, and attractions added.

Respectfully Submitted

J. E. Whitwell

(a) As regards the absence of any applicants for the degree of M.Sc., it may be pointed out that the stipulation that such candidates 'must hold the degree of M.D. with good standing', which is maintained by the Head of the Department as an essential qualification for the most advantageous teaching of medical students, has never been brought forward as a deterrent.

The explanation would appear to lie in the urgency, or more material attractions of medical practice, or in lack of time or interest, in spite of the inducements offered for such intending specialists as gynecologists, neurologists, or teachers of General Anatomy. It may be added that in the last twelve years no one has come to the school desirous of being trained as a full-time Anatomist, though at present one may be contemplating such future.

We can suggest no alterations to give these Courses greater attractions than their titles should induce, as none of them have been put into effect.

It has not been possible in the time available to obtain comparative experiences and results from similar courses offered in other Universities.

(b) Of the six Courses offered not leading to a degree, three <sup>been</sup> have utilised, namely, Ophthalmology, Otolaryngology and the Primates, and will be improved as may be necessary. Those not utilised are Elective Work, Neurology, and Physical Anthropology.

The Course in Dental Anatomy has only been taken once, by a group of six graduates, in 1927. Possibly better advertisement may be given it by inclusion in the Announcement of the Faculty of Dentistry, and attractions added.

respectfully submitted,

S. E. Whitwell,

Jan. 20. 1931

REPORT TO THE SPECIAL COMMITTEE OF THE FACULTY OF GRADUATE STUDIES  
ON THE FACILITIES FOR GRADUATE STUDY IN THE DEPARTMENT OF BACTERIOLOGY

by

E. G. D. MURRAY

Before the Department of Bacteriology can be considered to afford adequate opportunities for young men to do research work, of sufficiently high standard to be submitted as a basis for the granting of research degrees, it is imperative that good research work is being done by the members of the Staff. For this condition to be complied with, the Staff of the Department must have the ability, must be sufficient numerically to cope with the teaching and routine work of the Department, and must be provided with library and laboratory facilities essential to their work. That individual men will do good research work, under the most adverse conditions is no whit less a marvel for being a feature of the history of science, but it cannot be accepted as a reason to perpetuate disadvantageous conditions for research by the man of average research ability.

It is not necessary, for the purpose of this report, to enter into details of the working conditions existing in the Laboratory, it will suffice to affirm that they have not afforded the members of the Staff time and facilities necessary to make a reputation in research work. Therefore, at the outset, the Department suffers from disabilities inimical to good Graduate Studies towards the Masters and Doctors Degrees and, until these are removed, the stimulus and encouragement necessary for the development of Graduate Studies, resulting from research by the Senior Staff, must be lacking. The provision of laboratory and library facilities, and a highly skilled and inspiring Staff, does not completely fulfill the opportunities required by many well trained and promising young men before they can embark on a research career. Many cannot afford to

take advantage of such opportunities for lack of money, therefore, it is most desirable to establish Scholarships and Studentships. At the moment the Department of Bacteriology has no research Studentship or Scholarship fund.

Proposals are being put forward to increase the teaching and research Staff of the Laboratory, to provide equipment, facilities and to distribute the routine work of the Department in such a way that the Staff will have ample opportunity to do research, which it is hoped will establish the reputation of the Department. Even were this scheme to mature in a shorter time than is anticipated, it will take a year or two at least to produce results. The importance of a teaching Staff engaged in research work, to the adequate prosecution of Graduate Studies, is exemplified by the students now working in the Department. Two of them, who have been wholly dependent on the Department of Bacteriology, have made little or no progress and were not only despondent but had no clear idea of the problem they were facing, nor of the method of attack. Another one had the advantage of collaboration with the Department of Cellulose Chemistry and, although engaged primarily on Bacteriological work, under the guidance and stimulus of a Department in full working order he has made considerable progress.

The responsibility for the Department being ineffective in affording facilities for Graduate Studies cannot be saddled on the Staff. That the Department has contributed very little to knowledge must be admitted, but it is abundantly evident that the opportunity afforded for research has been insufficient to warrant even that little. The Staff has been overburdened by the routine work, the

distribution of the work has been uneven and the lack of facilities to carry out effectively even the routine work has been wasteful of time and energy. The discouraging effect produced by this situation was very obvious. The utilization of the available room space, too little for what is required of it in any case, was not to the greatest advantage. Graduate Students, people working in the Department on behalf of other Departments, and the Staff of the Laboratory in charge of the Clinical Bacteriology for the Royal Victoria Hospital, were all herded in one room to their mutual disadvantage. This has, in some measure, been corrected and the space allotted to the Department is being used to its full capacity. The space at present available for research workers, not members of the Staff, will only allow of four working at any one time, whether they be Graduate Students or others. At the moment there are two Graduate Students and two research workers working on behalf of the Departments of Medicine and Surgery. There is available space in the Department for one more Graduate Student or other worker, owing to the fact that I have accommodated one research student in my personal Laboratory for five months remaining of his period of study.

The equipment of the Department is barely sufficient for the routine work, as carried on at present, with an uncertain amount suitable for the ordinary teaching which is proposed for the coming year. It does not allow of certain investigations of an ordinary nature, such as should be done in the course of the routine examination of Hospital materials and in the course of Bacteriological research. As far as concerns the work proposed for one Graduate Student working in the Department at present, were it not that I had brought with me personal apparatus it would not

have been possible for this man to have started his work.

The accommodation for experimental animals and the animal supply is wholly inadequate at present. The relation of this to Graduate Studies is perhaps not clear, so I would point out that Animal Experiments are a very important side of much Bacteriological research, and its importance is not confined to the investigation of the Bacteriological problems of Pathology. The principles learned in the investigation of Pathogenic Bacteria are, for the most part, general principles and there is a wide field for research in the Immunological study of non-Pathogenic Bacteria, neglected up to now. It is possible that much that is new and the elucidation of much which is not understood in Immunity would result from such work.

The Department entirely lacks standard technical books of reference, particularly those frequently in the hands of research workers. These are not Text Books nor Journals, both of which it is more economical to have accessible in the University and Medical libraries, and it should be permitted that some relatively small sum, say \$100.00, be spent annually by the Department on necessary standard technical works. At the moment my private library is partly filling the demand and is used appreciatively.

I am not yet able to estimate the cost of Graduate Students to the Department and I do not know whether it is necessary to suggest a special addition to the appropriation on their account. The whole question of the appropriation of the Department is under consideration and this matter may be included.

The equipment of the Laboratory, to enable it to carry out the work required of it by both the University and the Hospital, is under consideration.

The Department is not equipped to undertake satisfactorily the duties involved in Graduate Studies. None of the conditions are satisfied at present, but there is every reason to hope that the Laboratory will be in working order within a year.

The men I have met, who are of the standing of Graduate Students, working at Bacteriological problems, (six in all), either in the Department of Bacteriology at McGill or at MacDonald College, all seem to me to have as good minds as similar students I have met elsewhere, but they give me an impression that they are not so well equipped by their preliminary studies in Bacteriology as they should be. This is, perhaps, to be expected from the matter discussed in another report, as well as from the preceeding part of this one.

