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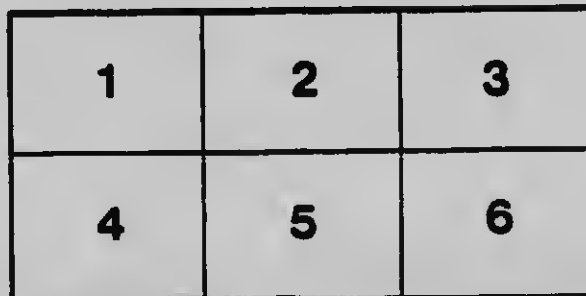
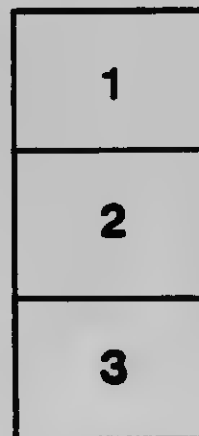
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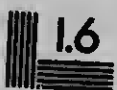
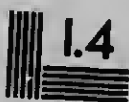
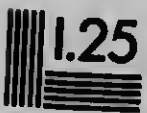
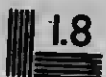
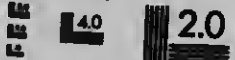
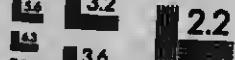
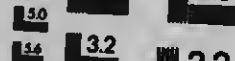
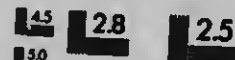
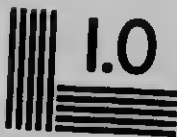
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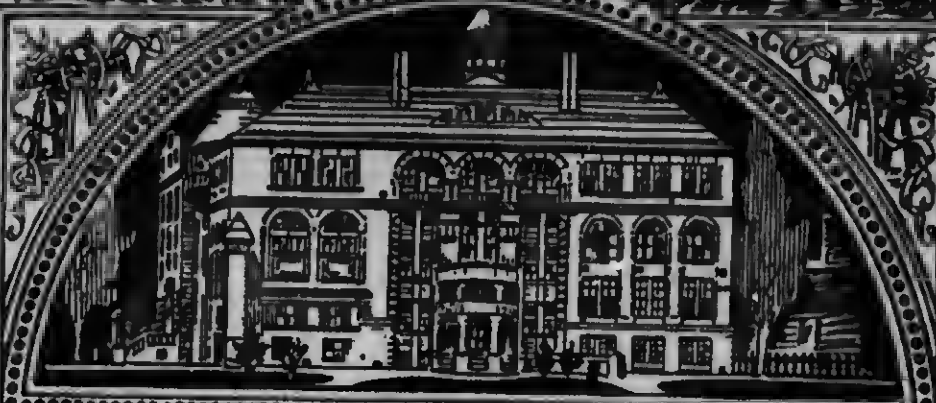
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In order to familiarize the friends of McGill with the work done by the University in the various Arts and Sciences, the Publicity Committee of the McGill Centennial Endowment Campaign has prepared a series of small booklets, each of which deals with a particular branch requiring special and immediate assistance. These will be mailed to a selected list of 10,000 names, previous to the actual campaign for subscriptions, which starts November 15th, for a total objective of \$5,000,000. Readers of this booklet can help the cause by sending names of those who might be induced to subscribe but who are not receiving this series of pamphlets. Send such names to

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McGILL AND SCIENCE

THE EARLY DEVELOPMENT OF SCIENTIFIC STUDIES AT MCGILL UNIVERSITY

By Frank D. Adams, Ph.D., D.Sc., LL.D., F.R.S.,
Dean of the Faculty of Applied Science, McGill University.

THE fame of McGill University is based in no small measure upon her achievements in the world of science.

In the early years, McGill men were attracted to the study of science by the outstanding personality of Sir William Dawson, who had not only himself won marked distinction in this field of knowledge, but had also a firm belief in the value and importance of scientific studies as a means of mental training and discipline, and foresaw the important role which science, pure and applied, was destined to play in the world of the future, and especially in the growth and development of a new country like the Dominion of Canada.

