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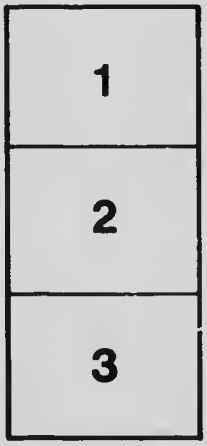
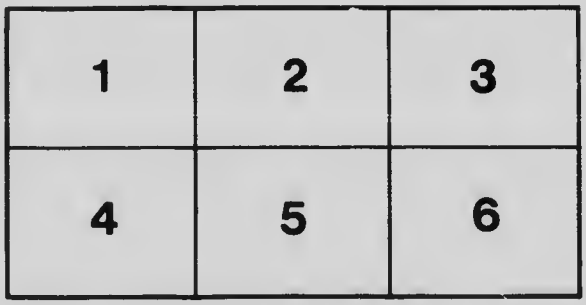




1920

UNIVERSITY OF TORONTO

December 6, 1920

TO THE HONOURABLE AND REVEREND H. J. CODY, D.D., LL.D.,
CHAIRMAN OF THE UNIVERSITY COMMISSION.

DEAR DR. CODY:

By the authority of the Governors and Senate of the University of Toronto I am submitting to you herewith a Statement with Reports setting forth the case of the University of Toronto for enlarged support by the Province of Ontario.

I have the honour to be
Your obedient servant,

President.

University of Toronto

STATEMENT AND REPORT

PRESENTED TO THE

UNIVERSITY COMMISSION

BY THE

Board of Governors and Senate

OF THE

University of Toronto

December 6th, 1920

CONTENTS

GENERAL STATEMENT.

The Provincial University.—The fortunes of the University have been very intimately associated with the life of the Province of Ontario from its earliest days. The first Governor, John Graves Simcoe, inaugurated the proposal that a college or university should be erected, and his recommendation was supported by the Legislative Council and House of Assembly with a magnificent grant of land for which sanction was given by the Crown in 1798, but his real purpose was not to be realized in his own time nor indeed except through years of wearisome and precarious struggle. At last, however, the Provincial University became firmly established in Toronto, and it must always remain the peculiar creation and property of the people of this Province, who are bound to provide for their youth such education as will continue to be worthy of their progress in intelligence and wealth.

Federation.—The character and destiny of the University have been further established by the undertaking to maintain the State University in efficiency given to Victoria and Trinity Universities at the time of their federation with the University of Toronto. This unique organization has created for this University a distinctive character. Federation came gradually, and its results have been gradually stabilised. It brought unification of collegiate and professional interests and has not only prevented costly duplication, but also a variety of ideals in higher education. To-day the degrees of the University of Toronto are recognized as comparing favourably with the best on this continent, and three colleges, besides the State College, in federation co-operate for the maintenance and development of one high standard in the Faculty of Arts. Communications are submitted from the federated Colleges.

Unification of the University.—Before Federation the diversity of interests in higher education was such that this Province was unable to provide for itself a University towards which the Legislature was either able or willing to grant such support as for many years previously had been given to State Universities in the United States. These great institutions had a start over the University of Toronto in their development. With the success of Federation, however, and with the carrying out of the constitution provided by the University Act of 1906 the University of Toronto entered upon a new and most successful period of its development. Arts became unified and strengthened by the addition of St. Michael's College in 1910. Some years earlier the rival Schools of Medicine in Toronto had been brought together into one great Faculty. In 1906 the School of Practical Science was transferred from its former direct relationship to the Government and became the Faculty of Applied Science, and in the same year the Faculty of Education was created to train the teachers of the Province of the higher grades. The University to-day, therefore, has grown into a vast, varied and complex organization.

Attendance of Students.—From the year 1897 to 1906 the attendance in the University and the School of Practical Science increased from 1,350 to 2,500, a little less than 1,200 in nine years, but in the first year under the new constitution numbers rose rapidly by 500 annually until 1909-10, when they reached 4,000. Standards were raised and courses were lengthened, with the result that there was very little change in the numbers until the first year of the war, 1914-15, when they stood at 4,400. During the war they declined rapidly. In the session 1919-20, however, the first full session after the war, they rose very unexpectedly to over 5,200. This year, at present, there are about 4,600 in attendance. But this reduction is more apparent than real, except in the case of the attendance at the Ontario College of Education, which is reduced by the removal of over 300 candidates for first class certificates from that College to the Normal Schools. The decline otherwise is due to the transfer to the College of Dental Surgeons of the teaching of Anatomy formerly given to students in Dentistry, owing to the impossibility of providing for them in our present anatomical quarters, and to the discontinuance of the matriculation class for returned soldiers. In Arts, however, the attendance this year is greater than last year, and is really larger than it has ever been. In Medicine the number of full-time students is slightly above that of last year. In Applied Science the attendance is practically the same. The congestion at present is, of course, partly due to the presence of the returned soldier, though chiefly so in the Faculty of Medicine. Though there may be fluctuations it would appear that in Arts and in Applied Science the numbers will not likely be permanently reduced in the future, but under the necessary limitation which has to be made in Medicine they will probably fall in a few years to perhaps 700 in that faculty. Other departments, however, are likely to increase, especially Graduate Work, the new School of Commerce, and Extension.

If the standards of entrance are raised in the Faculty of Arts, as has recently been done in the Faculties of Applied Science and Medicine, the students in the three largest Faculties of the University, as well as in the College of Education, will be of distinctly university grade, and no reduplication of instruction, such as may be given in the Collegiate Institutes of the Province, will be carried on in the University.

Origin of Students.—Tables are herewith submitted to show the origin of the students both as regards their homes and the occupations of their fathers. Attention is drawn to the wide representation of all parts of the

Province in this distribution of students, and to the fact that the homes from which they come represent in a remarkable way almost every variety of occupation in the Province. They show how thoroughly democratic is the character of the student body.

Building Activity.—The record of attendance provides the explanation of the great activity in building which continued for seven years after the present Board of Governors took office. New laboratories had to be constructed, the Library extended, and buildings erected to accommodate teaching departments, old and new. The Governors drew up a carefully considered plan of building, including developments for administration, for it was evident that the conduct of the affairs of a great University like Toronto could not be carried on under the conditions that might have been sufficient when the various interests of the University were more or less independent. Unfortunately, however, though the Governors had reason to hope that their programme would be carried out, a stop was put to construction by the limited funds placed by the Government at their disposal, and even before the war this kept the University in a position of great congestion, hindered development in research and seriously interfered with its work otherwise. At the outbreak of the war the former activities of the University were directed into new channels. The attendance dropped rapidly, building ceased.

Present Conditions.—But again, in the first year of peace, an unprecedented attendance caused the University to face the old problems in a more acute form; the former numbers of students would have overcrowded the old accommodations, but one thousand more were in attendance. This is the situation in which we find ourselves to-day, except that one new building, now nearing completion, has been added for the Departments of Applied Mechanics and Electrical Engineering. Many of the departments of the university will be seriously crippled unless immediate action is taken in carrying out the building programme, which is submitted in the Appendix to this Statement. Special statements are handed in by the heads of the Departments of Anatomy, Botany and Political Science, but the requirements of University College and for women students are scarcely less urgent. The Principal of University College has submitted a memorandum setting forth the building requirements of the College. Undoubtedly it has been suffering from lack of proper teaching accommodation and of residences, and as the oldest and most central part of the University its needs should receive immediate attention. It is most unfortunate that the revenues at the disposal of the Governors were insufficient to complete these necessary building operations before the war, during the period when construction was less than half its present cost.

Results of Too Small a Staff.—The large attendance of students created another problem. The staff of the University had never been large enough. As early as 1891, in the Blake Report, attention was drawn to this fact, but the difficulties grew as the numbers grew. Men who had capacity for doing graduate and research work were compelled to undertake so much undergraduate instruction that both time and energy were exhausted, and young men joining the staff were overloaded with routine work in class-rooms and laboratories, and were thus deprived of the opportunity which they should have had of laying a foundation for productive scholarship or scientific research. The numbers of students in several departments are so large that some lectures have to be delivered twice, three, or even four times, by one teacher; a routine which becomes deadening.

But the staff was enlarged from year to year as is shown by figures herewith submitted. In 1904-5 it stood at 210 (exclusive of federated universities), whereas in the present session it has risen to 511 with certain appointments still to be made. An increase in our present staff, however, is necessary even should the number of undergraduate students be reduced. Only thus will it be possible for the University to enter upon an enlarged programme of graduate and research work.

Faculty of Arts.—It must not be supposed, however, that either in University College or in the Faculty of Arts of the University we have yet reached our limit even as regards undergraduate work. Changes will be made in the curricula to meet the changing conditions of the time and new departments and sub-departments must be added. It is to be expected, for example, that the departments of Political Science and History, including Canadian History, will grow rapidly, and that with the general rise in the education of the Province greater attention will be given to the study of language and literature. In fact unless they are not only maintained but developed, the whole University will suffer. A wider diffusion of education on its humanistic side is required for our people, who now find themselves in the forefront among the most highly developed nations of the world. Also, if we are to judge by the experience of other Universities, both in Britain and in the United States, the new Department of Commerce will soon assume a large importance, and it will be necessary not only to provide accommodation, but to make new appointments of men who are competent to deal with the practical aspects of business administration and trade.

Graduate Work and Research.—But the direction in which the University must make the most distinctive progress is in graduate work and research. One chief function of a University is to extend knowledge and to train others who will extend knowledge; to be the home of productive scholarship and scientific investigation and to be the source from which there will go forth a stream of highly trained young Canadians competent to carry

through this land the most advanced ideals and methods both in science and in scholarship. Graduate work will be of great advantage to the nation and will react beneficially upon the Province even in a material way. No Ontario youth should be under the neccssity of leaving his own province in order to secure the most advanced instruction and the best guidance in graduate work and research which are to be afforded on this continent. Ontario must maintain the lead, and we have enough experience to prove to us that if we offer opportunities, not only shall we retain our own students who may be unable to go abroad, but we shall draw a very large number of graduates of other Canadian Universities, and thereby create a community of sentiment which will be of incalculable influence in unifying this Dominion in the future.

Research work is very expensive; it is impossible to prove its value by immediate results, but it is nevertheless essential. Good results cannot be obtained unless an investigator has uninterrupted periods of time for his work. Already, as is shown in the memorandum submitted, the University of Toronto has done much research, and a new impetus has been given to it by a special appropriation of $15,000 in the first year after the war, and $75,000 during each of the last two years. This is in addition to the research done under the special endowment of $100,000 created in connection with the Antitoxin Laboratories and an annual grant of $3,750 made to these laboratories for the same purpose by the Provincial Government. Attention is drawn to a careful Memorandum on Graduate Work and Research.

If graduate work is to be developed a system of scholarships must be established, not only to enable our students who have the inclination to undertake graduate work, but also to draw others from the Dominion at large. The Blake Scholarships awarded at Matriculation have been an inestimable boon to this University and to the Province. They have drawn into university life many of the finest minds who might otherwise have been diverted from an academic career. What these scholarships do for undergraduate work in the university should be done for graduate work either by a new foundation established from private sources, or, until this is provided, out of the regular university finances.

The Library.—The function of the Library in the life of the University can hardly be overemphasized. At present it contains about 160,000 bound volumes and 52,000 pamphlets, and in many departments is well provided. Ordinary undergraduate work in most departments may be maintained with moderate annual appropriations, but for graduate work there must be large outlay. In comparison with other universities the annual appropriation for the Library is very much too small. Also when additions are made to the Library building special provision should be made for graduate students. A Memorandum on the Library is appended.

Faculty of Medicine.—In recent years the Faculty of Medicine has made great advances. The erection of the Toronto General Hospital, the University Pathological Laboratory in close proximity to it, and the equipment of the Departments of Biochemistry and Physiology have placed this Faculty in an enviable position. Last year the gift made by Sir John and Lady Eaton of $500,000 for the development of Medicine and Pediatrics made possible for the first time in Canada the appointment of a full-time professor in Medicine, and already the good results are becoming manifest.

Word has just been received that the Rockefeller Foundation will appropriate $1,000,000 to the University of Toronto for the general endowment of the Medical Department upon condition that the University carry out a programme of development, including items to be provided from funds other than those contributed by the Rockefeller Foundation. Three of these items are the erection of a new Institute of Anatomy (approximately $600,000); an addition to the Pathological Building for Clinical Laboratories (approximately $300,000); and an annual increase for salaries on the scale set forth in the last estimates of the Board of Governors.

As will be observed in the appended memoranda of the Dean and the Associate Dean of Medicine this Faculty aims at turning ou. general practitioners who will be not only acquainted with the approved methods of practice, but who are able to keep abreast of new discoveries; large laboratories well equipped are necessary if the student is to get the habit of independent observation and understand the functions of organs and tissues; while in the hospitals there must be adequate provision made for the diagnosis and treatment of diseases. Toronto is equipped very badly with laboratories in Anatomy and Pharmacolog , moderately in Hygiene, not at all in the Clinical Departments.

In addition to this the supply of teachers is quite insufficient. There should be enough instructors to allow time for original investigation. Unless the University leads in original thought medical science will retrograde, and special research institutes can never exonerate a university from this duty. One great advantage possessed by this University is the close connection that exists between it and the Public Health Laboratories.

The re-organization of clinical teaching must be continued, especially in the departments of Surgery, Obstetrics and Gynaecology; Pathology also must be much enlarged; Psychiatry needs great expansion, and Hygiene is only at its beginning. Though the income from the magnificent gifts made by Sir John and Lady Eaton and

the Rockefeller Foundation will go a long way towards this re-organization, it must not be supposed that it will be nearly sufficient for the development that is necessary to place this Faculty abreast of the best on the Continent.

Antitoxin Laboratories.—Connected with the Department of Hygiene are the Connaught Antitoxin Laboratories, which were established to provide facilities for research in Preventive Medicine, Public Health and Hygiene and for the manufacture of diphtheria, tetanus and anti-meningitis sera, Pasteur treatment, smallpox vaccine, and sera and antitoxins for other diseases. Through these laboratories it has been possible for the Government of the Province to distribute sera and antitoxins free, and the Canadian Army was supplied during the war. The research in Preventive Medicine conducted in these laboratories has already been referred to. A statement regarding the work of the laboratories is appended.

A table is submitted making a comparison of Toronto with other leading medical schools of this continent in regard to the number of students in attendance and the expenditure per student.

The direct results of science in ameliorating the conditions of human life are strikingly manifest in medicine. In the laboratory the sources of diseases have been discovered, and their remedies provided, and the combination of laboratory methods with scientific clinical observation has resulted in the last two generations in adding ten years to the average human life in civilized countries. Expensive as is the equipment and maintenance of a first-class faculty of medicine, if it demands high standards of education and promotes research, it soon makes not only a province but mankind its debtor.

Faculty of Applied Science.—The Faculty of Applied Science has been organized into many departments to meet the developing requirements of the province, and to keep pace with the rapid expansion of engineering and of the applications of Science to Industry. During the past two years the attendance has been the largest in the history of the faculty and the indications are that the present numbers will be maintained or increased. It is, therefore, certain that a much greater expenditure may be anticipated. Indeed this faculty will always be one of the most expensive in the University. It must of necessity be so, for the cost of the apparatus and machinery required for instruction and research is very great, and they become antiquated so soon that constant renewals must be made. The development of the natural resources and the industries of the country has been and will be dependent upon the technical education that is given in the Faculty of Applied Science. The prosperity of the Province demands that this Faculty be maintained in a state of high efficiency. Efficiency in any one department depends upon a thorough co-ordination of several related departments, as *e.g.*, Mining Engineering is interlocked with Chemical, Electrical, Mechanical and Metallurgical Engineering. Of recent years Mining and Metallurgy have been greatly extended in this University to meet the needs of the Province. Within a few years the centre of the mining industry of Canada has been transferred from Montreal to Toronto. From this city the railways lead north into that section of the Province of Ontario which, in the richness of its minerals, has already far exceeded the dreams of its most sanguine promoters and which as yet is really known in but a few localities. The University must provide not only the scientific explorers but the mining engineers to develope the wealth that lies hidden in that north country to which Toronto gives access. The careful and suggestive report which the Dean has prepared sets forth the present condition of the faculty, its immediate requirements, with some indication of their cost, the aim of the Faculty in relation to the expansion of the country, and the connection of industrial development with its progress.