I have not yet had experience in examining for these Research degrees at McGill University so I am unable to express an opinion on the quality of the Theses submitted. For the same reason, I am not in a position to hazard an opinion on the preparation afforded them by their preliminary education, at school and in their first University year.

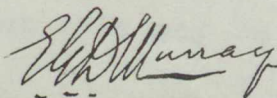
In the regulations for the M.Sc. Degree, Faculty of Graduates' Studies, Page 23, Paragraph 2, it is prescribed that the course of study shall be of an advanced and comprehensive character and followed by a searching examination. In the regulations for the Ph.D. Degree, Faculty of Graduates' Studies, Page 26, Paragraph 6, it is prescribed that two of the three years shall be spent in instruction, training



and prescribed reading, followed again by a searching examination, the final year being mainly devoted to the preparation of a thesis. Yet the advertized courses of study in Bacteriology are identical with those provided for Undergraduate Study, which I have already discussed and five out of the seven are designed as Medical Courses. As the student is already required to hold the Degree of B.Sc. honours, or a Degree of equivalent standing, these elementary courses of study seem to me of small importance.

I am prepared to make some tentative suggestions to serve as a foundation for courses of Graduate Study in the Department of Bacteriology. I say this advisedly for I am not only prepared to accept criticism of these suggestions, but I invite advice from my more experienced colleagues in the Faculty of Graduate Studies, who at the same time are well aware of the methods, needs, aims and ideals of McGill University.

Respectfully submitted



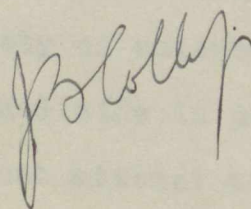
Professor of Bacteriology

REPORT OF THE BIOCHEMISTRY DEPARTMENT  
TO THE  
GRADUATE FACULTY

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This Department, with the present organization and equipment, is able to deal adequately with about six students working toward the Ph.D. Candidates taking the M.Sc. degree have been very few in the past. Increased facilities in both staff and laboratory will have to be made available as the number of graduate students working either for the M.Sc. or Ph.D. degree increases.

As Chairman of the Department, it is my desire to make this school an outstanding centre for research in the special field of endocrinology, and I hope in so far as we are able to direct the future development of this department of the graduate school that this may be realized.



DEPARTMENT OF MEDICINE.

The Department of Medicine of the Medical Faculty entered upon a new era in 1924 when the Department was re-organized and the University Clinic was established at the Royal Victoria Hospital. This was brought about through the generosity of the Rockefeller Foundation who endowed the Clinic with a sum of Five Hundred Thousand Dollars, the interest upon which was to be used solely for the Clinic's up-keep and for the payment of a full-time Professor of Medicine, the object being to place the Department of Medicine on a University basis similar to other University Departments. This very early brought to the fore the question of graduate study and research. The Department of Medicine, however, was not included in those University Departments that were considered equipped to do advanced teaching and research, and it was not until some three years had passed that this recommendation was granted.

During the past three years an increasing number of Graduate Students have been seeking advanced degrees and opportunities for research in this Department and it is the expectation that this number will steadily increase.

On account of the great variety of sciences which contribute to scientific training in Medicine it soon became apparent that this Department could not attempt to undertake all the diverse problems of medical research. It has therefore been our policy to concentrate on a limited number of scientific pathways; as, for instance, we have not

-2-

either the equipment or the space to undertake extensive bacteriological and serological research. Therefore, we could not encourage students who wished to take advanced work in these subjects to do so in the Department of Medicine. This was unfortunate, but could not be helped. On the other hand, we could encourage students who wished to work on biochemical and experimental physiological aspects of medical science.

Like all departments in a University, there is a steady demand for increased diversity of our work. This is to be expected and is quite a natural development, the end of which cannot be foreseen or even expected to arrive in the natural course of events. We would desire to have increased accommodation and facilities for broadening the scope of our advanced study and research, but this does not differ more in this department than in many others in the University. There is, however, a considerable demand for financial assistance for Graduate Students. The great majority of our students who would enroll in the Graduate Faculty have already spent at least nine years in obtaining their medical degree and by this time the financial situation occupies a position of first importance. The endowment of the Department was not granted to meet such an exigency but was given to create a more or less permanent personnel for Undergraduate and Graduate teaching and investigation. Therefore, I might say that one of the greatest needs we have in order to develop advanced study and research in our Department, both for Undergraduates and Graduates,

is scholarships, particularly scholarships of between Five Hundred and One Thousand Dollars a year.

Other important requirements cannot really be considered as University matters except in a more or less secondary fashion; namely, the provision of more beds and particularly small wards for the intensive investigation of certain types of disease. This, however, will not be possible for many years to come but it should always be borne in mind by the University authorities that graduate study and research in the Science of Medicine can only be carried out to a limited extent unless the University be equipped with a University Hospital devoted to this work entirely.

J. M. R. I.

JCM/MRI.  
March 19, 1931.

REPORT ON GRADUATE COURSES IN PATHOLOGY

As regards courses in Pathology in the Faculty for Graduate Studies and Research, it might be asked first: what type of students should be admitted to it and with what preliminary training. While it is appreciated that in some universities and here, physiology, anatomy and biochemistry have opened their subjects to students in general biology, who have neither had medical training nor propose to follow this, purely as a theoretical and laboratory science, I shall not discuss the desirability or disadvantage for these sciences but I do not feel that it is wise to adopt this plan for pathology. It is quite true that pathology may be pursued from a purely scientific standpoint without any practical leanings, but there is so much in its contents and investigations that requires information gained by the observation of the living sick individual at first hand, that thorough familiarity with, and critical understanding of, this evidence is really essential for a successful pursuit of the science of disease and consequently for its higher qualifications. I<sup>t</sup> therefore <sup>feel</sup> that the requirements of graduate studies in pathology demand an acquaintance with medicine in general, and still retain the medical degree as necessary for those who want to enter upon advanced work in it.

To my mind, also, a greater cultural background than that furnished by simple medical courses is most desirable, more especially in logic, philosophy, and an understanding of old and

modern languages. These prepare the student for the historic evaluation and development of the science, a thing quite necessary for a graduate worker. For, if the student desires to take pathology as a major he should not only familiarize himself with one particular field of investigation as embodied in his thesis, but master a comprehensive knowledge of the subject as a whole. Only then will he be able to understand a problem and attack it properly. For this reason the students for higher degrees in pathology should not only take up a thesis or prescribed courses, but follow as much as possible the whole routine work carried on by the Department of Pathology, more particularly in the varied material of the post-mortem service which is really a course in natural experimental biology.

The desire for higher degrees has prompted in the past practitioners of medicine and others occupied in various other fields of study to enroll in pathology, either as a major or as a minor, as partial students. This I have recently decidedly discouraged, for this practice is too irregular and <sup>permits</sup> only superficial penetration and is quite unworthy of the demands of higher academic training. I have therefore <sup>the rule has</sup> laid down the rule that students selecting pathology for higher degrees must have no other outside interests and be able to devote their entire or major part of their time to its pursuit and to their thesis.