So much impressed was he with the demand which would arise for men trained in science in connection with the development of the great resources of the Dominion, that as far back as 1856 he established a course in Engineering at McGill, which, however, after an existence of a few years, suc-

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McGILL CENTENNIAL ENDOWMENT

cumbed to adverse influences, not however, until there had been trained in it a number of men who subsequently did excellent work, and of whom several rose to occupy important positions in these early days. When announcing, in one of his University addresses, that it had been necessary to discontinue this course, Sir William declared his intention of reviving it whenever conditions became more favorable. This he did in 1871, when a Department of Applied Science was constituted in the Faculty of Arts, which in 1878 developed into a separate faculty, the Faculty of Applied Science, later to be suitably equipped and endowed through the magnificent generosity of that great benefactor of the University, Sir William MacDonald. It has now grown to be the largest faculty in the University.

When thus making provision for the teaching of those sciences which formed part of the curriculum of the Faculty of Applied Science, the biological sciences which find their place in the Faculty of Arts were not forgotten. The founding of the Graduate School in 1906 marked the formal organization of the higher science teaching in the University and provided for courses leading to the higher degrees of Master and Doctor.

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SOME ACHIEVEMENTS OF MCGILL IN THE FIELD OF SCIENTIFIC RESEARCH

From the days of Sir William Dawson to the present time, there have always been members of the staff engaged in important scientific researches at McGill, and a continuous series of papers setting forth the discoveries made in these researches have been issued from the University. A general reference only can here be made to a few of these investigations.

From the time of its foundation, the Department of Physics at McGill University has attracted the attention of the whole scientific world by a series of brilliant researches which have been carried out by a succession of distinguished men of science who have occupied the professorships in this department—researches which have advanced our whole knowledge and conception of the constitution of matter and the laws of the Universe.

Of these men Professor Ernest Rutherford is worthy of a foremost place. His investigations in the field of radioactivity were of a character so striking and far-reaching that he became at once the leader in breaking into this new world of scientific knowledge; and at the completion of nine years of continuous work at McGill University, in the course of which time he refused offers of the appointment to the headship of the Department of Physics in several of the foremost universities of the United States, he was called to be head of the Department of Physics

MCGILL CENTENNIAL ENDOWMENT

in the University of Manchester as a stepping stone to the Professorship of Physics in the University of Cambridge, and which is recognized as the leading professorship in this department of science in the English-speaking world. He attracted to McGill a band of younger men whom he associated with him in his work, many of whom have since achieved marked distinction. Among these may be mentioned Dr. Soddy, now at the University of Oxford; Professor Eve now head of the Department of Physics at McGill University, who rendered such excellent service during the war as Director of the Admiralty Research Station at Harwich, in the invention of methods for submarine detection; and Professor Louis Vessot King of the same department, whose recent work on fog signalling in the Gulf of St. Lawrence has attracted such widespread attention; also Professor Boyle, now at the University of Alberta; Professor McClung, now at the University of Manitoba; and many others who flocked to the laboratories of McGill University, not only from the United States and Britain but from Germany and other parts of the Continent of Europe, in order that they might be able to study under his direction.

Other men of marked distinction have carried out researches in this department at McGill in other lines of work. Professor Callendar in the accurate measurement of high temperatures; Professor Barnes on the properties of ice and the conditions

MCGILL CENTENNIAL ENDOWMENT

preventing its formation. The names of Professor Cox, and of Dr. (now President) Tory should also here be mentioned, as well as those of Dr. Shaw, Dr. Gray and other younger men in the McGill Department of Physics, who are now engaged in research work of importance, and who promise to carry on in a worthy manner the traditions of old McGill.