Faculty of Forestry.—Though the Faculty of Forestry has not grown as have others within the University, it has played an important part in the material development not only of the Province but of the Dominion, and there has always been a large demand for its graduates. The permanent productivity which will result from scientific care of the forests makes the work of this Faculty of high importance, and it is seldom realized that a much larger income has accrued to the Provincial Treasury from the forests than from the mines. At first sight it might appear that there is duplication in the work done in the Faculty of Forestry and in the Agricultural College at Guelph. But this is not the case. At Guelph forestry is studied only in so far as concerns the farm wood-lot. In the University the aim is to produce foresters whose life-work will be to conserve and develop the forest resources of the Province and Dominion. This training requires the best of the basic sciences as they are taught in the University, and the practical experience which is to be acquired from the observation and study of phases of the manufacture of lumber which have their headquarters in a large city like Toronto. The Dean of this Faculty outlines in a Report appended four directions in which development should take place:

1. Establishment of a practice camp and forest experimental station.
2. A post-graduate course leading to the degree of Master of Forestry.
3. A forest-ranger's course.
4. A forest-products museum.

It is also assumed that any development of this course is conditional upon the erection of a new building in which Botany also will be housed.

University Extension.—Unlimited opportunities are opening out for university extension. In the report submitted a summary is given of the main divisions under which this work is now being conducted.

1. Teachers' classes together with Summer Sessions for the purpose of enabling teachers to secure a degree in Arts. This department is now serving two hundred teachers with room for expansion for many times that number.

2. Local lectures are given in various parts of the Province. The development of these lectures depends only upon the size of the teaching staff of the University, and the time at its disposal for doing outside work.

3. Tutorial classes are conducted both in Toronto and in the Province. The extension of this work also is bound up with the growth of the teaching staff.

4. Special attention is drawn to the work which has been inaugurated under a branch of the Worker's Educational Association. The purpose and character of this work, which is very important for a Province which is growing so rapidly in its industrial centres, is well set forth in the attached memorandum.

5. A short course intended primarily for members of Farmers' Clubs. This course begins during the present session, but will probably be much developed in the future.

Social Service; Course for Graduate Nurses. A memorandum is submitted outlining the work of this comparatively new department. Also this winter a course has been established to provide special training for graduate nurses who will undertake duties in connection witn the Red Cross Society for the improvement of national health. The expense is borne by the Society.

Ontario College of Education.—By reason of the changes that have been introduced in the organization of what was the Faculty of Education it is now possible for the Ontario College of Education to modify to some extent the character of its work. Hereafter those who enter this college will be required to be graduates in Arts (with the exception of some in special courses), and reduced numbers together with the better quality of the student will make possible a more thorough training of the teachers in the higher positions. Also, graduate work will be developed, and it is hoped that a centre will be created within the University such as hitherto has only been found in some of the larger universities of the United States. The additional needs of this college are summarized in the Report submitted by the Dean. They are briefly: A new building for Gymnasium, Assembly Hall and Library, and more class-room accommodation. Also some additional instructors and graduate scholarships. Before long a residence should be provided for the students of this college.

Future Developments.—The university finances being what they are it is very difficult at present to consider seriously the addition of responsibilities in the way of development of new departments or faculties, but unquestionably the progress of the community will demand from time to time that attempts shall be made to meet the more urgent requirements.

Salaries.—The welfare and progress of the University are vitally dependent upon the scale of salaries which the resources at the disposal of the Governors allow them to adopt, because unless they are kept at the prevailing level of the universities of a similar grade, the staff will over a period of years deteriorate. The number of highly productive scholars and scientists who create the atmosphere of an institution, inspire students and call out their best powers, is comparatively small, and the best men receive attractive offers from other universities, as well as from industrial and business concerns. Also unless young men have fair prospects for a comfortable livelihood there will be a diminishing supply of our ablest and best for academic work. It would be delusive for the University to rely solely on idealism. Its quality will not survive long under hard conditions which the people of the country have it in their power to remedy. Moreover, as has been well said by Dr. Howell of Johns Hopkins University, idealism is not always accompanied by high intellectual gifts, and alone it will not prove sufficient to solve the scientific problems upon the determination of which so much of the improvement of our human lot is contingent. Reasonable salaries must also be given to skilled technicians, librarians and the general administrative staff, without whose faithful service the best results of the teaching staff cannot be obtained.

Estimated Expenditure.—As a result of the survey of the present position and the immediate needs of the University the following estimate may be made, including capital and the increased annual expenditure which may be anticipated as being necessary before the close of another decade.

I. Amount required on capital account for the erection of buildings, most of which should be proceeded with at once: (see memorandum).

(1) For the University itself..... $4,150,000

It is not necessary that the payment of this amount should be made within a few years by provincial grants; it may be met over a long period by a process of amortization. To extinguish the debt in forty years, $3.73849 paid semi-annually for forty years is the equivalent of $100 now, money being worth 7 per cent. per annum.

(2) For the College of Education..... 300,000

II. Increase in expenditure for Maintenance of the University.

Annual expenditures for emergent needs will rise rapidly unless the life of the University is to be injured. While it is hazardous to conjecture, it may be anticipated that with very moderate additions to the attendance expenditures will grow during the next ten years, until at the end of that period the annual increase over the estimates of the present year will reach at least $1,000,000, or in all a total annual outlay for general maintenance amounting to at least $3,000,000.

The facts upon which this estimate is made are:

(*a*) Maintenance of new Buildings ($4,000,000) and administration, at 7½ per cent	$300,000
General increase in Administration and other departments	100,000
Additional for Research	125,000
" " Arts	100,000
" " Medicine	125,000
" " Applied Science	150,000
" " Forestry	13,000
" " Library	75,000
" " Extension	50,000
	$1,038,000

(*b*) The proposal to aim at an addition to the annual budget of the University of $1,000,000 in the next ten years, in addition to over $4,000,000 required very soon for buildings, will not appear unreasonable when it is borne in mind that in 1905-6, when the Governors took office the expenditure was $456,398; in 1910 it was $775,000; in 1915-16 it was $949,630, and in the present year it is estimated at nearly $2,000,000. The increase from the year of the outbreak of the war to the present is more apparent than real when the depreciation of the value of the dollar is taken into account. In the ten years following 1905-6 there was an increase of about $500,000. Should the development of the University during the next ten years continue proportionately with what it was in the ten years preceding the war, and should the value of the dollar remain as it is at present, the addition of a million dollars would be no actual increase in the scale of expenditure over that of the first ten years under the present Board of Governors.

(*c*) Moreover, this expectation is supported by the accompanying figures from American Universities. Every one of the five great State Universities together with Harvard and Pennsylvania has at present a much larger budget than the sum proposed for Toronto within ten years.

	1901	1910	1918	1920-21
Michigan	$500,000	1,177,425	2,552,800*	3,819,000*
Wisconsin	400,000	1,755,000	2,598,287*	4,462,085*
Illinois	450,000	1,639,792	2,825,409*	3,532,785*
Minnesota	350,000	813,784	2,678,453*	5,059,591
California	500,000	1,625,000	3,486,625*	4,432,282*
Harvard	.....	.....	.....	4,157,315*
Yale	.....	.....	.....	2,667,518 (1918-19)
Pennsylvania	.....	.....	.....	3,269,552*
Toronto	233,283 (1902)	777,800	1,191,602*	1,993,000* (estimate)

*Exclusive of buildings.

Nor can the difference in expenditure between those Universities and Toronto be explained by the large numbers of students in attendance there, because the expensive Faculties are Arts, Medicine and Applied Science, and very few American Universities have an attendance in these faculties much in excess of that of Toronto. The real explanation is that Toronto has been conducted on a scale of expenditure which has been too small to permit of the development which has already been attained by the leading Universities of the United States. There can be no question, indeed, as to the present status of our undergraduate degrees in Arts and in the professional schools. They hold their own with any on the continent, but this will not continue long unless advancement is made now, and in the matter of graduate work and research Toronto has a long way to make up on its neighbours. It may not be out of place to quote a sentence written some years ago by Dr. Pritchett of the Carnegie Foundation for the Advancement of Teaching: "No such movement of the youth toward the institutions of learning has been seen since the great migrations of students to the universities of the Middle Ages. The university is becoming

each decade a more powerful factor in civilisation. The enormous increase in student attendance is throwing upon the strongest and most conscientiously conducted colleges and universities a burden and a responsibility that will tax their resources and their educational wisdom to the utmost. The country has grown accustomed to think in millions in the organisation and conduct of business; it still thinks in thousands in the organisation and conduct of universities, and yet the problem of the university in America has enlarged even more rapidly than the problem of business. The country is looking upon the university for an unprecedented service to civilisation. How shall we find the money and the teachers to answer the demand?"

The success of the University makes possible the intellectual, spiritual, social and economic progress of the province. From it come the teachers of the highest grades, clergymen, leaders in public life, lawyers, journalists, medical men who promote the health of the whole community, engineers and foresters who develope our natural resources, investigators who through their researches discover processes that lead to industrial and agricultural wealth. Not only so, the development of the University will inevitably improve education from the top to the lowest grade of school. A province cannot possess a first class university without soon finding keen intellectual vigour coursing through its whole system. It is this fact that has made the people of the American States so enthusiastic in the support of their State universities, for they know by experience that the general welfare of the public who do not come near them is affected by their efficiency. Our people are not less eager for education than the Americans, as is proved by our schools and by the large proportion of our youth who enter upon a university career, and they are sufficiently intelligent to be willing to make sacrifices equal to those of our neighbours for the support of a great provincial university in which their sons and daughters can find the best instructors, and so will not be driven by their desire for knowledge to emigrate to a foreign country.

The University of Toronto as the range and quality of its work become more generally known to the people of the province is bound to appeal to their imagination. It stands among the best of the continent. Its progress must not be impeded. In war its students, graduates and staff accomplished magnificent things; in peace they will prove themselves equally forward in the promotion of the intelligence and high endeavour that constitute the greatness of a people, and in diffusing such conceptions of truth and conduct as will make us worthy to be a leading nation in western civilisation.

OCCUPATIONS OF THE FATHERS OF STUDENTS APPLYING FOR ADMISSION TO THE UNIVERSITY IN THE SESSION 1919-1920

	Arts	Medicine	Applied Science	Forestry	al
Dentistry	6	1	2	1	10
Engineering	9	6	21	..	36
Finance	62	30	30	2	124
Journalism	12	3	2	..	17
Law	29	7	3	1	40
Medicine	27	41	11	2	81
Pharmacy	8	7	2	..	17
Teaching	27	14	18	3	62
The Clergy	61	27	26	2	116
Library	2	..	..	..	2
Veterinary	1	3	.	..	4
Art	2	2	1	..	5
Merchants: Wholesale	56	21	27	2	106
,, Retail	104	61	50	3	218
Manufacturers	59	19	28	..	106
Artisans	60	36	47	1	144
Railway Employees	32	10	13	1	56
Dominion Officials	16	16	8	1	41
Provincial Officials	3	2	9	..	14
Municipal Officials	10	3	7	1	21
Farmers	172	99	79	1	351
Lumbermen	2	5	6	..	13
Soldiers	4	1	2	1	8
Fishermen	1	..	..	..	1
Not Specified	120	54	59	7	240
	885	468	451	29	1833

The students from the Province of Ontario are distributed as follows:

County.	Faculty of Arts.	Graduate Studies.	Faculty of Medicine.	Faculty of Applied Science.	Faculty of Education.	Faculty of Forestry.	Faculty of Music.	Department of Social Service.	Returned Soldiers' Matric. Class.	Totals.
Algoma	13	.....	4	3	.....	.....	.....	2	2	24
Brant	39	.....	19	19	8	.....	.....	2	3	90
Bruce	28	2	23	15	12	.....	.....	9	7	96
Carleton	57	3	20	11	6	3	.....	3	5	108
Dufferin	7	.....	9	3	2	.....	.....	3	2	26
Dundas	12	1	3	2	4	1	.....	1	.....	24
Durham	8	1	11	5	8	.....	.....	6	2	41
Elgin	17	1	16	9	6	.....	1	6	.....	56
Essex	32	.....	21	7	6	.....	.....	1	1	68
Frontenac	3	.....	8	.....	1	.....	1	1	.....	14
Glengarry	3	1	4	.....	.....	.....	.....	1	.....	9
Grenville	5	1	3	3	2	.....	.....	.....	.....	14
Grey	30	3	29	17	9	.....	.....	4	1	93
Haldimand	16	1	13	8	8	.....	.....	2	1	49
Halton	20	3	10	9	4	.....	1	6	4	57
Hastings	19	1	17	6	1	.....	.....	1	.....	45
Huron	51	4	20	17	28	1	.....	2	2	125
Kenora	2	.....	5	1	.....	.....	.....	.....	.....	8
Kent	21	.....	23	7	6	.....	1	.....	.....	58
Lambton	21	.....	24	11	5	1	.....	5	.....	67
Lanark	15	2	10	6	7	2	.....	4	.....	46
Leeds	21	1	15	3	4	1	.....	3	.....	48
Lennox and Addington	11	1	7	1	1	.....	.....	1	.....	22
Lincoln	20	3	19	8	7	.....	.....	6	1	64
Manitoulin	1	.....	4	.....	.....	.....	.....	.....	.....	5
Middlesex	44	6	13	24	24	.....	.....	8	2	121
Muskoka	3	.....	3	5	.....	1	.....	2	.....	14
Nipissing	8	.....	4	5	2	.....	.....	1	3	23
Norfolk	10	2	6	9	3	.....	.....	4	2	36
Northumberland	20	.....	9	2	4	.....	.....	3	1	39
Ontario	41	5	22	25	7	.....	.....	8	4	112
Oxford	27	2	28	11	8	.....	.....	3	.....	79
Parry Sound	3	.....	6	2	.....	.....	.....	1	.....	12
Peel	31	1	17	12	5	2	.....	4	.....	72
Perth	51	.....	37	20	20	1	1	3	2	135
Peterborough	34	1	10	5	4	.....	.....	10	2	66
Prescott	1	.....	.....	1	2	.....	.....	.....	.....	4
Prince Edward	4	.....	4	2	4	.....	.....	.....	.....	14
Renfrew	17	.....	4	2	1	1	.....	1	1	27
Russell	1	.....	3	.....	2	.....	.....	.....	.....	6
Simcoe	68	4	48	27	20	.....	1	9	12	189
Stormont	6	.....	3	1	3	.....	.....	.....	.....	13
Sudbury	3	.....	4	2	.....	1	.....	.....	.....	10
Thunder Bay	6	.....	3	2	1	.....	.....	1	2	15
Temiskaming	4	.....	2	3	.....	.....	.....	.....	2	11
Victoria	15	3	15	12	10	.....	.....	1	.....	56
Waterloo	22	1	16	28	8	.....	.....	6	.....	81
Welland	21	1	25	13	2	.....	.....	2	.....	64
Wellington	53	7	46	9	17	1	.....	8	1	142
Wentworth	77	3	15	33	26	1	1	10	3	169
York	62	1	36	45	12	2	.....	14	10	182
Toronto	693	80	412	299	84	18	11	151	80	1,828
Totals	1,797	146	1,128	770	404	37	18	319	158	4,777

BUILDING REQUIREMENTS.

I

1. Heating Plant	$300,000	
2. Anatomical Building	600,000	
3. Forestry and Botany Building	300,000	
4. University College Extension	300,000	
5. Administration Building (probably including completion of Convocation Hall)	400,000	
6. Women's Building (Gymnasium, etc.)	250,000	
		$2,150,000

II

7. Union and Residence for University College Women	$450,000	
8. Residence for University College Men	450,000	
9. Part of South Wing, Museum (to relieve Applied Science by removing Mineralogy and Geolcgy)	250,000	
10. Medical Building at Hospital	300,000	
11. New Wing, Chemical Building	250,000	
12. Addition to Library	300,000	
		2,000,000
		$4,150,000

III

Extensions for College of Education	$300,000

1. *Heating Plant.*—The Heating Plant must be extended as soon as any additions are made to the buildings of the University. The present plant is now bearing a load almost heavier than should be put upon it.

A new plant should be erected probably north of Hoskin Avenue in order to serve the buildings on that part of the University grounds together with Victoria College, the Royal Ontario Museum and Trinity College. This would relieve the present plant sufficiently to enable it to carry the load when new buildings are erected south of Hoskin Avenue.

2. *Anatomy Building.*—Under the former Government authorization was given to proceed with the erection of a building for Anatomy. As far back as 1908 the need for such a building was presented to the Board of Governors. The condition of the Anatomy Department is being seriously jeopardized by any delay.

3. *Forestry and Botany Building.*—These departments are at present housed in an old residence to which temporary additions have been made under pressure of accommodation for students from time to time. Instruction is given in sixteen courses in Forestry and twenty-six courses in Botany, exclusive of graduate work. In 1919-20 forty-eight were registered in Forestry; and 645 were taking lectures and 303 taking laboratory work in Botany, from the Faculties of Arts (including Household Science), Applied Science, Forestry and Veterinary Science. In addition there were seventeen graduate students from nine Canadian Universities and Colleges. The condition of affairs is so serious that a special memorandum is submitted dealing with the needs of the Forestry and Botany Departments.