A common error is to allow or even encourage graduate students to specialize too narrowly and almost exclusively along certain lines - to make, as it is termed, "a research worker" out of him - and to omit other more fundamental general

matters which do not touch immediately upon the chosen field of research. Too sharp a line is often drawn between the classification of undergraduate and graduate education. It should be remembered that even the majority of graduate students have not acquired broad training in their undergraduate courses, and are still quite defective in their chosen science. The whole field from beginning to end should be made the subject of study even in a graduate school and I think it should even include the important fundamentals and methods of technique. Men are often graduated in the higher sciences from graduate schools who, while doing a simple creditable piece of research, are really poorly trained in the subject in which they are taking their degrees. That is particularly true of pathology. Even professors of pathology are at present of that type and often sadly lacking in the most elementary things, like methods of post-mortem examination, in which they were never properly trained - as below the dignity of their higher education as pathologists! (I would go as far as to say that a well balanced knowledge of the total subject is of at least the same importance as a thesis - a matter which students often neglect and remain unconvinced until it is too late. Even a thorough rehearsal of fundamentals, of course in a somewhat broader than undergraduate sense, is valuable as part of higher education.

I think this same consideration is applicable to other sciences, and I have some doubt and fear that many men who graduate from our and other institutions with a higher degree really deserve it as a declaration of a special



scientific qualification in the subject in which they take their degree.

I should therefore like to recommend that a candidate for a higher degree, especially for Doctor of Philosophy, should in his final examinations be tested not only on the subject of his thesis, but on his general knowledge of the whole science, on related, cognate subjects, and on his ability to think and reason.

*Howe*

## DEPARTMENT OF PHARMACOLOGY

MCGILL UNIVERSITY

MONTREAL

The department of pharmacology, in the sense of a department with a full time staff established for teaching in the modern manner and for the conduction of original investigations, took form in 1921. The start was a modest one and the department is still the smallest of the trio — physiology, biochemistry and pharmacology. So far as undergraduate teaching is concerned this relation is a natural one. So far as research is concerned, it is not — the problems are as numerous and as important as in the other two fields. It is because the size of a department is often determined by the extent of teaching requirements, independent of research possibilities, that pharmacology in America and Great Britain has remained relatively less important than physiology and biochemistry. From one point of view it is more important than these two subjects — it is directly associated with the treatment and cure of disease, that is, with the discovery of substances which will alleviate suffering; it is an applied as well as a pure science.

Pharmacology has reached its highest development in Germany. There are in that country institutes of pharmacology in all of the universities; there are only two "ordentliche" professors of biochemistry at the present time. The writer does not cite this as evidence that he believes pharmacology to be more important than biochemistry but rather as showing the regard in which pharmacology is held in Germany.

What has been the result of the emphasis laid upon pharmacology in Germany? It has been this, viz., by far the largest number of drugs developed through scientific methods have originated in Germany and continue to originate there — salvarsan, neosalvarsan, aspirin and novocaine, barbital, luminal, homatropine, chloral hydrate, atophan, quinidine, hexamine, paraldehyde, sulfoxal, Bayer 205, caffeine, Hg. diuretics, are some of them. Search for new drugs in America has consisted almost wholly in following up German leads.

What is the purpose of the foregoing? It is to show that one gets out of an enterprize in proportion to what he puts into it. There are at present only two full time workers in pharmacology at McGill. They are **probably** doing as much as they can. Whether more is accomplished or not depends upon whether greater support is given or not. It would be desirable, for example, to extend our work into

REPORT OF GRADUATE STUDIES IN THE DEPARTMENT OF MEDICINE

The Surgical Department of the Medical Faculty has

the field of chemotherapy. Dr Melville is already devoting some of his attention to chemotherapeutic problems, but in the face of considerable difficulty. He is capable and deserves much better support. The writer would like to see him encouraged by improving his status in the department and giving him a free hand to develop this phase of pharmacology. To work in this field to the best advantage requires the help of an organic chemist and of better quarters for small animals than are available. The department should be enlarged by building over the front part of the physiology department.

So far as the furtherance of research of a general nature is concerned much depends upon the availability of fellowship funds. There is not so much inclination to seek out good human material when one knows that if one could find such material it is then necessary to go begging for financial assistance. If, on the other hand, funds were available, one might, in all probability, obtain additional workers. Such funds need not be restricted to this or that department, but could be available for all departments and distributed according to circumstances.

Another matter which has been discussed in the past is the possibility of granting to those who wish to do research in the department a whole time. One of the letters received in this regard was received at the end of this year, and the Faculty of Graduate Studies during the past winter established the Department of Medicine as an integral part of the Department of Experimental Medicine, under the general direction of Professor Mackinnon. The result has been that a considerable amount of original work has been done, and already promising results of scientific value are being obtained and will before long be published.

This effort is only a beginning. Relations with the Faculty of Graduate Studies and Research have not yet had time to become close. In the meantime, at the request of Professor Mackinnon, the writer begs leave to set forth certain general ideas concerning the development of this research side.

REPORT ON GRADUATE COURSES IN THE DEPARTMENT OF SURGERY

The Surgical Department of the Medical Faculty has not hitherto contributed any share in the work going on in the Faculty of Graduate Studies and Research, with the exception of the Sub-Department of Neurological Surgery. Within the last two years, however, owing to the donation of a grant by the Rockefeller Foundation to the Department of Experimental Medicine, including Surgery, it has been possible to institute in a regular manner research work within the Department of general Surgery, and indeed for four years past a certain amount of research work has been done by members of the surgical staff, under scholarships granted by private individuals in Montreal. With the aid of the Rockefeller money scholarships during the past two years have been granted to three men working on half time, and to two men working whole time. One of the latter desired to take the M.Sc. degree at the end of this year, and the Faculty of Graduate Studies have during the past winter established the Department of Surgery as an integral part of the Department of Experimental Medicine, under the general direction of Professor Meakins. The result has been that a considerable amount of original work has been done, and already promising results of scientific value are practically attained and will before long be published.

This we trust is only a beginning. Relations with the Faculty of Graduate Studies and Research have not yet had time to become close. In the meantime, at the request of Professor Meakins, the writer begs leave to set forth certain general ideas concerning the development of this research side.

In the first place the experience of the past two years has shown that, in any surgical problem which is the subject of research and which at the same time required the collaboration of such departments as those of Biochemistry, Physiology, Anatomy, Pathology and Bacteriology, such collaboration is rather difficult, in spite of the willingness of the Professors of these branches to give help. These various Departments are already practically filled with their own workers, engaged upon their own problems. They have no trained investigator, nor technician, to spare, none who could be set aside for collaborative work with the surgical workers upon a given problem, and very little space for such part of the work as has to be done in their departments with their special equipment. The best that can be done is for the surgical Department to pay the salary of a trained worker who (to take the one instance at present in effect) is allotted laboratory space in Dr. Collip's department, and who is supposed to devote his whole time to the biochemical problems involved in the particular piece of research. While this way of managing things is the best that can be done under the circumstances, it is obvious that it is seriously limited in its scope, both because of lack of money and because of the lack of space and equipment. What the Surgical Department would like would be its own laboratories, with a staff, to start with, of at least one trained biochemist and one technician, with the Professor of Biochemistry in the background for consultation. The same applies to Physiology and to a less extent to Pathology and Bacteriology. The laboratories under which Professor Meakins presides offer a concrete example. This is not

meant to decry the present arrangement which, with the sympathetic help of the academic professors is working more or less satisfactorily, but to indicate the lines along which the Department of Experimental Surgery hopes to develop.