In the Department of Electrical Engineering, which in many ways is related to the Department of Physics, the Oscillograph Researches on the Surging in High Tension lines, and those on Transient Phenomena in the Armature Inductance and Re-action of Alternators by Professors Herdt and Dalemont may be mentioned. Also those on Transient and Permanent Phenomena in Electrical Series Transformers by Brig.-General Andrew MacNaughton, and on the Electro-Static Capacity of Insulator Units by Mr. E. Bieler.

From the Chemical Laboratories of the University also there has issued a continuous series of contributions to chemical science from the time of Dr. Harrington to the present day, when under Dr. Kuttan there is a group of able young investigators engaged in the study of various recondite problems in this science which lies at the foundation of modern industry.

In the Natural Sciences, McGill has also occupied a foremost place in the world of research. Professors Penhallow and Lloyd in Botany, Professor

McGILL CENTENNIAL ENDOWMENT

Wiley and Dr. Stafford in Zoology, have made most important contributions to the knowledge of their respective sciences. In Geology, the work of Sir William Dawson covered many fields and is well known to all; that of his successor in the Logan Chair of Geology, on the ancient crystalline rocks of Canada, on the problems of metamorphism, the origin of ore deposits, and more recently on the elasticity of rocks (with Dr. Bancroft), and their deformation and flow under great pressures, has thrown light upon many questions bearing upon the development of the earth and has received widespread recognition.

In various branches of Engineering, McGill has made important original contributions. Among these may be mentioned the researches of Professor Nicholson on the conditions which obtain in the cylinders of a steam engine when in operation, which have contributed largely to a true understanding of this prime mover. The work of Professors Porter and Durley on Canadian coals and the most efficient methods of their utilization was a most valuable investigation carried out for the Dominion Department of Mines. The work of Dr. Coker (now Professor of Mechanical Engineering in University College, London) on action of metals under stress and those of Professors Mackay and Brown and Mr. Batho on the deformation of bridge members under stress, and on other problems, carried out in the Testing Laboratories of McGill University, may be referred to.

McGILL CENTENNIAL ENDOWMENT

The work of Dr. Stansfield on the Electric Furnace and its adaptation to modern needs is well known

In addition to these investigations which represent actual advances of science by research into the unknown and which are, therefore, of world-wide value, the staff of McGill University have contributed to the development of the Dominion of Canada itself in their services on many Government Commissions and Boards, such as the Commission of Conservation, the Council for Scientific and Industrial Research, Civil Service Commission, various War Boards, etc., etc.