4. *University College Extension.*—The extension of the Main Building, by completing the quadrangle on the North side, would give University College immediate relief in the way of very greatly needed modern class-rooms and private rooms for the professors and instructors. If the Administration also were removed from the Main Building it might be possible to accommodate probably for the next ten years the non-laboratory university subjects, such as Economics, History, Philosophy, Mathematics, and Italian and Spanish. A special memorandum is submitted from the Department of Political Science setting forth the utter inadequacy of the present quarters in what was a private residence, 71 St. George St.

5. *Administration Building.*—The administration of this University is now so hampered by lack of adequate accommodation that the welfare of the University itself is beginning to suffer. Necessary developments cannot be undertaken unless more room is provided for various offices. The registration of students cannot be carried out, the effectiveness of the Registrar's and other offices is interfered with, and the Extension Department will be handicapped unless a new building is soon provided. It is suggested that this building might be erected at the West of Convocation Hall, the completion of the Hall being at the same time carried out.

6. *Women's Building.*—A women's building, which will be used chiefly for the physical training of the women of the University, is urgently needed. It will provide gymnasium and swimming facilities, together with common rooms for the general activities of all the women of the University, such as are provided for the men in the north section of Hart House. This building should probably be placed on the north side of Hoskin Avenue, where it will be centrally situated. Already the Governors have set aside $125,000 for the erection of this building.

The need for the erection of the foregoing buildings is so immediately urgent that construction should be begun upon them at once. The necessity for the following is hardly less pressing:

7. *Union and Residence for University College Women.*—The Union for University College women is now so crowded that its usefulness is being seriously interfered with. Already a committee of the women graduates of University College and friends have inaugurated a plan for raising funds to help in the erection of a new Union on the corner of Hoskin Avenue and St. George Street. Residences for women should be attached to this, and should be extended South on St. George Street as opportunity permits.

8. *Residences for University College Men.*—University College, with its attendance of several hundreds of men from outside the city, has no special residence accommodation. If it is to retain its identity and spirit in competition with the other colleges such a residence is a necessity.

Unlike other university buildings residences for men and women are self-sustaining when once erected.

9. *Removal of Geology and Mineralogy to Royal Ontario Museum.*—The removal of the Departments of Geology and Mineralogy to a wing to be erected in extension of the south side of the Royal Ontario Museum will not only bring these departments into more immediate contact with their great collections in the Museum, but also will release space in the Chemistry and Mining Building on College Street which can be used for the pressing needs of Chemical Engineering and other departments in the Faculty of Applied Science.

10. *Medical Building at Hospital.*—In order to meet the necessary expansion in the clinical departments of the Faculty of Medicine, namely Medicine, Surgery, Gynaecology and Obstetrics, a new building for laboratories should be erected in extension of the present Pathological Building on university property at the South-west corner of the grounds of the Toronto General Hospital. The Department of Pharmacy and Pharmacology would probably be transferred to this building. The gift made by the Rockefeller Foundation for the development of the Faculty of Medicine renders urgent the erection of this building.

11. *Chemical Building.*—Though at present the Chemical Building, which is used by Arts and Medicine, is sufficient to meet immediate needs, extension will be required before long.

12. *Library.*—In the present Library building the stack-room accommodation is exhausted, and when the shelves will have been filled within a short time addition to the stack-room will become necessary.

Ontario College of Education—

(1) Five rooms for Household Science course, one additional room for the Art course, three additional rooms for the High School Assistants' course.

(2) Gymnasium, Assembly Hall and Educational Library.

(3) A Kindergarten and two class-rooms (Grades I and II).

ENDOWMENT, INCOME, EXPENDITURE, REGISTRATION.

(*a*) The amount and nature of the University endowment is as follows:

1. Site Lands, Buildings and Contents:		
(*a*) The University site lands, valued mainly on a basis of 40 cents per superficial foot (with some later items at cost price)	$1,294,726.00	
(*b*) The various University buildings valued approximately at cost	3,580,306.52	
(*c*) The library, apparatus and other departmental equipment, furniture, etc.	549,146.42	
(*d*) The Central Power Plant	397,895.50	
(*e*) The Connaught Laboratories	75,000.00	
	$5,897,077.44	
2. Unproductive Lands, consisting principally of the remainder of the old Upper Canada College block, 103 feet on King Street, carried in the books at $50,000, but probably may realize more if a sale can be effected; also a few lots in Port Hope and other townships	57,067.42	
3. Leased Properties, including the Queen's Park lands	637,734.53	
4. Investments, Cash and Accounts Receivable	930,878.69	
5. Superintendent's Stores	13,297.36	
		$7,536,055.44
From this total there require to be deducted the following liabilities and trust funds:		
(*a*) Liabilities (present value) under Annuity debentures issued to provide funds for buildings	927,562.44	
(*b*) Scholarship and other Trust Funds	347,742.53	
(*c*) Retirement Fund accumulations	30,192.56	
(*d*) Equipment Funds (University Press, Connaught Laboratories and Organ Fund	115,377.96	
(*e*) Contingent Funds, etc.	4,768.29	
		1,425,643.78
Leaving the General Endowment as (30th June, 1920)		$6,110,411.66

(*b*) The various sources of revenue are the following:

Legislative and Government Grants,
Investment and Land Income,
Fees of Students, University and University College,
Residence Dues,
Central Power Plant Receipts,
Casual Items.

The receipts under these heads in 1919-20 were:

Legislative Grant, University Act 1906	$500,000.00	
Legislative Grant, 60 Vict., Cap. 59	7,000.00	
Grant by Provincial Government on account of Faculty of Education	15,000.00	
Grant by Provincial Government for Special Course in Household Science	5,400.00	
Investment and Land Income	62,508.00	
Fees, University and University College	382,559.00	
Men's Residences	15,211.00	
Women's Residences	24,159.00	
Women's Union	17,491.00	
Central Power Plant	34,821.00	
Casual Revenue	4,371.00	
	$1,068,520.00	
Deduct interest written to Scholarship and other accounts	12,695.00	
		$1,055,825.00

The fees per student in the different Faculties range from $10.00 to $150.00, according to the subject or course taken.

(c) The cost of the various Faculties and Departments of the University, including Administration, for the year 1919-20 is shown in the attached table.

REVENUE EXPENDITURES, 1919-20.

	Appropriation	Supplementary	Unused	Total
I. Administration:				
1. Salaries	$94,300.00	$525.86		$94,825.86
2. Pensions and Ret. Allowances	15,050.00	400.00		15,450.00
3. President's Office	350.00	23.00		373.00
4. Bursar's Office	2,200.00	4,570.21		6,770.21
5. Registrar's Office	4,650.00	406.00		5,056.00
6. Superintendent's Office	750.00	1,232.71		1,982.71
7. Library	50,900.00		17,124.03	33,775.97
8. Gymnasium and Students' Union. Hart House	8,200.00		248.68	7,951.32
9. Convocation Hall	2,525.00		51.39	2,473.61
10. Grounds	14,600.00	2,889.84		17,489.84
11. Examinations	12,250 00	5,455.78		17,705.78
12. Convocation Expenses	1,000.00	1,603.76		2,603.76
13. Receptions to Societies	1,000.00	27.38		1,027.38
14. Telephones	3,800.00	1,342.01		5,142.01
15. Insurance	9,000.00	865.06		9,865.06
16. Advertising Expenses	1,300.00		380.85	919.15
17. Aid to Publications and Societies	1,350.00		450.00	900.00
18. University Studies	3,000.00	755.67		3,755.67
19. Law Costs	500.00	640.37		1,140.37
20. Travelling Expenses	1,650.00		445.72	1,204.28
21. Senate Elections	1,200.00		557.20	642.80
22. Roll of Service	2,700.00		566.42	2,133.58
23. Alumni Association	5,200.00	100.00		5,300.00
	$237,475.00	$20,837.65	$19,824.29	$238,488.36
II. Faculty of Arts:				
24. Salaries	$370,022.00	$4,512.08		$374,534.08
25. Retiring Allowances	.....	.....	.....	.....
26. Main Building	11,700.00	7,411.75		19,111.75
27. Biological Building and Department	9,635.00	1,784.92		11,419.92
28. Sub-Department of Botany	4,650.00	2,141.07		6,791.07
29. Biochemistry Department	5,500.00	635.58		6,135.58
30. Physiology Department	3,200.00	67.30		3,267 30
31. Chemical Building and Department	10,775.00	1,903.88		12,678.88
32. Sub-Department of Physical Chemistry	500.00	80.27		580.27
33. Physics Building and Department	11,700.00	2,697.35		14,397.35
34. Sub-Department of Astrophysics	850.00		47.59	802.41
35. Geological Department	400.00	457.29		857.29
36. Mineralogical Department	1,000.00		577.88	422.12
37. Philosophical and Psychological Dept.	550.00	215.36		765.36
38. Mathematical Department	30.00		10.75	19.25
39. Sub-Department of Mechanics	400.00		235.83	164.17
40. Political Science Building and Department	2,650.00		804.78	1,845.22
41. History	75.00		19.18	55.82
42. Italian and Spanish	25.00	.10		25.10
43. University College Departments	420.00		224.60	195.40
44. University College General Expenses	350.00		196.20	153.80
45. Trinity College Service	525.00	328.84		853.84
	$434,957.00	$22,235.79	$2,116.81	$455,075.98

	Appropriation	Supplementary	Unused	Total
III. Faculty of Medicine:				
46. Salaries	$87,060.00		$16,381.34	$70,678.66
47. Retiring Allowances	.....	.....	.....	.....
48. Anatomy	2,750.00		371.84	2,378.16
49. Pathology and Bacteriology	2,260.00	175.57		2,435.57
50. Chemical Pathology	1,500.00		70.34	1,429.66
51. Pharmacy and Pharmacology	650.00	224.43		874.43
52. Medicine		13,000.00		13,000.00
53. Ditto, Maintenance of Building, 1 Queen's Park		1,084.56		1,084.56
54. Surgery	450.00		147.09	302.91
55. Obstetrics and Gynaecology	300.00		190 33	109.67
56. Ophthalmology	100.00		100.00	.....
57. Oto-Laryngology	200.00	58.84		258.84
58. Therapeutics	100.00	.49		100 49
59. Hygiene	2,600.00		296.91	2,303.09
60. Medical Jurisprudence	.....	.....	.....	.....
61. Medical Building	6,025.00	881.70		6,906.70
62. Pathological Building	7,925.00	142.00		8,067.08
63. General Expenses	2,100.00	606.23		2,706.23
64. Summer Session in Medicine	1,500 00		10.00	1,490.00
	$115,520.00	$16,173.90	$17,567.85	$114,126.05
IV. Faculty of Applied Science:				
65. Salaries	$147,000.00	$10,650.55		$157,650.55
66. Mining (C. & M.) Building	6,350.00	782.63		7,132.63
67. Engineering Building	4,250.00	768.55		5,018.55
68. Old Y.M.C.A. Building		491.72		491.72
69. Thermodynamics Building	1,925.00		59.84	1,865.16
70. Geodetic Observatory Building	440.00		77.57	362.43
71. Electrical Engineering	4,650.00		60.99	4,589.01
72. Mechanical Engineering	2,000.00	314.94		2,314.94
73. Applied Mechanics	800.00	704.21		1,504.21
74. Mining Engineering	1,000.00	663.54		1,663.54
75. Metallurgical Engineering	1 [illegible] 00		122.34	877.66
76. Ferro-Metallurgy		.....	.....	.....
77. Surveying	11 [illegible] 00	317.04		11,427.04
78. Applied Chemistry	3,500.00	934.04		4,443.04
79. Electro-Chemistry	1,750.00	382.36		2,132.36
80. Architecture and Drawing	800.00	1,149.00		1,949.00
81. Engineering Physics and Photography	1,850.00		859.76	990.24
82. General Expenses	1,200.00	1,634.09		2,834.09
	$189,625.00	$18,801.67	$1,180.50	$207,246.17
V. Faculty of Household Science:				
83. Salaries	$14,200.00		$200.00	$14,000.00
84. Household Science Building and Department	8,200 00	425.21		8,625.21
	$22,400.00	$425.21	$200.00	$22,625.21

VI. Faculty of Education:				
85. Salaries	$89,740.00		$1,205.67	$88,534.33
86. Education Building and Department	22,600.00		53.64	22,546.36
	$112,340.00		$1,259.31	$111,080.69
VII. Faculty of Forestry:				
87. Salaries	$12,250.00		$1,000.00	$11,250.00
88. Forestry Building and Department	4,250.00		236.89	4,013.11
	$16,500.00		1,236.89	$15,263.11
VIII. 89. Faculty of Music	$2,000.00		$231.35	$1,768.65
IX. University Extension and Social Service:				
90. University Extension	$10,000.00		$1,101.94	$8,898.06
91. Social Service Building and Department	6,950.00	1,270.00		8,220.20
	$16,950.00	$1,270.20	$1,101.94	$17,118 26
X. Residences and Dining Hall:				
92. Men's Residences	$7,650.00		$456.59	$7,193.41
93. Women's Residences	$29,600.00	$2,285.54		$31,885.54
94. Dining Hall		4,179.23		4,179.23
95. University College Women's Union	17,052.00	3,519.56		20,571.56
	$54,302.00	$9,984.33	$456.59	$63,829.74
XI. 96. Royal Ontario Museum	$20,000.00	$2,473.49		$22,473.49
XII. 97. Central Light, Heat and Power Plant	$83,600.00	$1,080.95		$84,680.95
XIII. 98. Contingencies and Miscellaneous	$5,000.00	$5,699.31		$10,699.31
XIV. 99. Capital Account Charges	$75,688.00		$88.46	$75,599.54
XV. 100. Special Research	$75,000.00		$16,632.42	$58,367.58
XVI. 101. Special Courses for Returned Soldiers	$5,000.00	$5,868.33		$10,868.33

RECAPITULATION.

	Appropriation	Supplementary	Unused	Total
I. Administration	$237,475.00	$20,837.65	$19,824.29	$238,488.36
II. Faculty of Arts	434,957.00	22,235.79	2,116.81	455,075.98
III. Faculty of Medicine	115,520.00	16,173.90	17,567.85	114,126.05
IV. Faculty of Applied Science	189,625.00	18,801.67	1,180.50	207,246.17
V. Faculty of Household Science	22,400.00	425.21	200.00	22,625.21
VI. Faculty of Education	112,340.00		1,259.31	111,080.69
VII. Faculty of Forestry	16,500.00		1,236.89	15,263.11
VIII. Faculty of Music	2,000.00		231.35	1,768.65
IX. University Extension and Social Service	16,950.00	1,270.20	1,101.94	17,118.26
X. Residences and Dining Hall	54,302.00	9,984.33	456.59	63,829.74
XI. Royal Ontario Museum	20,000.00	2,473.49		22,473.49
XII. Central Light, Heat and Power Plant	83,600.00	1,080.95		84,680.95
XIII. Contingencies and Miscellaneous	5,000.00	5,699.31		10,699.31
XIV. Capital Account Charges	75,688.00		88.46	75,599.54
XV. Special Research	75,000.00		16,632.42	58,367.58
XVI. Special Courses for Returned Soldiers	5,000.00	5,868.33		10,868.33
	$1,466,357.00	$104,850.83	$61,896.41	$1,509,311.42

(d) Revenues and Expenditures

	Provincial Grant under Act of 1906.	Percentage of Total Income.	Fees.	Percentage of Total Income.	Provincial Grant for Faculty of Education.	Income from Dining Hall & Residences.	Total Revenue.
1906-07	$213,258	= 47%	$184,211	= 40%			$456,398
1907-08	357,444	= 56%	213,219	= 33%	$15,000		642,108
1908-09	422,232	= 57%	224,405	= 30%	15,000	$26,578	741,155
1909-10	500,000	= 59%	237,938	= 28%	15,000	35,712	840,307
1910-11	459,503	= 55%	263,907	= 31%	15,000	41,173	836,039
1911-12	448,325	= 52%	264,895	= 31%	15,000	55,717	854,591
1912-13	423,070	= 51%	260,754	= 33%	15,000	59,222	828,788
1913-14	435,667	= 51%	274,938	= 32%	15,000	62,078	845,340
1914-15	488,725	= 54%	260,836	= 30%	15,000	68,024	905,019
1915-16	500,000	= 58%	215,312	= 25%	15,000	59,252	856,870
1916-17	500,000	= 58%	188,425	= 22%	15,000	70,292*	854,753
1917-18	500,000	= 55%	185,573	= 20%	15,000	105,102*	909,467
1918-19	500,000	= 50%	235,901	= 24%	15,000	133,433*	984,734
1919-20	500,000	= 47%	382,559	= 36%	15,000	56,860	1,055,825

	Capital Account Charges.	Residences and Dining Hall.	Total Expenditure.	Surpluses.	Deficits.	Amount from Succession Duties that would have been received.
1906-07			$411,696	$44,701		—
1907-08			613,344	28,763		—
1908-09		$34,223	679,867	61,287		—
1909-10	$25,260	33,755	752,183	88,124		—
1910-11	36,122	35,303	777,810	58,220		—
1911-12	54,132	47,141	875,849		$21,255	—
1912-13	63,405	50,584	912,995		84,207	—
1913-14	65,930	53,595	931,452		86,112	—
1914-15	67,193	59,432	949,630		44,621	—
1915-16	71,668	52,636	912,359		55,489	$510,282
1916-17	74,418	62,966*	946,447		91,694	690 799
1917-18	75,995	94,700*	1,076,225		166,758	1,008.122
1918-19	75,585	115,525*	1,191,602		206,869	1,208,647
1919-20	75,600	63,830	1,509,311		453,486	1,452,989
						$4,870,839

* *Note*—Military in occupation of Dining Hall and Men's Residences during portion of 1916-17 and 1918-19, and whole of 1917-18.