Secondly, with regard to such pieces of purely surgical research as can be sufficiently well done by the young surgeon alone, working either part of whole time, without the help of the academic departments, it is to be observed that the present accommodation is quite insufficient. The Animal House, while excellent in most respects, is deficient in others. There is far too little space for the ordinary pathological and bacteriological work, which is often necessary in such problems, and which it is difficult to find room for in the Pathological Institute. The present Animal House staff is also insufficient both in number and in ability to do such work, and the equipment likewise is unsatisfactory. What the Surgical Department hopes for is to find some place where its workers can feel themselves at home, as is the case with all other departments engaged in research work, and where there will be untrammelled conditions for good work. At present we are obliged to be guests in other departments, and accommodation is not always easy to find.

Nevertheless, even as things are, the Department of Surgery feels that its members working on experimental problems can shortly <sup>bring</sup> being forward candidates, at any rate for the M.Sc. degree, and can fulfil the conditions laid down by the Faculty of Graduate Studies and Research.

REPORT FOR THE PRINCIPAL'S COMMITTEE OF THE GRADUATE SCHOOL  
OF DEPARTMENTS DOMICILED AT MACDONALD COLLEGE.

REPORT OF DEPARTMENTS DOMICILED AT  
MACDONALD COLLEGE

FOR

THE PRINCIPAL'S COMMITTEE

OF THE

FACULTY OF GRADUATE STUDIES AND RESEARCH

In addition to the foregoing work, it was considered that  
 Plant Physiology and Animal Physiology should also be provided.  
 After consultation with Professor [Name], Department of Biology,  
 it was decided that .....  
 In regard to Animal Physiology, Dr. Conklin stated that he was pre-  
 pared to accept a course in graduate grade in this subject.  
 While the committee did not feel that it was necessary or  
 desirable to cover all branches of agriculture, it was thought  
 that instruction in one or two additional fields in the sciences  
 would be desirable. It was suggested that a course in  
 Microbiology be provided.

REPORT FOR THE PRINCIPAL'S COMMITTEE OF THE GRADUATE SCHOOL  
OF DEPARTMENTS DOMICILED AT MACDONALD COLLEGE.

.....

Introduction

In order to give proper consideration to the question of what could best be done to improve and, if desirable, extend the graduate work at present being carried on at Macdonald College, two committees were appointed covering the fields of plant and animal sciences respectively. After due study had been given to the subject it was considered that to strengthen the work in both these fields advanced work in Genetics and Cytology should be provided. Consultation with Dr. Huskins, Professor of Genetics (Department of Botany) made it clear that this could be provided for through his department.

In addition to the foregoing work, it was considered that Plant Physiology and Animal Physiology should also be provided. After consultation with Professor Scarth, Department of Botany, it was decided that the former course could be put on by him, if certain provisions in the way of needed space could be made. In regard to Animal Physiology, Dr. Conklin stated that he was prepared to offer a course of graduate grade in this subject.

While the committee did not feel that it was necessary or desirable to cover all branches of agriculture, it was thought that two courses, one in Animal Production and one in Horticulture, would meet a real need and, with the assistance indicated, could very well be put on with a minimum of added expense. A tentative schedule for these two courses is appended.



In addition to the foregoing it was emphasized that further provision should be made for Biometry, not necessarily at Macdonald College, but somewhere in the University. It was felt that work in this field was vital to several departments. Other courses that have been suggested that would be useful to many graduate students at Macdonald College, would be courses in Plant Ecology and Animal Ecology. A half course in the latter subject is offered by the Department of Entomology, but no courses in Plant Ecology are available.

Lecturer in Poultry Husbandry: E. W. Crapton  
 Lecturer in Poultry Husbandry: A. J. G. May

Prerequisite to major graduate work in this department is the completion of an undergraduate course equivalent to that required for the degree of B.Sc. at Macdonald College, including such undergraduate subjects as are necessary for the particular line of graduate study to be undertaken. Students who have not had adequate training in preliminary subjects will be required to complete prerequisite work.

A. Applied Animal Nutrition. Lectures, conferences, assigned reading, bibliographic review, and research in a related problem in Animal Nutrition and Experimentation. Hours variable. Lecturer: E. W. Crapton  
 Lecturer: Professor A. J. G. May

B. Applied Animal Breeding. Genetic relationships and their application to Animal Breeding. Research in specializations in breeding and heredity. Hours variable.  
 Lecturer: Professor E. W. Crapton

## (Proposed M.Sc. Course in Animal Production)

Department of Animal Production

Professor of Animal Husbandry and Chairman of Department: H. Barton.

Associate Professor of Genetics: C.L. Huskins,

(Department of Botany, McGill University).

Assistant Professor of Poultry Husbandry: W.A. Maw.

Assistant Professor of Animal Pathology: R.L. Conklin.

Assistant Professor of Animal Husbandry: E.W. Crampton

Lecturer in Poultry Husbandry: A.J.G. Maw.

Prerequisite to major graduate work in this department is the completion of an undergraduate course equivalent to that required for the degree of B.S.A. at Macdonald College, including such undergraduate subjects as are necessary for the particular line of graduate study to be undertaken. Students who have not had adequate training in preliminary subjects will be required to complete prerequisite work.

A. Applied Animal Nutrition. Lectures, conferences, assigned reading, bibliographic review, and research in a selected problem in Animal Nutrition and Experimentation. Hours variable..... Professor E.W. Crampton  
..... Professor W.A. Maw

B. Applied Animal Breeding. Genetic relationships and their application to Animal Breeding. Research in special problems in breeding and heredity. Hours variable.  
..... Professor E.W. Crampton.  
..... Mr. A.J.G. Maw.

C. Animal Physiology. Lectures and laboratory work on the systems and organs of the animal body, their functions and reactions.

Prerequisite: The undergraduate course in elementary physiology offered at Macdonald College or its equivalent. 2 lectures and 2 laboratory hours per week for one term. . . . . Dr. Conklin.

D. Seminar . . . . . Prof. Barton and staff.

Students taking graduate work in Animal Production will choose either Animal Nutrition or Animal Breeding as major work and will usually take minor work in Physiology, Chemistry, or Genetics.

(Proposed M.Sc. Course in Horticulture)

Department of Horticulture

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Professor of Horticulture: T.G. Bunting.

Assistant Professor of Horticulture: H.R. Murray.

Lecturer in Horticulture: G.C. Hilton

The Department of Horticulture maintains representative plantations of orchards, small fruits and vegetable crops which afford opportunities for study and research in varieties, cultural practices, including soil nutrition, plant breeding and for processing purposes. In addition to the land area, a large greenhouse, laboratories and storages are available. The department is well equipped with the necessary implements for horticultural work. The Departmental, College, and University libraries afford a wide range of literature on horticultural subjects.