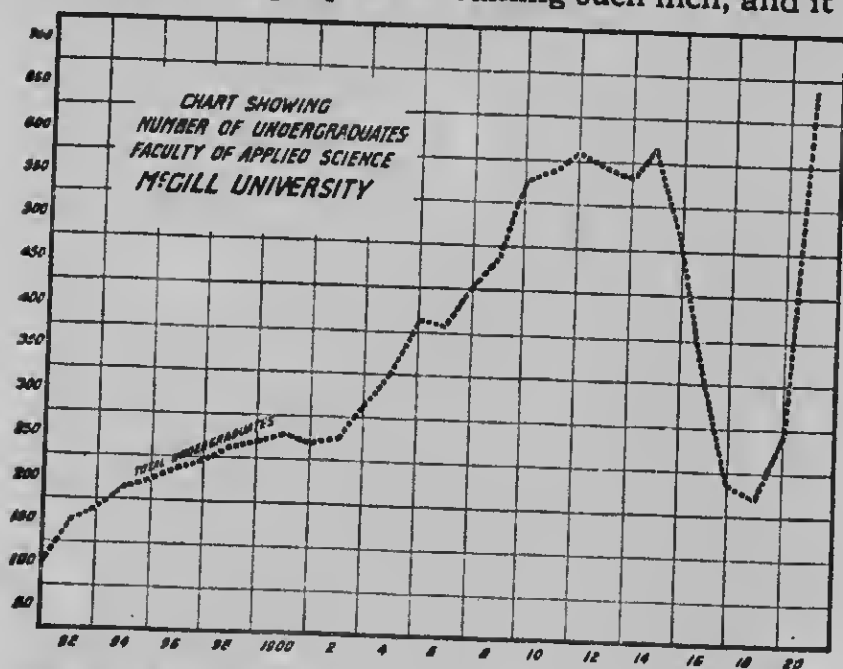
THE CONTRIBUTION OF MCGILL TO THE DEVELOPMENT OF CANADIAN INDUSTRY

The industrial development of any nation, under the conditions of the modern world, calls for an ever-increasing number of men, highly trained in the principles of science and with the ability of applying their knowledge to the industrial needs of the community. The war has strongly impressed this fact upon the thinking people of the English-speaking world, since it is now quite clear that one of the chief sources of Germany's strength is to be found in the large number of men thoroughly equipped in all branches of scientific work, who had been trained in the science schools of that country and whose services were immediately available both for the development of the arts and industries in times of

MCGILL CENTENNIAL ENDOWMENT

peace, and for the active and efficient prosecution of war upon the outbreak of hostilities.

The Faculty of Applied Science of McGill University was the first school in the Dominion founded for the express purpose of training such men, and it



has, since its foundation, trained an ever-increasing number of men, who have passed out into the industrial life of Canada and have been a potent force in the progress and development of the Dominion. The growth of the Faculty is well shown in the accompanying diagram, where the curve shows

MCGILL CENTENNIAL ENDOWMENT

the number of students in attendance each year. As will be seen, the number rose rapidly from 29 in the year 1879 to 583 in the year 1913. Upon the declaration of war, the students began to enlist at once, and by the year 1917 the attendance had fallen to 176, consisting for the most part of men under age or physically unfit. With the cessation of hostilities, they began to return as soon as they were demobilized, and in the session of 1919, the number in attendance in this Faculty had risen to 643, the largest in its history.

The number of graduates, undergraduates and former students of the Faculty who enlisted in the Great War reached a total of 1042. Of these 178 were killed, and a very large number were wounded. The proportion of casualties was high, for the men joined the most dangerous arms of the service.

The number of men who completed their training and graduated from this Faculty up to the close of the session 1919-20 reaches a total of 1813.

The Faculty of Applied Science provides courses of training in six separate branches of Applied Science, namely, Civil, Mechanical, Electrical, Chemical, Mining and Metallurgical Engineering. There is also the course in Architecture. The courses of study in all the branches of Engineering extend over a period of four years, while that in Architecture is a five years' course. In the summer vacation, about 86 per cent. of the students secure work in survey parties, engineering offices, factories

MCGILL CENTENNIAL ENDOWMENT

or industrial works, and thus gain valuable practical experience which supplements the work of the academic session. In this way nearly every student upon his graduation, has had four years of academic training and three summers in the practical work of his profession and has thus laid a sound foundation of knowledge in the principles and practice of the profession which he has selected as his life's work.

A number of colleges and other seats of learning in various parts of the Dominion work in affiliation with this McGill Faculty. Among these may be mentioned Acadia, Mount Allison and Alberta Universities, the University of St. Francis Xavier's College, the Royal Military College and the Royal Naval College. Arrangements have been made by which graduates of the Mechanical Science course in the University of Cambridge in England are admitted to advanced standing in the Faculty of Applied Science of McGill University. Students completing their course in these institutions may enter the first, second or third years at McGill, as the case may be.

There has thus gone forth from McGill a great body of young men with a sound training in science, who, having joined the staffs of great engineering works in Canada, of the industries and of the scientific branches of the Government Departments, have been, and are now, a most important factor in the growth and development of the Dominion. Of this number many have risen to occupy positions of

MCGILL CENTENNIAL ENDOWMENT

great importance and responsibility, and have become the leaders in their respective industries or professions.