Disposition of accumulated surpluses to 1911:

Returned to Capital account, amount borrowed *re* Physics building	$118,945.85	
Extras on Thermodynamics building	12,720.65	
Separation of accumulated surplus fees in Music towards Organ Fund	7,172,62	
(Balance applied on deficits)	$138,839.13	
Deficits as above		$1,211,578.68
Less balance from surpluses ($281,106.87-$138,839.13)		142,267.74
		$1,069,310.94

Special Government Grants:

1913-14	$80,000.00	
1915-16	80,000.00	
1916-17	100,000.00	
1917-18	200,000.00	
1918-19	200,000.00	
1919-20	400,000.00	
		1,060,000.00
Balance of deficit unmet on 30 June, 1920		$9,310.94

The University Act, 1906, provided that for the purpose of making provision for the maintenance and support of the University and of University College there should be paid to the Board yearly commencing 1 July, 1906, a sum equal to fifty per cent. (50%) of the average yearly gross receipts of the Province from Succession Duties, the average to be determined by and be based upon the gross receipts from such Duties of the three years ended on the 31st day of December next preceding the day on which the first instalment of the year is to be paid.

This provision was limited by an amendment in 1914 to a maximum of Five hundred thousand dollars ($500,000) in any year.

Had the above not been modified the University would have received $1,310,839 additional.

(e) Grants for Buildings

The Grants received from the Provincial Government for buildings during the last 15 years have been the following:

(1) Annuity Certificates of $30,000 per annum for 30 years from 1905. These realized upon sale the sum of $579,384.21, which was disposed of as follows—

I. University Buildings.

(a) Towards Cost of Convocation Hall and Examination Wing	$110,914.64
" " Physics Building	45,000.00
" " Forestry Building and Plant Houses	21,101.65
" " Men's Residences and Furnishings	60,238.33
" " Women's Residences	30,129.32
Removing Geodetic Observatory to new site	12,000.27
	$279,384.21
(b) The Erection of New Electrical Engineering Building 1920	350,000.00
	$629,384.21

II. The Toronto General Hospital

(a) From above Debentures	$250,000.00
(b) Special Grant on Capital Account 1920	125,000.00
	$375,000.00

III. The Royal Ontario Museum

The Government also contributed $197,973.12 being (approximately) one half the cost ($399,970.81) of the erection of the Royal Ontario Museum, the University contributing the remainder including $50,000 realised from the above debentures.

(*f*) THE VALUES ATTACHED TO THE VARIOUS UNIVERSITY BUILDINGS ARE AS FOLLOWS:

Household Science building	$455,000.00	
Main building	450,000.00	
Chemistry and Mining, with adjacent building	384,736.89	
Physics building	363,945.85	
Library building	327,425.50	
Convocation Hall and Examination Wing	214,866.22	
Education building	184,383.47	
Education building annex	6,698.63	
Pathological building	169,694.38	
Medical building	165,000.00	
Biological building	129,745.30	
Thermodynamics building	119,017.21	
Chemical building	77,469.88	
Engineering building	50,000.00	
Electrical Engineering building*	126,304.23	
Forestry building	30,101.65	
Botanical building	13,000.00	
Geodetic Observatory building	12,000.27	
Political Science building	11,933.26	
Social Service building	7,500.00	
Men's Residences	170,000.00	
Women's Residences	93,945.83	
University College Women's Union	13,521.18	
Argyll House	10,450.00	
Y.M.C.A. building	1.00	
No. 1 Queen's Park (Department of Medicine)	6,075.77	
	$3,592,816.52	
Less balances of purchase money yet due on Social Service building, 184 College Street, and Argyll House	12,510.00	
		$3,580,306.52

*In course of construction. Final cost will probably reach $350,000.

(*g*) COST PER STUDENT IN EACH FACULTY

Arts.

It is difficult to arrive at a very close approximation of the cost per student in each Faculty inasmuch as certain departments which serve several Faculties are classed under the Faculty of Arts, but making a deduction for instruction of students of the Faculty of Medicine in the Departments of Physics, Chemistry, Biology, Biochemistry and Physiology and for the Faculty of Applied Science in Mathematics and Mechanics, Geology, and Mineralogy, it may be estimated that the expenditure for the Faculty of Arts was in the neighbourhood of $365,000. The students in attendance in Arts numbered 2,158. The cost per student in Arts would be about $170.

The cost of individual students in Arts varies much more than in any of the other Faculties because of the variety of courses taken. and the non-laboratory courses are much less expensive than the scientific courses.

No fees are received by the University for tuition in university subjects given to the students of the Federated Universities; on the other hand the Province has not to pay for their instruction in college subjects.

Medicine

Adding $80,000 as a deduction from Arts for instruction given to medical students the total expenditure for Medicine in 1919-20 was $194,000. The number of students in this Faculty was 1,284. The cost per student would be $150, but assuming that the number will soon fall to 750 and that the expenditure remains the same the cost per student would be about $260.

Applied Science

Adding the proportion from Arts to Applied Science for instruction given to Applied Science students the total expenditure was $216,000. The number of students in this Faculty was 819, and the cost per student would be $270.

Forestry

Total expenditure $15,263; the number of students 50; and the cost per student $300.

Household Science

There are no regular students as these are included in the Faculty of Arts, and there were only occasional students. By the will of the late Mrs. Massey Treble the interest of $100,000 has been left for the maintenance of this Faculty.

The average cost per student for administration is about $46. Therefore the total cost per student without including interest on buildings and land is:

Arts	$170	+ $46	= $216
Medicine	260	+ 46	= 306
Applied Science	270	+ 46	= 316

Deduct fees:

Arts $50 to $60
Medicine $150
Applied Science
(average $112)

Deduct 1/14 of residue as income from endowments, etc.

Arts $11-$12
Medicine $11
Applied Science $14.50

Total cost to Province exclusive of interest on buildings and land:

Arts $145 or $154
Medicine $145
Applied Science $189.50

(*h*) THE SCALE OF PROFESSORIAL SALARIES ADOPTED BY THE BOARD 27TH MAY, 1920:

Lecturer	$1,800 to $2,500
Assistant Professor	2,700 to 3,500
Associate Professor	3,700 to 4,600
Professor	4,800 to 5,500
Some Heads of Departments to go to	6,000

The President to receive a salary of $10,000 with free house, heat and light.

Present salaries of the following:

The Bursar	$4,750+	bonus $500
The Registrar	4,250+	" 750
The Librarian	4,250+	" 750
The Superintendent	4,000+	" 800

(5) SCHEDULE OF REGISTRATION OF STUDENTS, 1899-1920

Faculty or Department	1899–00	1904–05	1909–10	1914–15	1919–20	1920–21
Arts—Regular and Occasional	763	1198	2149	2161	1925	2024
Summer Session and Teachers' Courses	....	....	....	....	64	99
[1]Graduate Studies	....	....	....	....	169	150
Medicine	313	652	641	660	1284	1009
[2]Applied Science and Engineering	193	483	729	563	819	806
Household Science	....	....	86	96	....	....
Education	....	....	236	412	423	68
Forestry	....	....	39	48	48	54
Music	....	....	....	....	20	11
Social Service	....	....	....	293	335	354
Returned Soldiers' Matriculation Class	....	....	....	....	172	
Summer Session (Conducted for Department of Education)	....	....	164	243	....	
Total (Less duplicate registrations)	1269	2333	4044	4428	5237	*4566

[1]Included in the Faculty of Arts until 1916.
[2]School of Practical Science until 1903.
*The reduction in this total from the total of 1919-20 is due to the following causes:

1. The removal of non-graduate students (350 approx.) from the Ontario College of Education.
2. The transfer of the teaching of Anatomy to students in Dentistry (200 approx.) from the Faculty of Medicine to the School of Dentistry.
3. The discontinuance of the returned soldiers' Matriculation Class (172).

SCHEDULE OF STAFF, 1899-1920

Faculty or Department	1899–00	1904–05	1909–10	1914–15	1919–20	1920–21
Arts—University and University College	50	87	136	146	182	186
Victoria College	14	14	20	24	23	25
Trinity College	....	19	14	21	18	15
St. Michael's College	....	....	11	9	22	22
Medicine	40	96	124	145	189	197
Applied Science	14	27	67	73	73	79
Household Science	....	....	9	8	11	9
Education	....	....	46	26	32	29
Forestry	....	....	2	2	4	3
Music	....	....	....	....	....	5
Social Service	....	....	....	....	14	3
	118	243	429	454	568	*573

*Figures for the present session are approximate, as certain appointmnts have still to be made.

BENEFACTIONS TO THE UNIVERSITY OF TORONTO

It is often said that a University supported by the Government does not receive large benefactions from private donors. This is emphatically not the case with the University of Toronto as is evident from the following gifts which have been received during the past fourteen years.

Two of the three men's residences were given, one by E. C. Whitney, Esq. and Mrs. Whitney, and the other by friends of the University among whom were several of the Governors; each of these buildings cost $50.000.

The Household Science Building, which at the time of its erection must have cost nearly $500,000, was given by Mrs. Massey Treble and opened in 1912, and in her will there was a legacy of the interest on $100,000 for the maintenance and development of this Department.

In 1917 the Connaught Anti-toxin laboratories, together with a farm of fifty-eight acres, the cost of which amounted to at least $75,000, were given by Col. A. E. Gooderham, a Governor of the University. Also during the years 1918-19 and 1919-20, Col. Gooderham provided a laboratory with equipment for the Research Department of Zymology.

Of all the gifts to the University the most magnificent is the Hart House, which has been designed and constructed on such a scale as to make it a unique building for its especial purpose among those of the universities of the world. It is probably one of the most munificent individual gifts that has been made to any university on this continent. While the Governors have not been informed as to the cost of the structure, furnishing and equipment, it is probable that it should be estimated at not less than $1,500,000.

Sir John Eaton, a Governor of the University, and Lady Eaton have undertaken to give $25,000 a year for twenty years to maintain the Department of Medicine in the University, a total of $500,000.

Over a period of five years the sum of nearly $50,000 was given for research in clinical medicine by five donors, Sir John Eaton, Sir Edmund Osler, Col. R. W. Leonard, J. L. Englehart, Esq., and Dr. Geo E. Cook, of whom the first three were Governors.

Sir Edmund Osler has for five years given $1,000 a year for two graduate fellowships and for three years $1,000 a year for Research in Pathology.

From 1901 until 1919 Sir Joseph Flavelle gave an annual post-graduate fellowship of $750 a year, the amount of the final award being raised to $1,500. For three years he gave in addition a post-graduate fellowship of $500.

Col. Leonard has for five years given a post-graduate fellowship of $500 a year and for one year he paid the salary of a lecturer in Chemical Metallurgy: he also provided the equipment for the Cadet Corps of the University of Toronto Schools.

Mrs. H. D. Warren, in addition to large benefactions to the Museum, and to the University War Memorial Fund, provided a salary of $3,000 a year for four years for the salary of the Director of the Social Service Department.

Through the advice of the late Mr. Z. A. Lash, one of the Governors of the University, a bequest of $25,000 was made from the E. C. Walker Estate.

Last year the Alumni Association raised a fund for a War Memorial which already has amounted to nearly $335,000. To this Sir Edmund Osler and Col. Leonard contributed each $25,000 and Sir John Eaton $10,000.

In memory of Dr. Richardson his daughter, Mrs. Freeland, gave $10,000 to found a fellowship in Anatomy, and an unknown donor has given $10,000 to found a scholarship connected with the Guelph Collegiate Institute in memory of the late Col. John Macrae.

By the will of the late Dr. W. J. Mickle, of London, a distinguished graduate of the University of Toronto, a legacy of $50,000 has accrued to the University to found two Fellowships to be called respectively the Charles Mickle and the Ellen Mickle Fellowships. The latter of these is to be given to the student highest in Medicine for the purpose of post-graduate research. The former is to be awarded annually by the Faculty of Medicine to that member of the medical profession who will be deemed to have made the most valuable contribution to the science of medicine during the preceding ten years.

The late Mrs. Marfleet of Illinois gave $5,000 to found the Marfleet lectureship in memory of her husband.

The University Base Hospital was splendidly equipped by friends of the University, over $150,000 having been raised, of which $40,000 was given by a graduate, A. C. Hardy, Esq., of Brockville, and Mrs. Hardy.

Many other smaller donations have been received, giving evidence of the deep interest taken in the University by members of the Board of Governors, graduates, and citizens generally. Also groups of Alumni in the United States, or belonging to the Faculty of Applied Science, have from time to time contributed graduate fellowships for research work in science.

The Royal Ontario Museum is intimately connected with the University of Toronto which bears one-half of the expense of its maintenance. It is surpassed by only one, or perhaps two, museums on this continent. Its contents, which are of varied and extraordinary interest, have been acquired for the most part through the generosity of citizens of Toronto, several of the chief donors being Governors of the University. It is almost impossible to place a money value on the contents of the different museums, but, probably, they could not be replaced for several millions of dollars, and in many cases the exhibits are unique.

While the Toronto General Hospital is under the direction of its own Board of Trustees it is very closely associated with the University and is indispensable for the instruction of its students in medicine. Towards the erection of these magnificent buildings $2,250,000 in private subscriptions have been received, several of the largest subscribers being gentlemen who are on the University Board of Governors.

Since the year 1906 the total amount granted to the University by the Legislature of the Province has been in the neighbourhood of $7,450,000. During the same period the gifts to the University, apart from the Ontario Museum and the Toronto General Hospital have been, on a moderate estimate, about $3,400,000. If these two institutions, so closely associated with the University, were included, as much more should be added, with the result that private benefactions direct or indirect have nearly equalled the outlay of the Province.

COMMUNICATIONS FROM VICTORIA AND TRINITY UNIVERSITIES AND ST. MICHAEL'S COLLEGE.

(1) *Victoria University.*

Victoria College,
Toronto,
Dec. 1st, 1920.

PRESIDENT FALCONER,
University of Toronto,

Dear Sir Robert:

In the matters which are now before the University Commission, recently appointed, I desire to lay before you the interests of Victoria College.

Victoria University entered into Federation with the University of Toronto because Toronto University was the property and care of the people of the Province of Ontario. The debates and correspondence in the press in connection with the action then taken by the Methodist Church bring out clearly two considerations which appeared to justify Federation and the action of Victoria with reference to the same. In the first place it was felt that if Victoria, and other Universities, would accept the conditions of Federation and move to Toronto, the way would be open for the first time for the people of this Province to build up one great, strong, adequately equipped University. Distracting counter interests created by the Church Universities would disappear, and the Legislature of the Province would be free to make all needed money grants with a generous hand. The second reason, of course, was that Victoria College believed that it would be to the advantage of her own students to share in the advantages and prestige of such a great Provincial University as would thus be created in the course of time. It did not occur to the friends of Victoria at that time, or if it did it was dismissed as too great an improbability, that the time would come when her students would find themselves handicapped in the University by reason of inadequate provision for the proper maintenance of the University. She came in to share not the poverty (she had enough of that of her own) but the prestige of a great and distinguished University. It cost Victoria very much, not in money, but in that University sentiment and pride which the long years of her history had created for her. She has a right to feel aggrieved, and deeply aggrieved, when University classes in which her students share, are altogether too large for efficient teaching.

To Victoria Federation is a compact. She has tried to fulfil all her obligations. I think, if inquiry were made, it would be discovered that her income from her endowments and from the givings of the Methodist people year by year, is larger than any similar income in any University outside of Toronto, receiving aid from the Government of Ontario. She has done her part, not only in maintaining, but in elevating the standard of education in the University. To educate her students in the subjects assigned to the College, she is spending to-day more money per student than does the University of Toronto in University College. Surely in these premises Victoria College has a right to expect that Toronto University will receive from the Government of this Province all the money needed to make it the great and splendid University which the advocates of Federation in the Methodist Church and in Toronto University circles, predicted would surely come, and which was the hope and dream of all those who had anything to do in advancing the cause of Federation of the Universities of the Churches with the University of the State.