- A. Pomology. Lectures, conferences, assigned reading, bibliographic review and research in selected problems in the breeding and nutrition of pomaceous fruits. One lecture, one colloquium and four laboratory hours per week. .... Prof. Bunting.
- B. Olericulture. A course designed to cover the same general ground as the foregoing in the field of vegetable crops. One lecture, one colloquium and four laboratory hours per week. .... Prof. Murray.

Students taking graduate work in Horticulture will choose either Pomology or Vegetable Crops as major work and will take a minor in either Physiology, Chemistry or Genetics. If necessary, courses in other departments may also be required.

Prerequisites - A candidate for a Master's Degree must have taken a high standing in the undergraduate courses at Macdonald College or have its equivalent, and must have a good knowledge of the respective major subject selected. Unless the candidates have special experience in either Pomology or Vegetable Crops before entering the course they may be required to spend one season in investigation and research in the Horticultural Department, Macdonald College.

M.Sc. Requirements - To obtain the Master's Degree the student will be required to have shown initiative in research and to present an acceptable thesis in some phase of his major work in addition to an examination in the subjects of his course.

Department of Agricultural Bacteriology.

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1. (a) The department offers, as a basis for major study, courses in Soil Microbiology and Dairy Bacteriology. These are supplemented by courses in Systematic Bacteriology, and on Fermentation organisms of both agricultural and industrial importance.

The above programme of work is outlined to cover the possible requirements of students in agricultural and other lines of bacteriology, other than that of pathology. The aim is to raise the standard of basic knowledge of biological processes carried out by micro-organisms. The course on Systematic Bacteriology is essential and required by graduate students who are candidates for the M.Sc. degree; this course is taken in the first term of study. Either of the courses on Soil and Dairy Bacteriology, forms the basis for thesis and experimental work, and occupies the whole year. Studies on fermentation organisms may be taken in the second term, or alternatively, a student may elect to take instead a course such as Biochemistry, in the Department of Agricultural Chemistry. It is hoped that by making use of the facilities offered by the adjoining Stock Farm, Dairy and experimental plots, the student will be able to carry out thesis work on a wider scale, and to gain an understanding of microbiological processes going on under natural conditions. The facilities for such work also lie in adequate laboratory space and a considerable amount of the necessary equipment of the usual kind.

(b) In the past the department has been actively engaged in investigations of a varied nature, about thirty papers having been published since 1906. These were largely by Dr. Harrison, generally in association with a full time assistant. Some of the past assistants now hold good posts elsewhere.

The present personnel consists of:

Mr. P:H.H. Gray, M.A. (Oxon), recently Soil Bacteriologist at Rothamsted Experimental Station, England, (Assistant Professor and Chairman of the Department), has published several scientific papers on soil organisms and methods, and articles of a less technical nature; engaged in investigations on the microbiology of Quebec soils, with the assistance of a grant from the National Research Council.

Mr. R.R. Thompson, M.Sc. (Assistant), trained in Bacteriology at Ontario Agricultural College; has completed courses for the degree of Doctor of Philosophy in Bacteriology; has had experience in investigations in soil and animal bacteriology.

Mr. E.T. Bynoe, B.S.A. (Student assistant), trained in Bacteriology at Macdonald College; completing thesis for M.Sc. in Bacteriology.

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2. It is suggested that the best method of encouraging and developing work progressively lies in strengthening the present staff. A large amount of time is occupied with undergraduate work in the School, of Household Science as well as in the School of Agriculture. out

*out*

As the department offers graduate courses of full time value there should be an instructor of higher rank than assistant.

Laboratory assistance is inadequate, all of the washing and cleaning, and a considerable amount of media-making being done by a maid. A technical assistant trained to carry out the routine of making up of the more special media and of many of techniques now devolving upon the instructor's time would be of immense help.

The use also of more stenographic assistance is greatly needed. At present we have 1/6 of the time of one stenographer.

A larger appropriation of money is required for material such as glassware, of which at present there is a bare minimum requirement; one extra worker at present would be an excessive drain on the supply available. More modern equipment and apparatus is also required, such as constant-temperature baths, and especially an efficient system of refrigeration.

Department of Agricultural Chemistry *copy*

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Personnel -

J.F. Snell, B.A. (Toronto), Ph.D. (Cornell), F.A.A.A.S., F.C.I.C. - Professor. Research in fields of Physical Chemistry, Calorimetry, Soils, Maple Products. Dr. Snell's work in maple sugar is very well known and he has published widely in the other fields indicated.

J.B. McCarthy, D.Sc. (King's College), Assistant Professor, formerly Professor of Chemistry, King's College, Windsor, N.S. One year of graduate study in Harvard University; thesis for D.Sc.,

King's College, in the field of Physical Chemistry. A skilful teacher. Has conducted research on animal fluids in collaboration with colleagues in Macdonald College.

R.R. McKibbin, B.S.A. (McGill), Ph.D. (Maryland), Assistant Professor, formerly Assistant Professor of Soils, University of Maryland. An active and energetic investigator in the field of soils. Results of his work have been published in the form of a number of technical bulletins and scientific papers.

Record in Graduate Work and Research -

In the twenty-three years of its existence, the department has had twenty-two graduate students, (not including those taking Chemistry as a minor). Of these fourteen have attained the degree of M.Sc. in the department, two are now enrolled for that degree and one is enrolled as a candidate for the degree of Ph.D. Of the remaining six, three have transferred to the McGill Department of Chemistry where two have completed courses for advanced degrees and the third is still enrolled. Three have failed to qualify for the degree of M.Sc. Of those who attained the degree, five have since proceeded to the degree of Ph.D. - four in Chemistry and one in Bacteriology - and two are enrolled as candidates for that degree.

Research on the chemistry of maple products has been pursued for twenty years. Soils have been studied for eight years and some work has been done on butter fat and on the amniotic fluid of cattle.

Eleven papers on the analysis of maple products have appeared in Industrial and Chemical Engineering, a journal published by the American Chemical Society, and the results of our study of that field were summarized in a contribution to the Royal Society of Canada in 1919. Several reports on methods of analysis of maple



products have been made to the Association of Official Agricultural Chemists (of the United States and Canada). A process of moulding maple sugar into cakes which do not harden and become mottled has been invented and is being perfected in the laboratory of the National Research Council. A process of recovering malic acid from maple sugar sand has also been worked out, but an American synthesis of the racemic form from maleic acid obtained by controlled oxidation of benzene has rendered the recovery of malic acid from sugar sand uneconomic.

Several papers on soil chemistry have appeared in Soil Science, Science, the Canadian Journal of Research, and Scientific Agriculture, the organ of the Canadian Society of Technical Agriculturists. Contributions have also been made to the Journal of Chemical Education, Canadian Chemistry and Metallurgy, the Journal of the American Chemical Society and the Journal of the Society of Chemical Industry.

Two part-time teaching assistants are employed and at present two graduate research assistants are at work under grants from the National Research Council. All of these except one of the research assistants are enrolled as candidates for advanced degrees, - one in the Department of Biochemistry, the others in the Macdonald College Department.

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Additional Facilities Required

The department should be in a position to take over a refrigerating outfit and some microchemical analysis apparatus provided by the Research Council for the work on maple products and also some apparatus for pH determinations provided for the work on soils.