It would be invidious here, especially in view of the prescribed limitations of space, to single out for special mention any individual graduates from among the large number who have risen to positions of especial eminence.

A few of the great engineering enterprises which have been carried out chiefly by the work of McGill graduates may be mentioned to indicate in a general way the scope and importance of the work in which they have been engaged.

Going back some years, there is the Canadian Niagara Power Company's hydroelectric development of 100,000 horse power at Niagara Falls in 1904, the City of Winnipeg hydroelectric development of 150,000 horse power at Point du Bois in 1907, and the great irrigation development scheme of the Canadian Pacific Railway, by which one and a half million acres of land in the Provinces of Alberta and Saskatchewan have been, or are being, brought under cultivation.

The telephone system of Canada has been developed largely by McGill men; the great engineering works which are being carried out in Halifax are largely the work of engineers trained at McGill.

The engineering staff of the Shawinigan Engineering Company, which is responsible for the main-

McGILL CENTENNIAL ENDOWMENT

tenance and development of the work of the Shawinigan Water and Power Company, and of all its subsidiary companies, which are grouped about the great power centre at Shawinigan Falls, is composed largely of McGill graduates.

A few years since, a McGill man was at the head of nearly every large smelter in the United States; and in Canada at the present time the management of two out of the three great companies which smelt practically all the nickel which is produced in the world are McGill graduates, as are also many of their staff. The President of one of these companies has recently stated that, while his company was engaged in operating large metallurgical and chemical plants in many different lands, in none of these was the work carried on so efficiently and satisfactorily as in his Canadian plant which was staffed exclusively by graduates of McGill.

Many other great enterprises, which owe their success to McGill men, might be cited, but these will perhaps suffice.

It may be added, that it is not only in the field of actual practice that McGill engineers have been pre-eminent, but that they also occupy a prominent place in the training of the engineers of the future, as shown by the fact that at the present time the Professor of Civil Engineering in nearly every university in Canada is a graduate of McGill University.

MCGILL CENTENNIAL ENDOWMENT

THE NEEDS OF MCGILL FOR THE CONTINUANCE AND DEVELOPMENT OF HER WORK IN SCIENCE.

It is hardly necessary to remark that it costs more to train men in science than in any other branch of academic work. In all faculties, the most outstanding and inspiring teachers, with libraries and classrooms, are required, but in order to give an adequate training in science, it is necessary to have in addition extensive and well equipped laboratories. These in their turn require to be housed in suitable buildings, and not only is the primary cost of this additional equipment great, but it must be maintained in good condition and supplemented from year to year to meet the demands of advancing knowledge.

McGill, at the present time, in all its Faculties, needs first and foremost higher salaries for its teaching staff in order that they may be able to live in decent comfort and devote their undivided attention to their work. The loyal devotion of the staff in these latter years, in the face of the ever-increasing cost of living, is beyond all praise, but they must now be adequately provided for if the work of McGill is to grow and prosper.

The buildings which house the Faculty of Applied Science and the classes in pure science in the Faculty of Arts are now entirely too small to accommodate the rapidly growing number of students. In addition to a new building for Biology,

McGILL CENTENNIAL ENDOWMENT

at least one more building, simple in construction, but of adequate size, is needed to provide accommodation for certain of the departments of Applied Science, thus setting free space in the present buildings for the expansion of the other departments. The equipment of the laboratories and workshops, which was excellent and quite adequate for all requirements when it was installed many years ago, now requires to be renovated and extended to bring it up to date and to provide for the needs of the present time. New fields in all the sciences are continually being opened up by study and research, and McGill must be prepared to keep pace with this growth of knowledge.

The increasing complexity of modern industrial life is furthermore giving rise to a demand for men of still more advanced training and experience. These, McGill must be prepared to train, if it is to retain its leadership in scientific research and continue to educate men who are fitted to play their part in fitting Canada to take that place among the nations of the world which she has achieved as one of the results of the Great War.