I cannot refrain from referring to another matter. The great and splendid gifts which in recent years have been made to the University, have come very largely from those sources from which Victoria University has derived her support. It is difficult for me to resist the impression that if Victoria had remained an independent University a very large portion of these gifts would have gone directly to her. The contention of the advocates of Federation that the coming of Victoria to Toronto would be greatly to the advantage of the University of Toronto has been, I am sure, fully justified. I feel, therefore, that Victoria has a special right to urge upon the Commission that the first duty of this Province in higher education is to adequatcly and generously support the University of Toronto.

Yours sincerely,
R. P. BOWLES,
President.

(2) *Trinity University.*

SIR ROBERT FALCONER, K.C.M.G.
President, University of Toronto,

Trinity College,
Toronto,
2[illegible] November, 1920.

My Dear Mr. President:

Trinity College, as one of the Federated Universities, desires you to present its claims before the University Commission.

Our chief claim lies in the fact that the Province of Ontario entered into a formal agreement with Trinity College to provide adequately in the University of Toronto for the work Trinity was asked to give up. This undertaking on the part of the Province was entered into in consideration of valuable rights both of a financial and an educational nature surrendered by Trinity College in return therefor; and the agreement remains binding on the Province as long as Trinity College continues in federation with the University of Toronto.

About 1899 and 1900 A.D. the Government of Ontario, through the then Minister of Education and others, appealed to Trinity College to strengthen the position of the Government in relation to the State University—and likewise to strengthen the work of that University also—by bringing within the one Federation Trinity Medical College which was a large and flourishing institution, and the University of Trinity College which was carrying on instruction and examination in the two Faculties of Arts and Divinity, and conducting examinations and conferring degrees in other Faculties also.

The grounds of the appeal then made to Trinity College were mainly as follows:—

1. That Higher Education in Ontario would be better served by the strengthening of the University of Toronto which would result from this wider application of the University Federation Act.

2. That this closing up of the ranks would enable the Government to deal justly, and more liberally, with the State University.

3. That besides the advantages which would by Federation accrue to the teaching in the Faculty of Arts, Medical education also would be greatly benefited by the union of Trinity Medical College and the Toronto College of Medicine to form one Faculty of Medicine in the University of Toronto.

4. That the University of Trinity College also would benefit by pursuing the course thus recommended, inasmuch as it could always rely upon the Government to provide adequate financial support for the University of Toronto, in which the students of Trinity College at that time and in future years would fully participate.

In response to this appeal Trinity College inaugurated and supported amongst its graduates in all parts of the Dominion and elsewhere and amongst the members of the Church of England in Ontario who constitute its chief clientele, a movement which in 1903 and 1904 issued in the union of these two Medical Colleges to form the Faculty of Medicine in the University of Toronto; the establishment of Trinity College as an Arts College of the said University; the surrender by Trinity College of its degree-conferring powers in all Faculties except Divinity, and the conferring upon Trinity College of the status of a University Federated with the University of Toronto and entitled to enjoy as long as such status continues all the rights and privileges present and prospective accorded to the Federated Universities by the several University Acts of the Province of Ontario and by the special agreement entered into between the Government of Ontario and the University of Trinity College in 1903 and again in 1906.

Therefore, Trinity College would respectfully submit that the Province of Ontario is under special obligation to it to provide adequately for the University of Toronto, with whose fortunes we joined our own under the circumstances herein stated. Trinity College is more especially concerned in the Faculties of Arts and Medicine, and in those features of the University in which all its constituent elements are alike entitled to participate, such as the Library, the Laboratories, the Class Rooms for University lectures, and facilities for exercise and sports on the part of the students.

The last named item is one which Trinity College has a special claim to be heard. According to the terms under which the federation of this University with the University of Toronto was originally concluded, Trinity College was entitled to remain within its own ample grounds of thirty acres on Queen Street West and to have University lectures duplicated there for its students; but in 1906 the University Commission of that year urged us very strongly, in the interests of the University and particularly of the Faculty of Arts, to surrender that privilege and move into Queen's Park. This we agreed to do, and are now about to carry out the agreement. In doing so we are obliged to give up excellent and most ample playing fields of our own, and be content henceforth with our share in such facilities for athletics as the University may provide. These facilities, as at present existing, are rapidly becoming seriously overcrowded, and we would urge upon the Government a generous policy in securing sufficient land to meet the ever-growing needs of the students of the University for healthy outdoor exercise.

Another claim which Trinity College wishes to put forward is its right to share in the benefits of the central heating plant of the University for the new College Buildings about to be erected on Hoskin Avenue. Other Colleges and Departments of the University are supplied with heat from this system, and Trinity College would have just cause for complaint if it were discriminated against in this matter. Therefore, the College trusts that the Government will provide the University with sufficient capital to enable it to enlarge its heating plant sufficiently to answer to the many new calls now being made upon it. To do so at this juncture will doubtless prove a profitable investment in the long run, as well as an immediate act of justice.

In conclusion, Trinity College would assure the Commission of its entire loyalty to the University of Toronto, its desire to support and strengthen the University by every means in its power, and its conviction that a future big with vast possibilities, which will accrue to the benefit of the whole Province, lies before the Provincial University, if at this critical period the Province has the fore-sight and the wisdom to provide in no grudging spirit an adequate, just, and even generous measure of support to this great educational Institution.

I have the honour to be,
My dear Mr. President,
On behalf of Trinity College,
Your obedient Servant,
T. C. S. MACKLEM,
Provost.

(3) *St. Michael's College.*

SIR ROBERT FALCONER,
President, University of Toronto.

St. Michael's College,
Toronto,
Superior's Office,
December 2nd, 1920.

Dear Sir Robert:

In view of the coming investigation into university conditions by the Government Commission, I feel it my duty to represent to you that St. Michael's College went into the University under definite assurances from the University and from the Government, and that she would have good reason for complaint if the other parties failed on their part.

It is a fact that federation was a difficult and complex problem. All sections of the Province had to be brought to a willingness to see the government concentrate its efforts on one Provincial University. The entrance of St. Michael's, as representing a considerable proportion of the population, was no small factor. How important it was from our point of view may be seen from the fact that it was the first Catholic college anywhere to take such a step. We gave up all hope of independent existence.. In return the government was to provide the best for our students in non-college subjects in Arts and the best for our young men and young women in other faculties. In the present impoverished state of University finances the Government does not seem to be doing its part.

I trust that after this investigation the Government's attitude will be more in accord with the spirit of federation.

Yours very truly,
H. CARR,
Superior.

UNIVERSITY COLLEGE, TORONTO

In reference to the needs of University College which will come up for consideration by the new Commissioners appointed to report on the University and its finances, I beg to present the following as the most urgent and immediate necessities of the College.

(1) Enlarged accommodation for lecture rooms: the surrender this session of a large lecture room (No. 13) to the Bursar's department has rendered this question acute: and it is only by trespassing on the Medical Faculty and its large room that our work in English is carried on at all. We require at the earliest possible date the completion of the quadrangle on the north side: which would provide presumably some six fair sized lecture rooms and twice as many small private rooms for the staff; who for the most part at present have half of one small room. The needs of the College will ultimately require that it occupy the whole College building, at present largely usurped by the Registrar, Bursar and Superintendent; but the smaller change, the completion of the Quadrangle, cannot be deferred.

(2) The University draws a considerable portion of its revenue from the tuition fees of the students of the College; the number of these students must be adversely affected when another resident college is established on the University grounds. The security for the number of University College students and the income thereby received will disappear in a year to two, when Trinity College takes its place on its new site. Residences for University College will become necessary, if the University is to receive anything approaching its present tuition fees. Obviously a Residence is desirable on other grounds as well, especially in a University which makes so little provision for its students in this direction; and provided the new Residences be large enough to give board and lodgings to several hundred students the difficulties, which arose in connection with the very small residence for men in old days and led to its relinquishment, need not be anticipated.

(3) The previous paragraph has been concerned with Residences for men; but in a certain sense the women students of University College have more pressing claims for further accommodation than the men; for, though Queen's Hall and other houses may give shelter to a larger fraction of the women than the men's residences give in the case of the men, on the other hand the women students have nothing to compare adequately with Hart House. These residences may contain perhaps half the number of women for whom provision should be made, but 85 St. George St., their Union building, cannot begin to hold even this fraction of their number. A new Union for women is urgently needed.

(4) I have not said anything of the serious problems existing to-day in connection with the social activities of University College, and arising solely out of the lack of halls and space sufficient to entertain its thousand and more students: the University School is quite inadequate; Hart House, by the terms of its foundation, is not available; but none the less the difficulty is a serious and an increasing difficulty; and such Residences, as I have mentioned, seem the natural solution and almost the only solution. All of which is respectfully submitted for the consideration of the Commissioners.

MAURICE HUTTON.
Principal.

THE UNIVERSITY OF TORONTO LIBRARY

Summary

At times of expansion hitherto the needs of the Library have been underestimated. The demands upon it are constantly increasing with new requirements as to affording help to students.

1. The fund for the purchase of books is far too small. Now only $18,000, and actually much below the purchasing power of the annual amount granted before the war. The number of volumes added is not much more than one-third of the lower figures among the leading State Universities. An increase will be necessary if graduate work is to be carried on and undergraduates are to be given larger assistance.

2. Need of building expansion—Reserved reading rooms, private rooms for graduate study, and more seminary rooms with stack-room.

3. Administration staff and accommodation inadequate. Staff only 17. Michigan has 62 with part-time undergraduate service in addition. The staff should be doubled in size.

Memorandum

In any attempt to foresee and provide for the expansion of the University Library during the next ten or fifteen years, it should be borne in mind that in the past the extent of probable expansion for any similar period has always been underestimated. The building erected in 1892 was outgrown in every respect after fifteen years, although when planned it was supposed to satisfy all possible requirements for at least twenty-five years. The substantial additions made in 1908-09, which doubled the size of the original building, are beginning after twelve years to prove inadequate. The steady growth of the older Faculties of the University and the addition of new ones have multiplied the demands upon Library resources in many unexpected ways, and latterly the establishment of graduate courses of research, leading to higher degrees, has introduced into Library administration a new element not previously reckoned with. Moreover, methods of bringing books to readers and readers to books are constantly being improved by the great University Libraries of this continent, which aim at rendering more and more efficient aid to the inexperienced student, with a result that a feature which in one decade is regarded as an interesting experiment may become in the next a recognized necessity for every properly organized Library. The problem, therefore, of Library planning, which formerly was limited to the provision of possibilities of liberal enlargement of book-room and reading-room space has now been complicated by the necessity of including reserved-book reading and distribution rooms, special collection rooms, departmental studies, individual studies, a Library extension department, and of providing suitable and convenient offices for a larger staff of attendants, such as is indispensable for working out all the novel features. For the purposes of this memorandum, it will be convenient to set forth the probable Library requirements of the University of Toronto in three divisions, in relation to books, readers, and administration respectively.

I. The funds allotted for purchases of books for the University Library have always been less than the average for Universities of similar standing. When the war broke out in 1914, a beginning had just been made of more liberal appropriations, and a policy of yearly increases had been proposed which appeared to meet with the approval of the governing body. But the necessity of rigid economy during and since the war has prevented any such policy from being proceeded with, and the increase of the appropriation for the current year to $18,000 has not even been sufficient to match the great increase in the cost of books, periodicals and binding. In order, therefore, to bring the Library of the University of Toronto up to the standard of other state University Libraries of similar standing, there is urgent need of a much larger annual grant for the purchase of books. The following table will show how far behind in this respect the University now stands. The latest available figures are given for the American Universities, those of the year 1918-19.

Name of University	No. of vols. in Library	No. of vols. added last yr.	Expenditure last year	Appropr. foll. yr.
Michigan	413,000	13,000	$30,000	$56,000
Minnesota	280,000	14,800	31,000	35,000
Wisconsin	260,000	11,100	25,000	26,000
Ohio	202,000	21,700	26,000	21,000
Illinois	418,000	23,400	53,000	55,000
Iowa	170,000	11,100	30,000	38,000
Toronto	160,000	4,040	11,000	18,000

The lower annual expenditure of the University of Toronto results not only in a smaller stock of new literature for the work of the year, but in a progressively inferior collection for the purposes of graduate work, which is

becoming so important a part of the functions of Universities. To a certain extent this inferiority is not so marked as the statistics seem to imply, because the policy of the Library has hitherto been to spend as little money as possible in duplicating textbooks for undergraduate use, whereas the other Universities have done so freely. In the interests, however, of the undergraduate student, this policy should be altered as soon as an increase in the annual grants permit. At the present rate of annual additions, the stackroom for the books will not have to be added to for four or possibly five years.

II. The readers in the Library may be divided into three classes, members of the Faculties, graduate students, and undergraduate students. There are in use at present three large reading rooms, one for members of the Faculties, in which for their convenience the current numbers of periodicals are also kept, the other two for students, one assigned to men, one to women. There are also eight departmental studies or seminaries which are used both as rooms for small classes and as reading-rooms for honour students in the respective departments. A small collection of reference books is kept on open shelves in each departmental study. It is also intended to use two of the large basement rooms, left vacant this summer by the removal of the University Press to another building, for the purposes of special reserved-book reading-rooms for undergrdauate students, in which they may find the text-books and works of reference recommended in their various courses without having to apply for them at the main Delivery Desk. The present arrangement results in much congestion at the Desk at certain hours, and the way out of the difficulty in some University Libraries is to place, under supervision, in another room away from the main reading-room and Delivery Desk, the prescribed books of all the undergraduate courses. A complete solution of the problem has not yet apparently been reached anywhere, but it is becoming recognized that it will probably be found in the principle of separating readers instead of accumulating them in a single room. Whether the two basement rooms above mentioned will be sufficient as reserved-book reading-rooms cannot yet be asserted with any confidence. It is well to bear in mind that, both at Leland Stanford University and at the University of Michigan, which have very recently erected new Library buildings, the room provided as reserved-book room has already proved too small for the purpose for which it was planned. Profiting by their experience, the Library authorities of the University of Toronto are prepared to open not one but two rooms as reserved-book rooms, but experience alone can show whether further provision should not be made in the next extension to the present building for other separated reading-rooms, perhaps in the form of a connected series of smaller rooms to insure greater quiet than can be obtained in large rooms where readers are constantly coming and going. The departmental studies or seminaries mentioned above are now too few and too small for the classes that use them. In any future extension of the building provision should probably be made for other departmental seminary or study rooms in closer connection with the stack-room. A novel feature of the last addition to the building, erected in 1908-09, was a series of small private study-rooms above the stack-room, to be used by research students. What was then an experiment has proved now a necessity, and many more similar rooms will be needed for graduate students in the literary and historical subjects whenever the next addition is planned. The whole question of what accommodation for graduate students should be provided is as yet uncertain, but there is no doubt that with the growth of graduate work in the University and from the experience of other Universities, provision must be made for great expansion in that respect.

III. The Library administration is suffering from the lack both of an adequate number of assistants and of sufficient space in which to do the work. Here again the outbreak of war prevented what would probably have been a gradual expansion of staff commensurate with the increase both of book funds and the number of readers. The present Library staff is quite insufficient to carry on all the duties devolving upon it. Only the essential routine work can now be kept up to date, while other things which can bear postponement have to be put aside until additional assistance is obtained. New and desirable features of Library service cannot be undertaken at all. Among these may be mentioned special assistance to undergraduate readers in reference work, and Library extension service to graduates and others outside of Toronto. Other Universities have devoted much attention and money to both these enlargements of the usefulness of a University Library. The staff of the Library numbers at present 17 persons. The University of Michigan Library has a staff of 62, some of whom are doubtless employed in departmental libraries in other University buildings, but, in addition to the regular staff of 62, it also employs a large number of undergraduates on less than full time and these are not included in the above figure. It is safe to say that no University Library in the United States of similar standing to the University of Toronto attempts to carry on its work with less than twice the staff at present employed here. The office space is also in need of enlargement. Some of the existing rooms are as full as the nature of the work carried on in them will permit. The removal of the University Press has set free a small room in the basement, which is being fitted up for work hitherto very unsuitably done in the Faculty Reading Room. In the next addition to the Library building, a liberal estimate should be made for administration rooms.

THE FACULTY OF MEDICINE

Medical Course. Part I.

The education of competent physicians and surgeons involves much more than a training in the use of established methods. The medical faculty must not only see to it that the approved methods of practice are properly learned by the student, and that ample opportunity is given him under supervision, to apply them in the clinics, but it must also provide instruction by which the student's mind shall be so trained that it can comprehend new discoveries and see their application in medical and surgical science.