*out*

Some additional equipment in the way of constant temperature baths, and electrical measuring instruments is needed, and an outfit for the determination of the moisture equivalent of soils. out

Two thousand dollars would cover the cost of this apparatus.

If the number of graduate students increases, some additional work benches will be required. There is room for these in the basement of the building.

One of our greatest needs is the provision of research assistantships, scholarships and fellowships which would enable us to carry on independently of the National Research Council, whose grants can only be regarded as temporary.

We need additions to our library in the way of completion of sets of journals and encyclopedic works now owned in part, additional journal subscriptions, and monographs. A large sum could be spent to advantage in this line at the outset and an endowment yielding \$250 a year (in addition to our present appropriation) would enable us to keep it up.

Department of Agricultural Economics

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The recent development of increased attention of economists to the problems of agriculture has apparently stimulated an interest in study and specialization in what is generally known as agricultural economics. Demand for graduate training in this field of effort is increasing and this requirement is now being provided for by the universities of Toronto and Manitoba.

On account of the comparatively close proximity of Macdonald College to the other faculties of McGill, it would appear that arrangements might be made whereby graduate training might be offered in this particular field by providing that the major portion of this training might be secured at the Department of Economics, McGill University. Enquiry as to possibilities of securing instruction in this line would appear to warrant present consideration of the possibility of providing for this.

Agronomy Department

Past Achievements

When the Agronomy Department was first organized, twenty-five years ago, a definite policy of investigation was adopted. This has been continued to date. Extensive investigations have been carried on with the more important farm crops, namely, wheat, barley, oats, peas, alfalfa, red clover, corn, mangels, swedes, turnips, carrots, and millets. The results of some of these experiments have been published. The others are not yet complete.

Early in the history of the department, an extensive program of breeding crop plants was undertaken. By this method alone can permanent improvement be accomplished and it offers great possibilities. No other institution in this province is doing this type of work.

Several improved new varieties have been produced and many more exceedingly promising ones are in the advanced stages of testing.

Present Program of Work

The breeding work is now given major importance in the department's activities.

The main objectives sought may be summarized as follows:-

In wheat - quality, strength of straw, hardiness and yield.

In barley - strength of straw, hulllessness, freedom from disease, smoothness of awns, and yield.

In oats - low per cent of hull, strength of straw, freedom from disease, and yield.

In corn,- earliness and yield of grain and fodder.

In mangels and swedes - yield of dry matter and keeping quality.

In alfalfa - hardiness, yield, quality, and seed production.

In red clover - hardiness, longevity, and seed production.

In timothy and orchard grass - yield, quality, earliness and suitability for pasture.

In addition to the breeding work, the following problems closely related thereto are being investigated:-

1. - Soil heterogeneity studies and field research technique.
2. - The effect of inbreeding in swedes.
3. - Genetic studies in corn and in oats.
4. - Varietal hybridization in corn.
5. - Varietal resistance to smut in oats.
6. - Varietal hardiness in alfalfa.
7. - Rates and proportions of oats, peas, and vetches for silage.

Facilities

The department is well equipped in field and laboratory equipment for crop studies, plant breeding, and field experiments. A greenhouse is available for the study of plant material in winter, and facilities are available in the Chemistry Department for students to make chemical analysis.

Record of Staff

Professor R. Summerby is a graduate in Agronomy from McGill University in 1911, and obtained his M.S.A. degree from Cornell in Plant Breeding and Plant Physiology in 1921.

He was assistant in charge of field experiments from 1911 to 1912; lecturer in charge of cereal breeding from 1912 to 1919, and professor of agronomy from 1919 to date. He has given special attention to the application of Biometry to the results of experiments, and has published a number of papers thereon. Professor Summerby is now on leave working with Dr. R.A. Fisher at Rothamsted.

Professor L.C. Raymond is a graduate in Agronomy from McGill University in 1912, and obtained his M.S. in Genetics from the University of Wisconsin in 1924. He was assistant in charge of field experiments from 1913 to 1916; lecturer in charge of roots and corn 1918 to 1923; assistant professor in charge of root and corn investigations 1923 to 1929, and assistant professor in charge of forage crops 1930. He has given special attention to corn genetic studies.

Professor E.A. Lods is a graduate in Agronomy from McGill in 1912. He took graduate work at Cornell and obtained his M.S.A. from McGill in 1924. He was lecturer in charge of root investigations from 1916 to 1918; in charge of cereal breeding and extension

1919 to 1928, and assistant professor in charge of cereal breeding from 1928 to date.

J.N. Bird is a graduate of Toronto University in Biology, and took his M.A. from the same institution in Botany and Genetics. He took graduate work at McGill in 1928-29, and obtained his M.S.A. therefrom in 1929. He was appointed lecturer in Agronomy in 1930. ✓

Suggested Methods of Encouraging and Developing Graduate Instruction and Research.

A most useful and direct method of doing this is by the provision of graduate assistantships. These should be based on an eleven month year and should provide a remuneration of \$900.00. Holders of these assistantships would assist in the research work of the department and take two years to complete their work for the master's degree.

Two assistantships for this department would be very helpful in developing research work and in attracting students.

Additional Facilities Required for Carrying out Proposed Plan.

A. Research in agronomy frequently involves problems of chemistry, physiology, pathology, and genetics. There is therefore a distinct need for a definite basis of cooperation between this department and those represented by the sciences mentioned. The situation can be illustrated by the following examples:-

1. In breeding for winter hardiness with grasses and clovers physiological and biochemical problems are involved.
2. Pathological problems have presented themselves in investigations conducted with a number of the crops but particularly with the oat crop.

3. Feeding tests are necessary for the completion of some of the experiments now under way.

The most immediate need is for the development of the chemical aspect of our research problems.

- B. More help is needed to adequately carry on the present program and to make it possible to undertake other projects. A number of important agronomic problems cannot be satisfactorily undertaken at present, e.g., the pasture work, fertilizer investigations, weed eradication, etc.
- C. The nature of agronomic work necessitates the immediate attention of the staff throughout the whole calendar year. To maintain a high standard it is necessary that the members of the staff keep in touch with other workers, which is almost impossible under the short holiday period at present existing. Provision should therefore be made so that men can get away for at least one term occasionally to study and work with the best authorities in their field.

Animal Husbandry Department.

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1. Need and Opportunity.

Animal Husbandry is one of the largest, one of the oldest and one of the most important branches of professional agriculture in Canada. Very little graduate work is being offered at present and practically none has been given. There is a definite demand for it and those now engaged in the profession are being trained outside of Canada.

2. What the Department can offer.

(a) With the present facilities it would seem that the efforts in graduate work would largely be confined to problems of Animal Nutrition together with a consideration of methods of experimentation along these lines. For this work there is available, or could be made available, the necessary live stock.

Work of this type has been undertaken for the past three or four years and the equipment, other than the live stock necessary, has now accumulated to the point where, with small additions, it is quite satisfactory for certain important studies in applied nutrition.

(b) Projects already reported from this Department, particularly those dealing with experimental methods, have been favorably accepted by the workers in this field both in this country and the United States. Papers on this project have been presented before the Eastern Society of Animal Production and the American Society of Animal Production and appear in the 1930 reports of these respective organizations.

3. Methods of encouragement and development.

It is felt that the student should be afforded opportunity to undertake project work under direction but largely on his own responsibility. Such work is likely to require more time and involve more expense than does similar work in other branches. It becomes important, therefore, to incorporate it if possible in the regular investigation programme of the department. This being the case, there is all the more justification for some financial assistance in the form of part-time assistantships.



4. Additional requirements.

Some relief in the teaching schedule, particularly non-degree work, should be provided. It is possible that this could be done through graduate help on a part-time basis.

Some equipment for special problems would be necessary from time to time but no large expenditure is necessary to permit a certain amount of work being undertaken.

Entomology Department ✓

1. Equipment.

The Department of Entomology contains the usual equipment for laboratory work, including the following collections:

(1) a growing systematic collection of mounted insects, (2) a collection of economic insects in all stages with samples of the injury caused by these insects, (3) a collection of named and unnamed, mostly local insects, for the use of students in morphology and taxonomy. The laboratories are well equipped and a greenhouse and insectary are available for life-history studies. A laboratory for the study of problems in insect biology, physiology and physiological ecology is projected and some of the equipment is already available.

The College Library contains an entomological section. There is a departmental library consisting chiefly of works on economic entomology, including a set of experimental station bulletins. The private libraries of the members of the staff, containing many items not available in the general and departmental libraries, are open to advanced students.

In addition there is a large collection of insects and books available through the Lyman bequest and housed in the Redpath Museum. To these also, advanced students have access, as well as to the Blacker Zoological Library housed in the Redpath Library Building.

2. Past Work of Department.

(a) Teaching.

✓ This department was the first to put on graduate work commencing in 1911 and since that time a succession of graduate students have taken the Master's degree in Entomology. There are now four graduate students registered in the department and the equivalent of seven full courses are offered for graduate study.

(b) Research.

Until recently no provision, financially or otherwise, has been made for carrying on research in entomology. For this reason the members of the department have devoted most of their attention to morphological and taxonomic problems, that required no outlay for equipment or assistance. Numerous papers in these fields have been published by members of the staff and others are in course of preparation.

With a certain amount of assistance from the Research Council several years of work were devoted to the investigation of the onion maggot (Hylemyia antiqua Meig.). A careful study of the bionomics of this pest has been made and the results published.

Much preliminary work has been done on the parasites of domestic animals, particularly poultry. Our field survey has given us valuable data on the distribution and relative abundance of the species concerned. Preliminary experiments have given indispensable information as to the nature of the problem and the difficulties involved. More detailed work is now going forward and, with the provision of expected increased facilities, the work can be rapidly expanded. This problem is first considered of importance for the following reasons:

(1) It offers the best method for cooperative work and pooling of resources of the departments concerned, viz., Poultry, Animal Husbandry, Veterinary, Chemistry and Entomology.

(2) The problem is one of great intrinsic importance and is nowhere in Canada being investigated in a comprehensive and fundamental manner.

### 3. The Staff.

The nature of the work carried on by the department and the opportunities it offers for advanced students may be indicated, in a measure, by the lines of activity that have been and are engaging the attention of the departmental personnel.

W.H. Brittain - has worked for twenty years in field of economic entomology, specializing in fruit insects and has published quite widely in this field, also contributing articles on subjects of insect morphology and taxonomy; for past three years has directed an investigation of apple pollination financed by Dominion Government, employing several assistants; has worked in

various parts of Canada and travelled in the United States, Europe and Far East.

E.M. DuPorte - research work in field of parasitology and morphology; has contributed a number of scientific papers on these subjects; spent summer of 1930 in England and studied organization of parasitological work in that country.

A.D. Baker - spent several summers in bionomic investigation of the onion maggot and has published results of this work. Taxonomic and morphological studies in Pentatomidae with several papers; another more extensive study in same field nearing completion. Mr. Baker is directly responsible for carrying out this department's part of parasitological investigations under Dr. DuPorte; has published several preliminary papers on poultry parasites.

W.E. Whitehead - has approximately ten years experience as laboratory and scientific assistant at Nova Scotia Agricultural College before coming to Macdonald; has collaborated in a number of economic and taxonomic investigations and published a number of independent papers; is a skilled technician and artist.

#### 4. Future Developments.

##### (a) Development of Graduate Teaching.

One line of work that needs strengthening from the standpoint of graduate teaching is taxonomy. Dr. DuPorte has put on an advanced course in this field very acceptably but as this is only one of many of his activities the research side of the field is being left unworked. Coincident with this our permanent collection must be increased and improved and a collection of immature stages developed. One

man's whole time is a minimum requirement for the development of this field. We have a lecture course in ecology, but no laboratory course in this subject or in insect physiology. These fields, and provision for toxicological studies, are among our needs for the future.

We could greatly increase our attendance and improve our position were a few scholarships and graduate assistantships available. In fact this provision would change the whole picture of graduate training at Macdonald College. Unfortunately our good students find it impossible to secure such inducements here, but many opportunities are available in the United States.

The development outlined or projected in parasitology and agricultural entomology would afford opportunity for students to secure the necessary training and experience along these lines and this is the way that such work can be developed.

Our library needs considerable strengthening, particularly with respect to foreign language books and periodicals.

(b) Development of Research.

1. Parasitology. The development of our present plans for parasitological research calls for an expenditure of approximately \$45,000 over a period of five years. Some of this is in sight and it is hoped that the remainder can be secured. Meanwhile, we propose to go ahead with the development of the poultry parasite investigations.

2. Agricultural Entomology. The opportunities in this field are excellent but we have little to build upon as yet

in the department. Certain problems that have engaged our attention have been referred to, but continuity has not been possible. Important studies in vegetable and orchard and greenhouse insect problems are available for study in the district. Provision for continuity of work provided by graduate assistants and to enable us to undertake investigations of outbreaks where they occur, would enable us to make a real contribution to this field.

5. General.

One matter that should be given the earnest attention of the University authorities is that of a sabbatical year. The institution of a sabbatical year at most American and some Canadian institutions has undoubtedly improved the position of research at those institutions. For a more or less isolated institution such as ours, the need is even more compelling.

Horticulture Department

Practically no graduate work in Horticulture has been offered in any Canadian University and many Macdonald College graduates, as well as those from other colleges have been obliged to go to foreign countries for graduate work. There is an increasing demand in Canada for men with a high graduate standing in Horticulture, and it is believed that much of this demand may be met through the facilities of Macdonald College.

The Department of Horticulture, Macdonald College, is prepared to offer graduate courses in two branches of Horticulture; namely, Pomology and Vegetable Crops.

The Department of Horticulture has as head of the department, and Professor of Horticulture, a man with twenty-two years academic, practical and research experience in the various phases of Horticulture at Macdonald College, the Dominion Department of Agriculture and the University of New Hampshire. The Assistant Professor of Horticulture has had wide experience in his graduate training at Cornell University, Yale University, and the New Haven Experimental Station, in addition to service with the Dominion Seed Branch. The Lecturer in Horticulture has completed graduate work at the University of Michigan.