It is important to point out that this training in independent thought should be given to every member of the class, and not alone to selected groups of the better students. The future advancement of Medical knowledge depends as much on careful observation and investigation of the incipient stages of disease by the general practitioner, as on highly specialised research in laboratories and clinics. Detection of disease in its earliest stages and the application of therapeutic measures to combat it rest entirely with the general practitioner and he cannot do this properly unless he is thoroughly trained in powers of accurate observation and has been taught to think independently.

In order that these two functions can be performed by the medical school the latter must be provided with the following:

1. Laboratories that are sufficiently large and well equipped that each student may independently make observations of the structure of the normal body, and conduct experiments to illustrate the functions of the various organs and tissues.

2. Hospital and dispensary facilities offering a sufficient number of patients so that each student may acquire adequate practice in the diagnosis and treatment of disease.

3. A sufficient number of properly trained instructors so that adequate assistance may be given to each student to enable him to overcome the technical difficulties involved in making the observations or experiments, and to guide him in arriving at their correct interpretation and application.

Not only must the laboratories be specially equipped, each for its particular purpose, but their staffs must be composed of men who have been specially trained in that particular field of medical science.

All the departments must moreover be developed to approximately the same degree of efficiency, otherwise the training of the student will be imperfect, not only in the particular subject which may be poorly taught, but also as a whole, because of the interdependence of the courses, the one on the other. It is undesirable for a medical school to specialize along certain lines in the development of its departments. All of them must be developed according to a well thought out scheme of general efficiency if the students are to be adequately trained to deal with the many and diverse problems that arise in the practice of medicine and surgery.

Because of the fortunate association between the faculties of Medicine and Arts in this University, it is unnecessary for the former to assume any responsibility in the teaching of the premedical sciences (Biology, Physics and Chemistry). The departments which more properly compose the medical faculty are those of the fundamental medical sciences (Anatomy, Physiology, Biochemistry and Pharmacology), Pathology and Hygiene and the clinical subjects, and it is the purpose of the present report to show the extent to which the laboratory courses must be developed if the University of Toronto is to fulfil its function as a centre for the training of efficient physicians and surgeons and Hygienists, who will practise in the State and Dominion. It must train not alone general practitioners for city and country district, but specialists as well.

Following these general remarks, it may be well to state the aims and purposes of the departments of the Medical School, to consider in how far these are being achieved, and then to point out by what means short-comings and deficiencies could be remedied. A detailed statement of these matters will be found in the report of the Rockefeller Committee.

The aims and purposes of the laboratory departments are:

1. To afford every student the opportunity to carry out for himself in the laboratory the dissections, microscopical studies and experiments that are essential to practical knowledge of the structure and functions of the human body. This demands, not only adequate bench space and equipment, but also the furnishing of suitable material upon which to conduct the observations.

2. To provide experienced laboratory teachers or demonstrators so that every student may receive adequate guidance and assistance in his work. In most of the subjects it is agreed by medical educators that there should be at least one teacher to every 15 students in the laboratory subjects. If the supervision of the work of the student at this stage be inadequate, it means that he will go forward to the clinic untrained in the fundamentals of medicine and surgery, and without good training in these he can never become a really efficient clinician.

3. To expound the theory of the subject by lectures which must be thoroughly up-to-date, authoritative and well-balanced. If the lectures are merely compilations of text book matter, they are worse than useless since

they lead the student to believe that the medical sciences are stationary and dogmatic and they fail to stimulate him to independent thought. It is in the lecture theatre, more than anywhere else, that a good teacher can inspire the students to aim at high ideals in their work, and to be self critical and exacting in its performance.

4. To conduct demonstrations, reviews and conferences in which the work done in the laboratory and the theoretical knowledge gained by attendance at the lectures, and by reading will be correlated. To carry out this part of the training properly the class should be taken in groups of 15 to 20 students each and the instructor should encourage the students to discuss with him their difficulties in comprehending the subject.

In the various laboratories of the medical department in this University, all of these ideals cannot be attained at present, for the following reasons:

1. In certain departments especially Anatomy, Pharmacology, and Pathology, the space is grossly inadequate, even for much smaller classes.

1. Inadequate facilities exist in the laboratories of Physiology, Biochemistry and Pharmacology for conducting many important lines of research because of unsuitable quarters for the care of animals.

3. The number of properly trained laboratory instructors is inadequate (compare Rockefeller report).

4. There are relatively too few instructors of sufficient experience to conduct, with small groups of students, review classes and conferences.

There is no doubt that many of these evils will be removed when the number of students is reduced, but even if the staffs, exclusive of part-time fellows, are retained at their present strength and the number of students in each year is reduced to an average of one hundred the ratio of instructors to students will fall far short of the accepted standard. Increase in the size of the staff is urgent in all departments.

It may be pointed out here that, with the possible exception of Anatomy, the employment of part-time fellows is highly undesirable, both from the point of view of the student that is thus appointed and of the department. When the salaries paid the part-time fellows are released, by discontinuing such positions, it will be possible to appoint a few more instructors on a full time basis which will slightly improve the above ratio.

In their organization and equipment the laboratory departments of the Medical Faculty, with the exception of Anatomy and Pharmacology, can be considered as equal to the best in England or the United States, but they all lack in one feature that is essential to their being considered worthy of a great University and that is in research. Their activities in this direction are hampered mainly by the lack of uninterrupted time on the part of the members of their staffs, because of the relatively large number of students that they have to be trained in the essentials of the subjects. In not contributing its share to the advancement of human knowledge the Medical Department is not fulfilling one of its most important functions to the State, for unless the Universities lead the way in original thought, not only will Medical Science stand still, but it will retrograde, as the history of all times abundantly testifies. The establishment of special research institutes that are independent of Universities can never serve to exonerate the latter from their functions in this regard, and for several reasons, among which may be mentioned, that in most such "institutes" attention is centred on special problems of a more or less applied nature, that the atmosphere is usually uncongenial to the many types of original mind, and that there is not, and through force of circumstances, never can be, opportunity to train new investigators. The last-mentioned reason in itself sufficiently emphasizes the necessity for a greater degree of research activity in the laboratories of the University. Without adequate opportunities to engage intensively in original investigation on some chosen field of his subject, the teacher fails entirely to arouse in his pupils any ambitions to engage in research. He soon comes to be regarded by the student merely as a pedant and he fails to inject into teaching anything that appeals to the imagination, and leads to independent thought.

Among the students that attend the University of Toronto, there are many in every year that could undoubtedly contribute greatly to the advancement of knowledge by original investigation, and later, by teaching, if there were greater opportunities for active research within its laboratories. These opportunities can be afforded by the appointment of *larger staffs than at present*, so that every member can have suitably long periods of uninterrupted time, free from teaching duties to devote to it. In the laboratories of Medical Science, there should be no place for men who have not contributed their share to research or are engaged in its prosecution.

In conclusion a few words may be said about the great advantage to the medical department arising out of its close association with the Connaught laboratories of Public Health. The conspicuous efficiency of this department in the preparation of antitoxins and vaccines for use by the community and the great influence which it has in promoting the control of public health by the State, depend very largely on its close association with the University. In its laboratories researches of great practical value can be conducted provided it can find suitably trained investigators to conduct them and this it is the duty of the medical school to enable it to do. Provision is made in the new Six Years' curriculum of medicine for a more extended and thorough general course in Hygiene, and for optional courses in its various branches.

In this report nothing is stated about the proposed development of the Pathological department so that it may provide laboratory facilities for the clinical departments. This is fully dealt with in the Dean's report.

It became necessary at a recent date to consider the requirements for the future evolution and development of the facilities for teaching and research in the Faculty of Medicine in the University of Toronto. A Committee of the Faculty had this matter under consideration and investigated the most minute details regarding the various Departments of the Faculty. They placed on record a detailed statement of the present facilities and equipment, and the requirements which will be necessary in the immediate future if the efficiency of the various Departments is to be maintained.

The work of the Committee is embodied in an extensive report which contains in detail a statement indicating the present equipment of each Department in the Faculty. It contains a discussion of the requirements necessary for future development and gives reasons for the conclusions arrived at by the Committee. This report, which contains seventy-three folios of typewritten matter, is available for detailed study.

The report was considered by the Council of the Faculty of Medicine and, after certain amendments suggested, was adopted by unanimous vote of the Faculty.

CLINICAL DEPARTMENTS

1. *Medicine, Surgery, Obstetrics and Gynaecology—*

These three great Clinical Departments require organization along specific lines. The ideal organization possesses certain principles which are common to all three departments. Provision for an efficient staff and adequate facilities for effective Clinical teaching become imperative.

(*a*) *Teaching—*

The teaching conducted by these Clinical Departments should provide for instruction of three classes of students.

(1) Undergraduate Medical Students.
(2) Specialist training for Junior Members of the Staff.
(3) Post-graduate study for men who have undertaken private practice.

The machinery suggested would provide for the teaching of all three classes. Increased staff is necessary but it becomes essential that certain members of the staff should be appointed at an adequate Annual Salary for specialized work.

(*b*) *Research—*

Provision must also be made for Clinical and Laboratory Research, and in this regard the present facilities are most inadequate. If the University of Toronto is to keep abreast of other Institutions of a first class order it must necessarily provide for the training of specialists and the conduct of Research.

(*c*) *Laboratories—*

In order that the necessary provision be made for Laboratory space it becomes essential that a building should be erected.

It is suggested that a new building be erected on the portion of the present Hospital grounds which belongs to the University. In this building will be housed suites of laboratories, one for each of the five Clinical Departments, viz., (1) Medicine, (2) Surgery, (3) Obstetrics and Gynaecology, (4) Oto-Laryngology, (5) Ophthamology. The building will also contain a large lecture room, a museum, a library for students and staff, additional laboratory unit for the teaching of Pathology and Bacteriology, adequate space for animals, etc.

2. *Oto-Laryngology and Ophthalmology—*

The organization in this Department should embody the same principles as those detailed for Medicine, Surgery, Obstetrics and Gynaecology.

3. *Department of Pathology—*

The organization of the Department of Pathology demands a greatly increased staff.

The staff in Pathology will be so organized that provision will be made for supervision by competent members of the staff of sub-departments closely associated with the work the clinical departments, such as, Bacteriology and Surgical Pathology. Thus it is recommended that a Lecturer be appointed in Surgical Pathology. In addition to the appointments requisite for these purposes it is obviously necessary to secure such special assistants as an artist, a photographer (expert in micro-photography), a librarian and a museum preparateur. The artist and photographer will be available for clinical Departments as well as in the Department of Pathology.

4. *Psychiatry—*

The Department of Psychiatry needs much greater expansion. There is widespread interest taken in th subject by the community at large, not only in Canada but abroad.

The recent remarkable development of this Department and the widespread interest taken in it by the community at large not only in Canada, but abroad, demand adequate provision in the teaching of the subject in the University and in the securing of hospital accommodation.

5. *Hygiene*—

This Department, though organized only on a part-time basis, is responsible for the instruction (graduate and undergraduate) in Preventive Medicine, Hygiene and Public Health, in the Faculties of Medicine, Applied Science and Engineering, Household Science, and the Department of Social Service. The scope of graduate work will be understood when it is pointed out that for the academic year, 1919-1920, ten graduate students were registered in this Department. The staff at present consists of a Professor, Lecturer, Lecturer in Industrial Hygiene and Demonstrator in Sanitary Chemistry, all on a part-time basis. No laboratory assistants or stenographer on a full-time basis have heretofore been provided.

The Research and Antitoxin Divisions of the Connaught Antitoxin Laboratories are staffed in large part by the personnel of the Department of Hygiene. These Laboratories provide adequate funds and facilities for research in Preventive Medicine and Hygiene.

For the extension of teaching and research facilities in the Department of Hygiene close affiliation with the Research Division of the Connaught Laboratories is desirable, in order that the facilities of these Laboratories may be made available for the purpose of graduate (D.P.H. and other) teaching and for Research.

BUDGET INDICATING PRESENT EXPENDITURE AND THE PROPOSED INCREASE OF EXPENDITURE

Clinical and Final Departments

	Annual Expenditure Necessary	Present Expenditure	Increase of Expenditure Necessary
Medicine, including Pediatrics	$60,000.00	$37,600.00	$22,400.00
Therapeutics	7,000.00	2,000.00	5,000.00
Surgery	40,000.00	11,600.00	28,400.00
Obstetrics and Gynaecology	20,100.00	4,900.00	15,200.00
Psychiatry	16,300.00	1,400.00	14,900.00
Ophthalmology	7,750.00	1,600.00	6,150.00
Oto-Laryngology	8,250.00	1,650.00	6,600.00
Radiology	8,000.00		8,000.00
Pathology	41,000.00	13,000.00	28,000.00
Pathological Chemistry	18,750.00	10,700.00	8,050.00
Medical Jurisprudence	700.00	700.00	
Hygiene	15,500.00	8,000.00	7,500.00
	$243,350.00	$93,150.00	$150,200.00

Primary Departments

	Annual Expenditure Necessary	Present Expenditure	Increase of Expenditure Necessary
Physiology	$32,850.00	$16,762.00	$16,088.00
Biochemistry	23,250.00	14,900.00	8,350.00
Anatomy	30,623.00	11,423.00	19,200.00
Pharmacology, including Toxicology	13,550.00	6,525.00	7,025.00
	$100,273.00	$49,610.00	$50,663.00
Clinical and Final Departments	$243,350.00	$93,150.00	$150,200.00
Primary Departments	10,273.00	49,610.00	50,663.00
	$343,623.00	$142,760.00	$200,863.00

This does not include expenditure for Buildings and Equipment.

THE CONNAUGHT ANTITOXIN LABORATORIES.

The Connaught Antitoxin Laboratories constitute a Department of the University of Toronto.

The Laboratories were established to provide facilities for research in Preventive Medicine, Public Health and Hygiene; and for the production of public health biological products, including diphtheria and tetanus antitoxins, smallpox vaccine, anti-meningitis serum, the Pasteur treatment (anti-rabic vaccine), anti pneumococcus serum and typhoid and paratyphoid vaccine.

Through the generosity of Colonel Albert Gooderham, the University was provided with a farm of over fifty acres in York Township (the University Farm), on which were erected Laboratories and Stables where preparation of antitoxins and vaccines and serums is carried on under ideal conditions. The value of this gift to the University was seventy-five thousand dollars.

Part of the work of preparing these substances is carried on in the Medical Building of the University. This work is done in what is known a[illegible]ntitoxin Division of the Laboratories. There is also the Research Division, the work of which is linked [illegible] that of the Department of Hygiene and Preventive Medicine of the University.

The Antitoxin Division of these Laboratories is, and has always been, entirely self-supporting. There has been every year a surplus on operating in these Laboratories, and this surplus has been used to establish what is known as the Connaught Research Fund, the income on which is available for the support of research in Preventive Medicine. At the present time several researches of great practical importance are being carried on in the Research Division of the Connaught Antitoxin Laboratories, and are supported by the Connaught Research Fund. Dr. Fitzgerald is engaged in a statistical investigation and follow-up study of diphtheria deaths in Ontario; Dr. Caulfield and his Associates are engaged in a study of certain important phases of the tuberculous problem; Dr. Defries has been investigating certain points with reference to smallpox virus and vaccine virus, and Mr. Moloney and Miss Hanna are studying toxin production by bacteria.

The antitoxins, vaccines and serums produced in the Antitoxin Division of these Laboratories are sold to Provincial and Local Boards of Health. In Ontario free distribution of all of these products is carried on by the Provincial Board of Health of Ontario, who obtain them at a very low price from the Laboratories. The price at which these products are sold to the Provincial Board of Health of Ontario is lower than obtained anywhere else in the world. This fact has been ascertained by Dr. J. W. S. McCullough, Chief Officer of Health of Ontario.

The Province of Saskatchewan is also supplied with diphtheria antitoxin which is distributed free in Saskatchewan by the Bureau of Public Health of that Province.

Alberta, Nova Scotia, New Brunswick and Manitoba are other Provinces whose Provincial Health Departments obtain products from these Laboratories. The same is true of the Cities of Vancouver, Edmonton, Calgary, Saskatoon, Regina, Winnipeg, and of Charlottetown, P.E.I. Certain physicians in the Province of Quebec also obtain antitoxin from these Laboratories.

The Colony of Newfoundland and several of the West Indies also obtain their supplies of antitoxin, etc., from the Connaught Antitoxin Laboratories.

During the past year considerable quantities of antitoxin have been sent to New Zealand for the use of physicians in that Dominion.

During the war most of the antitoxins used in the Canadian Army were prepared in these Laboratories.

The work of the Connaught Antitoxin Laboratories is analogous to that done in the Pasteur Institutes in France and Belgium and to that of the Lister Institute in London, with this advantage on the side of these Laboratories that the Connaught Antitoxin Laboratories are an organic part of the University, are self-supporting and provide funds and facilities for research in Preventive Medicine and also opportunity for graduate teaching in Public Health.

THE FACULTY OF APPLIED SCIENCE AND ENGINEERING.

PART I.

The Faculty of Applied Science and Engineering had its beginning in the School of Practical Science authorized by the Province of Ontario under an Order-in-Council in 1877. The School was affiliated with the University of Toronto in 1889 and by the University Act of 1906, it finally became an integral part of the University as the Faculty of Applied Science and Engineering.

General: Organization and Functions.—As now constituted there are seven regular Departments of graduation leading to the degree of Bachelor of Applied Science:

Civil Engineering.
Mining Engineering.
Mechanical Engineering.
Architecture
Chemical Engineering.
Electrical Engineering.
Metallurgical Engineering.

The courses extend over the standard period of four years and are designed to give the students a thorough knowledge of the scientific principles underlying the practice in the several branches of the profession, and also such training as may make them immediately useful on graduation whether in purely professional work or in those occupations indirectly connected with Engineering in its various branches.

In addition to the instructional work in the several courses the Faculty performs a useful public service in respect to testing and research work to which the members of the staff devote a portion of their time.

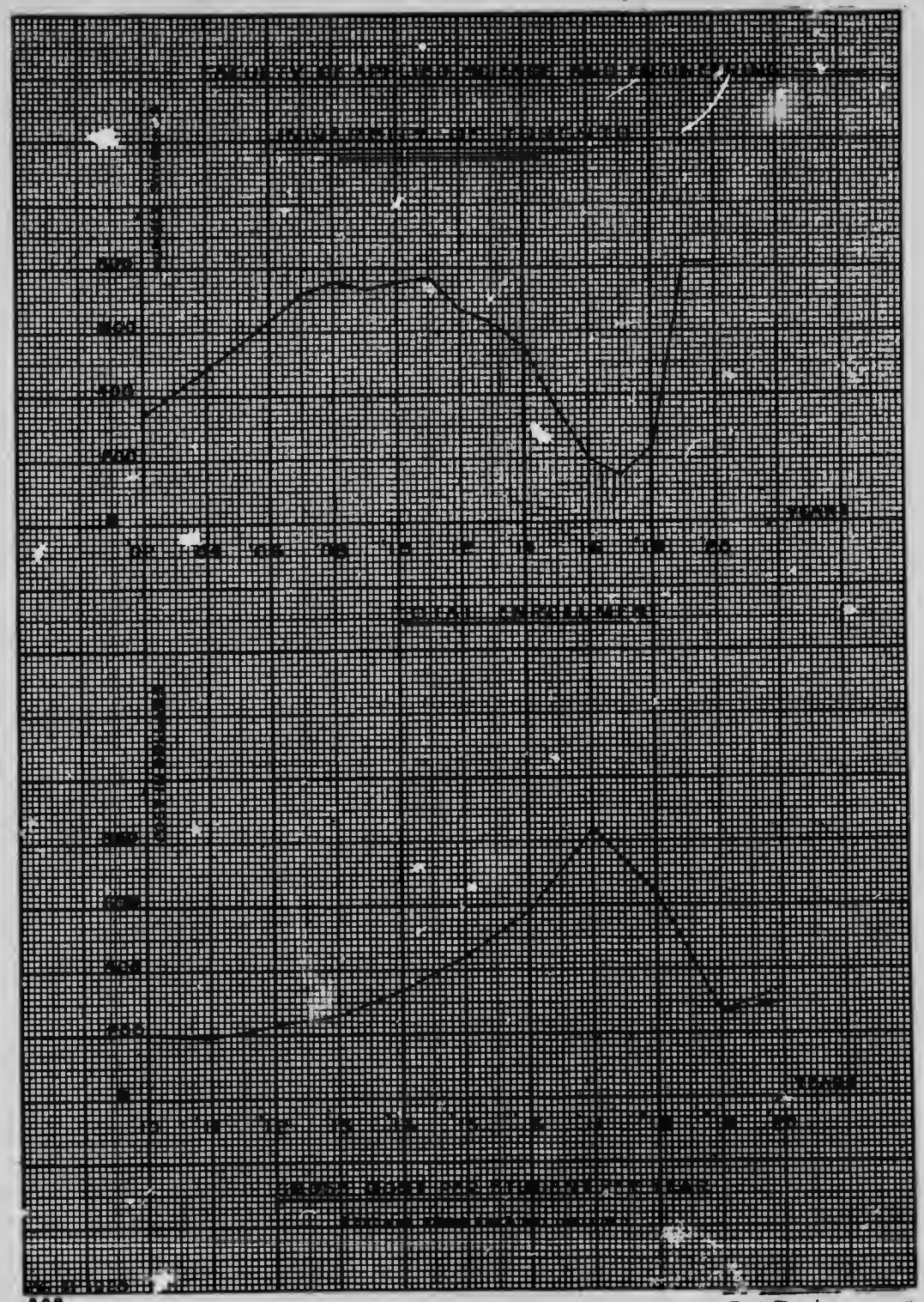
Staff of the Faculty.—The staff consists at present of 103 members, of whom 47 are of professor grades. Of this full staff 75 are engaged wholly upon the Engineering portions of instruction and research and are carried and paid from appropriations made to the Faculty as such; the remainder are members of the Arts or Medical Faculties who lecture in various subjects to the students enrolled in the Faculty (*e.g.*, Mathematics, Languages, Geology, Mineralogy, Biology, etc.).

Represented on the staff are graduates not only of this and other Canadian Universities but several from British and American Universities and many of the senior members are men who have attained distinction in their respective branches of the profession and as such have brought great credit to this University; their services continue to be sought as consulting engineers and advisers by various interests both public and private.

Buildings and Equipment.—The buildings occupied by the Faculty are six in number—The "Engineering," being the original of the School of Practical Science; the "Chemical and Mining;" the "Mill" (Mining); the "Observatory" (Surveying); the "Mechanical" (Thermodynamics and Hydraulics); and the New Building to house Electricity and Applied Mechanics. In addition the large hall behind Convocation Hall is used for drafting.

In general the names indicate the use to which they are put but it should be explained that the Engineering Building provides for a large part of the instruction common to all Departments, such as drafting, surveying, engineering, physics, photography, applied mechanics lectures (in part); it also contains the Department of Architecture. The Chemical and Mining Building, in addition to these engineering departments, provides for the Department of Metallurgy and is occupied as well by the Departments of Geology, Mineralogy and Electro-Chemistry of the Arts Faculty although lectures and laboratory work in these are carried on also in other buildings of the University and at the Museum. The New Building is to provide, when completed, for all the lectures and laboratory work in Electrical Engineering and for a portion of the lectures and laboratory work in Applied Mechanics, including the testing laboratories for Structural materials; this building is now only partly occupied, the equipment being in process of transference from the old Engineering Building.

The equipment of these various buildings, while generally very complete, has been increased but little during the past few years, excepting the Aeronautics added during the war and the Electrical now being installed in the New Building. In general the equipment of laboratories comprises those of the Thermodynamic and Mechanical, Hydraulic, Aeronautic, Engineering Physics, Electrical, Chemical, Electro-Chemical, Assaying, Metallurgical, Mining, Milling and Concentrating, Strength of Materials (Structural) Highways, Sanitary (with Ontario Board of Health), Cement, Metrological and Geodetic Observatory, Geological and Mineralogical. There are in addition the special equipments of the Art and Modelling studios in Architecture, the very large equipment of the drafting rooms and the Surveying equipment located and used both at the University and at the Summer Camp.



During the past year use was made for the first time of the Summer Survey Camp at Gelert, in Haliburton, which has recently been established with lands and buildings on Gull Lake to provide more efficient higher instruction in geodetic work and in land, railroad, hydraulic, hydrographic and trigonometric surveying. It is the intention to extend this summer work to Mining, Geology and Mineralogy.

Attendance of Students.—The enrolment of students in this Faculty has steadily increased through the periods o "School" and "Faculty" in University connection until about 1911, when there was a slight dropping off which, followed by the war, brought the number down to a very low figure. On the conclusion of the war the enrollment suddenly increased so that during the past year and the present the total (808 and 807 respectively) has exceeded any former numbers. The yearly enrollment is shown on the attached diagram between the years 1902 and 1920.

An analysis of the attendance indicates a very considerable change in the demand by the country as indicated by the relative enrollment in the several Departments. This is evident from the decrease in students in Civil Engineering and kindred branches and the great increases in Electrical, Mechanical and Chemical indicating a decided swing to-day to the industrial side of Applied Science and Engineering education.

Following are tables of distribution of enrollment for the two critical years of 1910 and 1920, which will indicate the change. (Note that the Department of Analytical Chemistry is being discontinued in this Faculty and is replaced by Chemical Engineering, also that Metallurgical Engineering is new since 1910.)

ENROLMENT OF STUDENTS

Year 1910-1911

	First Year	Second Year	Third Year	Fourth Year	Total
Civil Engineering	138	85	104	55	382
Mining Engineering	28	14	19	16	77
Mechanical	31	18	66	48	163
Architecture	7	8	5	4	24
Analytical Chemistry	10	5	6	2	23
Chemical Engineering	4	3	2		9
Electrical	56	34	2		92
	274	167	204	125	770

Year 1920-1921

	First Year	Second Year	Third Year	Fourth Year	Total
Civil Engineering	29	58	30	37	154
Mining Engineering	13	25	16	12	66
Mechanical	44	56	33	26	159
Architecture	10	11	3	9	33
Analytical Chemistry				15	15
Chemical Engineering	32	66	38	10	146
Electrical	60	93	40	23	216
Metallurgical	3	9	3	3	18*
	191	318	163	135	807

*In addition to these in the regular Metallurgical Engineering there are 26 in Mining and 40 in Chemical Engineering of third and fourth years taking Metallurgy.

It is to be observed that the large second year of 318 in 1920 is a result partly of the war and partly of the impetus in Applied Science education; this class as freshmen last year numbered 403. The drop in the enrolment in the First Year to 191 in 1920 is considered to be due to the higher matriculation standard just now applied and a very stringent application of entrance regulations as well as possibly some diminution due to the absorption of returned soldiers.

The Cost, Past and Present.—A review of the cost for administration and work of the Faculty for the past ten years indicates a gradual but slow increase for the few years before the war, then a decline during the four war years to a figure below 1910, and then a sudden rise for last year to a figure 35 per cent. greater than 1910. In considering this fluctuation it is interesting to keep in mind that the number of students enrolled in 1910

and 1920 were almost the same, being 770 and 808 respectively. This range is approximately $140,000 for 1910 up to $160,000 in 1914, down to $125,000 in 1917, and up to $190,000 in 1919. These figures do not include the *pro rata* amounts for salaries of staff carried on the Arts Faculty giving lectures to Applied Science students which rightly, if considered included, would increase these amounts by from about 10 per cent. in the years before the war, reduce to 8 per cent. toward the end of the war and rise to 16 per cent. at the end and since the war. (None of these figures include any *pro rata* amount of the whole University overhead cost chargeable to this Faculty nor do they take into consideration the cost of Applied Science buildings nor the interest or depreciation thereon.)

Comparing these yearly costs with the number of students annually enrolled in the Faculty as shown on the first diagram, the cost per student per year has been determined as shown on the second diagram herewith. (These costs, as before, do not include University overhead or interest and are gross costs, *i.e.*, do not take into consideration fees paid.) It will be observed that the rate per student gradually rose in the few years before the war until in 1914 it was about $330, and then it rose very rapidly during the war (due mainly to decreasing attendance) until in 1917 it reached $340, and as rapidly fell again until last year it reached about $270, due mainly to the greatly increased attendance. For the current year it is estimated that with the standard salary list, without the bonus, this will increase to about $300, and taking the salary bonus into consideration, as now applied for this year, the rate may reach about $350 (shown dotted on diagram) which, it is to be noted, is an approximation to conditions at the commencement of the war. For comparison, it may also be noted that this rate is lower than those in the larger Engineering Colleges in the United States.

Part II.

The Relation of Faculty to Profession.—As already pointed out the members of the staff participate in the professional work of the country and indeed this is encouraged. The younger members employ their summer holiday periods in Engineering work of various kinds and add not only to their incomes but to their knowledge and experience, and in this manner increase their value to the University. The senior members also give considerable of their time to professional work, and this is encouraged not only during the holidays but during the session provided it does not interfere with their work. From this course many advantages accrue to the University, not the least being the broad viewpoint gained and retained through close contact with the activities of the country, and through their high connections as consulting engineers and technical advisers they bring credit and recognition to the University from sources which can be of great assistance to the cause of higher education. For these reasons it is not only desirable to give such opportunities by long summer holidays, etc., but to endeavour to attract to the staff of the Faculty such engineers of standing as will be increasingly recognized by the profession.

The Graduate Body.—The graduates of the Faculty, including those of the School of Practical Science, now aggregate 2,040 and they represent all branches of engineering and technical business not only throughout Canada but in the United States and various parts of the British Empire. It may be of interest to note that of these 1,444 are at present engaged in the Province of Ontario, 78 in Quebec and the Maritime Provinces, 240 in Manitoba, the Western Provinces and British Columbia, and 177 in the United States, 64 are deceased. With regard to the United States it is to be recongized that while many are there permanently, a large proportion will return to Canada as opportunity offers and bring with them incalulable experience.

The prominent and influential positions held by the graduates and the high quality of engineering work in which many of them are engaged have already brought much credit to this University. So far as the Province of Ontario is concerned, it may be pointed out, for instance, that nearly all the senior members of the technical staff of the Hydro-Electric Power Commission are graduates of this Faculty, and to these may be added the large numbers who are engaged in Engineering work, both technical and administrative, for the Dominion Government, the Provincial Governments, and the many municipal and civic utilities. The alumni are found on Harbour Commissions, Power Commissions, Irrigation schemes and deep water-way projects. In addition to these are the numerous large private technical and business undertakings in which Engineering graduates occupy most important posts.

Part III.

The Requirements of the Country.—Canada, and especially the Province of Ontario, require for the next few years a type of education which will best help the national development in the most direct, substantial and permament manner. So far as Applied Science and technical education generally are concerned, we realize that its product must be a national asset. The nation's knowledge and dexterity in material things, too, are very determining factors in its prosperity and, if it lacks these, it will not be able to maintain its place; its ability to develop and utilize its natural resources, its aptitude and energy in trade and commerce and its skill in industrial pursuits are the essential elements in these determining factors which in turn depend primarily on scientific education.

The Future of Applied Science.—To fully develop the resources of the country, the resources of the field, forest, mine and river, we must start afresh our study and preliminary planning for those projects contemplated before the war, we must investigate and analyse the newer problems which have arisen in the past few years and must plan for the future on the larger things of the country's development with a wider horizon than ever before.

This means dealing with the great fundamental problems of Transportation, with Mining and its Geological and Mineralogical exploration, with Water Powers and Hydro-Electric development, with Municipal Utilities and problems of health and convenience, with the great basic industries and with the other varied branches of Industry and Manufacture both Mechanical, Electrical and Chemical, which have now entered so much into our national life. It means, too, the awakening of a national style and originality in Architecture, in its combination of Art and Applied Science. And, above all, it means applying and reapplying, through the medium of Research, our scientific knowledge and discoveries, so that we may plan for the work of to-morrow on the results of yesterday.

The Place of the University.—In putting into effect this programme for the country's development the University must play the leading part. It must not follow the trend of events, it must actually lead in the national progress; it must anticipate the country's needs.

The Faculty of Applied Science and Engineering of a National University such as this is, must be prepared to train its students for the national needs not as for to-day but for five and ten years hence. Its policy, therefore, must be laid down with wide vision and with a view to applying the best that is in the country's Human Resources for the development of its Material Resources.

The wide extent of instruction which this involves in its fullest service to the country presents a large problem to the University. It cannot be expected to make engineers of young men in four short years; the fuller process must be carried on in the years after graduation. The University, however, can lay the foundations and educate the student in the practical application of the scientific fundamentals to the various phases of Applied Science as they are known and practised to-day. It is not its function to teach its students the work of artizans, but primarily to educate them to be original thinkers, designers and constructors, and leaders of character in the service of the community. For this they must have as well a broad education, not wholly technical, and must have enough of those general fundamentals by which they can orient their technical education with the economics of the world into which they enter after graduation.

In the short period of four years, each with an academic session of not more than seven months, it is found most difficult to crowd in all the varied instruction that the needs of to-day seem to demand. It must be remembered, however, that the process of absorption proceeds throughout the summer holiday whereby the student is enabled to apply under actual working conditions, the principles he has learned the preceding winter. In this respect the long summer vacation is of value to both student and staff alike. Neither can the student be expected to specialize; indeed it is considered undesirable beyond such general specialization as is involved in the broad divisions into which the profession is divided.