The Department has produced a new variety of Rhubarb, the "Macdonald", which has been well distributed in Canada, particularly in the Prairie Provinces, and is now in great demand in the United States. It has also been instrumental in distributing large numbers of plants of new and better varieties of many fruits, vegetables and ornamental plants to various parts of the Province of Quebec as well as other places.

Graduate courses, in addition to training students, would be one means of further developing investigations and researches in the many problems of Horticulture. Some of these problems are, - processing fruits and vegetables, preservation of fruits by freezing, the production of improved strains and varieties of vegetables through plant breeding work, the carrying on of studies in plant nutrition, pollination and sterility of fruits, etc.

The extensive plantings and varieties of fruits, vegetables and ornamental plants, maintained by the Department of Horticulture, from which incidentals a substantial revenue is obtained, make it difficult, with the present assistance, to carry on many urgently needed investigations.

It is felt that the present equipment and plantations could be used to provide additional means of extending the work now under way with the help of graduate students of a desirable type; but to advance the work, as the situation and needs indicate, a considerable increase in finances is required for technical assistance, as well as skilled labor and equipment.

Plant Pathology Department

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Plant pathology which has had a comparatively recent development and due to the demands of agriculture, a rapid growth is a highly scientific study and at the same time an intensely applied subject. Thus the members of this department endeavor to keep in close contact with the practical aspects of the subject by giving whatever assistance is possible to plant growers in solving their disease problems as they occur from time to time. This experience proves to be of real value in teaching work and in choosing and directing thesis problems in connection with post graduate studies. At the same time investigations in a few more or less restricted lines have been and are being emphasized and consistently followed.

Chief of these is the investigational work of the department on the virus diseases of plants. This was started in 1920 and has been carried on ever since. This year researches are being made into the properties of the virus causing tobacco mosaic, a common and troublesome disease. Investigations on the action and value of various chemicals as seed disinfectants against seed borne parasites has been for some years a particular effort. The effects



of one pathogenic organism on another, (both of which are disease organisms common to one plant) have been made a special study. A start has been made in investigating the factors determining winter hardiness in plants and it is the intention to develop as intensively as funds will provide for the necessary equipment, this study which is of great importance in Quebec and Canada generally.

The department is quite well equipped with the apparatus necessary for plant pathological work such as sterilizers, glassware, microtomes, research microscopes, photomicrographic apparatus, hydrogen-ion outcit and chemicals. A fine collection of prepared microscope slides and preserved material of pathological specimens are available for the study of the important plant diseases. The department is endeavoring to build up special lines of equipment such as temperature control apparatus for the study of winter hardiness and effects of temperature on disease development. A start has been made along this line and one experimental plant chamber artificially lighted and thermostatically heated is available. This equipment has proven to be very useful and other units should be added. A laboratory hydraulic press was added last year to be used in the extraction of plant juices in comparative studies on the juices of diseased and healthy plants. There is considerable greenhouse space available for graduate students who might require such facilities. An important feature is that this space is divided into convenient sections with separate heating which allows for much better control over the environmental factors which are important in all plant disease studies. The College library is well provided with the botanical and phytopathological journals and publications, but there is some need for additions, particularly relative to publications in foreign languages.

Thirty-five students have taken post graduate studies either as major or minor work in the department during the past ten years, which covers the period of post graduate teaching at Macdonald in this subject. At the present time four men are registered for post graduate studies. While the numbers are not large, they are quite in keeping with the demands for men in this field. A goodly number of the workers in plant pathology in Canada today are graduates of Macdonald and four are in the employ of the British Colonial Service. Thus the teaching work and graduates of the department are given recognition.

It is recognized that in order to properly teach the subject of plant pathology, one needs to keep in touch with the problems of the growers. The field work done each summer by the members of the department provides this experience and contact with the practical aspects of the subject. Yet it is felt that the reputation of the department can be best established by emphasizing a few well chosen and important lines in investigational work. Thus it is proposed to make a special feature of research work on virus diseases; seed treatments and develop the study of winter hardiness. This requires special equipment which should be provided as funds will allow. This should be a proper basis for the encouraging of graduate work particularly along lines of phytopathological studies not covered elsewhere in Canada.

The post graduate course in mycology is given particular emphasis as a necessary supporting subject to the study of plant pathology. That the courses given by the department are adequate and constitute a sound training in plant pathology seems to be proven by the fact that a number of our graduates who have gone to other

institutions to pursue post graduate studies have been granted full credit for the work taken at Macdonald. However, post graduate studies in plant physiology should be made available for students taking post graduate plant pathology. Tentative plans have been made to meet this situation through cooperation with the Department of Botany, McGill University.

The department is very much handicapped through lack of laboratory space and this should be provided as soon as possible.

The standing of the department would be greatly enhanced by the addition of another member to the staff. The present organization of two professors, one lecturer and an assistant places a heavy teaching burden upon each member, since there are both undergraduate and post graduate courses to be taught, Then there is also considerable extension work. Thus each member has insufficient time for the pursuit of research work, which is so necessary in teaching and directing post graduate studies. The addition of a man who has an established reputation for his work in some branch of plant pathology would add greatly to the prestige of the department and at the same time lessen the teaching programme of each member for increased research work. During the period of rapid expansion in phytopathological work in Canada there was a demand for men with a general type of training, but the stage has now been reached where the demand is more for the man with a specialized training. The department should make an effort to offer opportunities for such training in as many branches as possible. Thus this suggested increase in the personnel of the staff deserves consideration.

Poultry Department.

At the present time the Poultry Department is equipped with facilities for both genetic and nutritional project work for advanced studies. Undoubtedly the present equipment may have to be supplemented to permit the carrying of numbers of stock over prolonged periods. Such additions, however, are likely to be made as the regular work of the department develops. Nutritional studies with adult and growing stock could be undertaken with the cooperation of the departments of Animal Pathology and Agricultural Chemistry.

The experimental and research problems in nutrition and genetics at present under way offer excellent opportunities to graduate students for working out problems in these fields.

The establishment of a number of bursaries, scholarships and fellowships is, however, vital to the development of graduate work in this field.

Present equipment is reasonably adequate for ordinary work, but further development in the department will necessitate further provision for handling experimental groups of stock and certain special equipment.

SUMMARY

The present facilities, possibilities and needs of individual departments are set forth in the foregoing pages. It may, however, be well to emphasize those points which have been brought out by several departments, or which appear to be of paramount interest and importance.

1. The necessity of making provision for graduate scholarships, assistantships and fellowships was emphasized by all departments.

2. Few departments are provided with adequate funds for prosecuting research in their particular field, and in some cases no special financial provision has been made. The establishment of research grants and a special research endowment is an obvious necessity.

3. Our library appropriation is entirely inadequate for a research institution. Fortunately, the general McGill library is of great assistance to some departments, but for others further provision for books and periodicals is a prime need.

4. As regards new subjects of study that should be provided, biometry was stressed by practically all departments. Establishment of a course in Plant Ecology and development of the work in Animal Ecology was suggested.

5. The need for the institution of the sabbatic leave was considered by several departments to be vital to the development of research work.

6. While most departments are reasonably provided with ordinary equipment, provision for special equipment to attack special problems is an urgent need in certain departments.

7. The provision for advanced work in the field of Agricultural Economics is recommended, through cooperation with the Department of Economics, McGill University.