With these conditions surrounding the education of the young engineer the University undertakes to prepare him for his future work whether purely professional or only remotely so. What that future may be he may not clearly foresee even when he graduates, and when the broad field is presented it is quite evident from its diversity that there is room for uncertainty; then it is that the student commences his process of specialization.

The field of the Engineering profession, now expanded to many times its breadth of forty years ago, covers the wide range of a country's activities. These can only be enumerated:

Civil Engineering constitutes by far the largest field in the profession. It may be divided into many sections such as: Transportation Engineering comprising work connected with steam and electric railways, their construction and operation; Public Works Engineering, including waterways, harbours, docks and terminals elevators; Municipal Engineering, which embraces all branches of water supply, drainage, sanitation and the laying out of streets and pavements with their lighting and traffic questions; Hydraulic Engineering, of importance in Canada in the development of Hydro-Electric Power, in questions of water storage, supply and control, and closely allied with this are Irrigation and Reclamation Engineering. Connected with the foregoing are the branches of surveying and geodesy and the precise work of mapping. Structural Engineering includes the design and erection of steel buildings and allied work. It is Bridge Engineering, the building of reinforced concrete bridges and viaducts. Highway Engineering, while related to both transportation and municipal, is now assuming such proportions that it is considered as a separate branch.

Mining Engineering also covers a larger field and might be divided into the processes of mining and the processes of treatment or milling and refining. The laboratory work embraces assaying with its economic features. The processes involved in the working of our iron, coal, gold, silver, copper, nickel, lead and zinc resources alone cover a very large scientific field.

Metallurgical Engineering can be divided into two distinct parts: the first is the production of metal from the ores and the second the working of the metals as produced. To Canada this is most important as affecting the basic industries of iron and steel, fuels and the economic metals.

Mechanical Engineering, which has a scope approaching that of Civil, comprises that work connected with Steam Engineering, Internal Combustion, Aerodynamical Engineering, Heating, Ventilating and Refrigerating Engineering. Manufacturing and Industrial Engineering comprising the basic industries of grain milling, clay products, cements, glass, textiles and the great number of metal industries. Under this might also be included Naval Architecture.

Electrical Engineering is a steadily increasing profession dealing with Electrical Traction and Transportation, the Telegraph, Telephone and Wireless, Illuminating Engineering and the generation, transmission, distribution and application of electric current to the many utilities and industries of the country.

Chemical Engineering has taken a sudden advance into a leading place in the profession. Chemical Engineering fields are now developed in the pulp and paper industry, in the manufacture of oils, soap, sugar, rubber, textiles, soda, and other electro-chemical products which now enter into Canadian enterprises.

Architecture, which is closely related to Engineering, embraces, along with its artistic branches, much of Applied Science in its application of building materials and modern building construction as well as Town Planning and Landscape Architecture. The demands and the trend of to-day offer greater opportunities in this direction than heretofore.

Part IV.

Aims of the Faculty.—This Faculty from its early days has attained a unique place in Canada. This has been due to the personnel of the staff and administration, the high character of work and the quality of the graduates. This place must be maintained.

While the number of students enrolled has, apart from the war, almost steadily increased it is believed that the strength of the Faculty lies rather in the quality of its work and its graduates than in the large numbers. This Faculty believes that it is quality and not numbers which makes a University a power in the country.

It is evident, however, that the number of students coming to this Faculty is steadily increasing, and it may be expected to increase for a few years at least, with the technical activities of this country under post-war conditions. It is to be expected that the present numbers of 808 and 807 of enrolments last year and this are in the process of enlargement and that the figure will approach or pass 1,000 next year. This is based upon the view that the present smaller first year represents a temporary check in the increase owing mainly to the greatly increased matriculation requirements through the operation of which many students have been delayed in coming up; those who succeeded in gaining entrance elsewhere probably need not be expected. For future years beyond the immediate post-war period it is difficult to forecast, but with the assured development of the country and the place which this University has acquired in it, it appears that at least 1,000 students must be expected for some time.

But there is a still further consideration. The present day demands are so great for particular instruction in various branches that the Faculty is faced with the constantly increasing difficulty of providing requisite instruction within the four year period. The experience of other Universities is similar and the criticism of to-day is that students are asked to do too much within the time. The complexity and increasing number of subjects in which instruction is sought also complicates this situation and while not encouraging a multiplicity of subjects as do some Universities, it must be recognized that this University must meet the requirements of the country.

It is not a question yet for consideration whether or how soon a fifth year may be found necessary or expedient. There are already various arguments for it as a post-graduate year for specializing and research work. If it were established as a special year for the latter purpose and not as a compulsory year of the course it is not yet certain that there would be a large attendance and the expense would not be large. If, however, the course itself were made five years in length the attendance would be increased by say, 200 yearly, and this greater number would be the measure of the greater expense which, of course, would be very considerable.

In addition the subject of Research must be kept prominently in mind The continuance of the efforts of this Faculty in this direction is essential. So essential is it considered that two years ago a special organization was established within the Faculty called the "School of Engineering Research," through the medium of which this most pressing work could more efficiently be carried on. The success of this arrangement has warranted the course taken and while the large number of students has demanded much greater attention to instruction—which is, of course, the first duty of the staff—it is hoped that with this efficient organization much more research of primary and practical value to the country can be accomplished.

The aims of the Faculty must be directed toward the proper instruction and best efficiency in providing for these large numbers. These students must be given the utmost facilities for their education and for education which they and the trend of national activities demand. The Faculty, too, must do its share, and it must be a large share, in Research of that peculiar type which the various branches of Applied Science in these national activities require and which they expect of a national University.

Requirements of Faculty.—The immediate requirements of the Faculty comprise mainly increased personnel of staff and increased equipment for carrying on work.

It is recognized that with the new responsibilities in its relation to the country's requirements the work of the Faculty must be considerably enlarged. It must provide for some new lines of instruction and it must expand and greatly strengthen certain departments.

It is not necessary to point out the essential requirement that a Faculty of this nature must have its Departments so arranged that they are interdependent; the best efficiency demands an interlocking of the work of various groups or Departments. All the branches of Civil Engineering, for instance, are interlocked; mechanical and electrical depend upon each other; Mining, Metallurgy and Chemical Engineering are so connected with each other, and indeed with Electrical and Mechanical that they cannot be disassociated. Architecture and Civil Engineering are yearly becoming more necessary to each other, especially in industrial fields. In a larger way, Metallurgical and Structural Engineering are interlocked with Architecture. Similarly it may be noted that there is and will continue to be an interlocking between certain portions of the Chemical, Mining, Metallurgical and Surveying Departments of this Faculty with those of the Faculty of Arts and Forestry.

To build up and expand any of these Departments means a corresponding strengthening of its complementary ones and in this way effort and expense is repaid in a general consolidation throughout the whole Faculty.

With these objectives it is considered desirable to somewhat reorganize the Civil Engineering to provide for and strengthen branches now being more emphasized; Municipal Engineering, Sanitation, Town Planning, Highway Engineering, Irrigation and Reclamation are amongst these. In what is now called Mechanical Engineering it is desirable to make a more definite branch, possibly a separate Department of Hydraulic Engineering on account of its great importance. It is desirable to consolidate the Mining and Metallurgical Engineering more completely with Chemical and Electro-Chemical Engineering, and especially to expand Metallurgical work on account of its increasing importance to the country. It is necessary to extend the programme now entered upon for the greatly increased facilities of Electrical Engineering. In Architecture, which is also in process of considerable expansion, it is desirable that greater attention be given to the art side and a much broader course followed in design in its various branches.

For the later development of the Faculty the provision of further buildings will be essential. It is not yet apparent how soon or how great this will be. The immediate situation is being relieved by the new Building for Electrical Engineering and Applied Mechanics. It is most necessary, however, that within a year and a half at the latest, arrangements now in contemplation be carried into effect whereby the Chemical and Mining Building can be devoted wholly to those groups within this Faculty; this involves the removal of the Geological and Mineralogical Departments to other quarters.

The provision for the future, where 1,000 or 1,200 students must continually be provided for, is another matter. Whether a fifth year, creating a total probably in excess of 1,200, is added or not, the provision of a new main building to replace the old Engineering ("School") Building must assuredly be considered in any building programme. Apart from the unsuitability of this old building it is now quite evident that with 1,000 students it will be taxed to its utmost and that any new building to replace it must, in view of a possible total attendance of 1,200 or more, be of a size considerably larger.

Under any circumstances it must be kept in mind that laboratories and equipment must be enlarged and maintained and that laboratories of this character are necessarily very expensive. It must be recognized too that in the very nature of this work adequate salaries and attractive conditions must be offered for staff appointments whereby engineers eminent in their profession can be secured and, above all, retained.

Financial Requirements.—It is not the purpose herein to represent financial requirements in detail. It has been shown that the present cost per student per year is about $350. This figure is the gross cost without deducting fees paid and is based upon the salaries of the current year (plus the bonus which is being paid), which it is considered should become the fixed salary scale; it also includes the small portion which is provided for under Arts appropriations. With due consideration for the increased personnel and equipment which is required, for the reorganization and strengthening of the various Departments as outlined, it is thought that this should be slightly increased. It is, therefore, considered that for the next five years a student attendance of at least 1,000 should be provided for—with possible increases up to 1,200—and that the financial provision should be contemplated on the basis of $380 per student enrolled within the Faculty, of which about $350 would be the net amount required for appropriation direct to this Faculty.

FACULTY OF FORESTRY

The present instruction in this Faculty should be expanded in the following directions—the establishment of: (1) a practice camp and forest experiment station: (2) post-graduate courses leading to the degree of Master of Forestry; (3) a forest ranger course, and (4) a forest products museum. These are necessary for the full rounding out of forestry education in this Province and there is already sufficient demand to justify the University in its inauguration and financial support of them. The objects to be attained by these four lines of development are set forth in the paragraphs below, together with an appendix showing the probable cost to the University.

It is understood, of course, that the cost items given below represent development and are, therefore, in addition to the usual annual budget of $16,000. No estimates have been made of a new building because it is understood that our requirements in this respect are to be presented in a separate memorandum.

1. *A Permanent Practice Camp and Forest Experiment Station.*—In the past we have been dependent upon the generosity of various lumber companies to furnish camps and working fields for the practical instruction of our students. Each camp has been in a new place and thus the cumulative effect of the students' work in the forest has been lost. This method has proved very expensive in time and money and unsatisfactory from the teaching standpoint. Under an arrangement with the Provincial Forestry Branch the practice camp during the present fall was held in the Timagami Forest Reserve. While as yet no definite announcement can be made with regard to the matter, it is expected that the Provincial Government will soon grant the University a large tract of land to be used as a demonstration forest and practice ground for the students of the Faculty of Forestry. There for six weeks at the beginning of the Third Year and for an equal length of time in the early part of their Fourth Year the men will put into practice as far as possible the things they have learned in their forestry text-books.

In the first place, they usually lay off the boundaries of their practice area and divide it into working sections. The students construct a map showing twenty-five or fifty or one hundred foot contour intervals. This, of course, discloses the topography and drainage and thus indicates where the hauling roads and camps may be conveniently located. The next procedure is to make a forest type map which locates, for example, the pure stands of hardwoods and softwoods and the mixed stands of these species. It also shows the distribution of the barrens, burns, swales, and muskegs, if present. The students then estimate the timber on the tract in terms of board feet or cords for each commercial species.

All these data are placed upon the map of the tract so that one may see clearly the topography and drainage, the location of the logging roads and camps, the nature of the forest types and stands and the amount of material that may be cut in the form of saw logs, pulpwood or cordwood. These are about all the facts with regard to the condition of an area that a lumberman needs for the purpose of logging, but the forester must enter into the condition of the future productiveness of the area, for it is his business to maintain the continuity of the crop. In order to find out the condition of the tract from this standpoint, he must do two things: he must determine the amount of material not yet of merchantable size, and having done this he must determine how fast it is growing, or in other words, how much wood in board feet or cords will accumulate each year on the average acre. Therefore, in addition to estimating the amount of material now merchantable on the practice area, the forestry students, by means of the data obtained from regeneration and growth study surveys, make estimates of the probable yield at stated intervals in the future. This involves not only a stock-taking of the young growth, but also the determination of the probable death rate as the stands pass from youth to maturity, and this in turn involves, among other things, the making of forest disease surveys.

In order to keep an area continuously productive, provision must be made for the reproduction of the merchantable species at frequent intervals. The natural mortality is very large in a forest and, therefore, there must be an abundance of young trees coming on if the continuity of production is to be preserved. The natural regeneration of the forest is precarious and uncertain and the necessary conditions are not well understood. Yet the study of such conditions forms an interesting and very important part in the formation of plans for an unending supply of pine saw-logs or spruce pulpwood as the case may be.

There is little need of making plans for the future supply of timber on an area if, as is unfortunately the case in some of our best timbered regions, the area has practically no chance of escaping destructive fires. An essential part of the forestry students' work in the practice camp is to work out the details of an adequate system of fire protection. This includes the locating and building of trails and telephone lines.

The work outlined in the preceding paragraphs covers the main things accomplished by forestry students in a practice camp. In the end they have the knowledge and the data necessary for the making of working plans

for the tract, plans that extend a long way into the future and if carried out by the owners of the land would result in a supply of saw logs or pulpwood so long as the sun shines and the rain falls, for wood is only solidified sunshine and water with a few mineral salts from the soil thrown in for seasoning. The forester uses his intelligence to direct these processes of nature. Under a let-alone, do-nothing policy there is no direction and there will be no future supply—at least sufficient to meet the present demands on the present commercially valuable species.

As indicated above, the present methods of logging do not as a rule result in the continuance of a forest of the same nature as that removed. In fact, the result is usually a forest of much inferior quality from a commercial standpoint. That this is the case on burned areas is fairly well known, but it is not generally realized that the same condition holds for logged-over areas that have not been burned. Therefore, if we would maintain the productivity of our forests in pine and spruce especially, we must not only check the ravages of fire, but we must also, in some way, modify our logging methods so as to insure the natural regeneration of pine and spruce. How this can be done in Canada with Canadian species is not yet known and it can be discovered only by experimenting with different methods of cutting, keeping an accurate record of the conditions before and after the operations and measuring the results in terms of the reproduction and growth of the commercial species. The Provincial Government is much interested in such experimental cutting and logging methods, and it is expected that they will be made under the direction of the Provincial Forester and the staff of the Faculty of Forestry on the tract granted the University.

2. *Graduate Courses in Forestry.*—Within the past year we have had six applications for post-graduate work. The applicants are already engaged in research work in some aspect of forestry or allied subjects and wish too prepare themselves better for carrying on their investigations by taking additional work at the University. It has been necessary to turn these men away because at present there are no courses in the University to meet their particular needs.

To meet this demand and to offer to any forestry graduate an opportunity to specialize in any aspect of his profession it is desired to establish graduate courses leading to a Master's degree in Forestry. The number and nature of the courses will depend upon the demand. At present, for example, there should be graduate courses for specialized training in forest tree diseases. A few years ago the Commission of Conservation wished to engage a specialist to study the balsam heart rot, and it had to go to the United States to get him because there was no available man in Canada with the required training. The Entomological Branch imported a man from the United States to study the spruce budworm, again because we did not have any one with the proper training for the work. The spruce budworm has already killed enormous quantities of pulpwood producing trees in the Maritime Provinces. The toll of fungous diseases in the forest is enormous each year. With growing scarcity and increased cost of timber more attention should and will be given to forest tree diseases. We should train men in our own country for that kind of work and they should have a forestry course for a foundation.

One of the applicants referred to above is making a special study of balsam and another of spruce in relation to the reproduction and growth after logging operations and after fires. Still another is studying the distribution and timber yield of the forests of a province in relation to climatic and soil conditions. They wish to take special courses in methods of field research, silvics, forest ecology and forest geography. We never will know how successfully to modify a forest to meet the needs of man until we better understand how nature makes a forest, and we do not yet know how nature regenerates a pine forest after it has been burned or a spruce forest after logging. Such knowledge is fundamental and can be discovered only by painstaking investigation. The Faculty of Forestry wishes to encourage forest research of this kind by offering courses to prepare men for it.

An increasing number of our graduates are entering the employment of lumber companies, and pulp and paper companies. Some of them have asked for advanced courses in logging, engineering, and wood chemistry. It is for the best interests of forestry to encourage such men to prepare themselves for positions of increased responsibility in large private companies.

The giving of graduate courses will necessitate an increase in the teaching staff. Naturally, such courses should be given by the senior members but they are already overloaded with work.

3. *A Forest Ranger Course.*—Scarcely a week passes that we do not receive an inquiry about a short course in forest surveying, timber estimating, log scaling, the grading of lumber or forest planting from men experienced in work of some kind, but who cannot meet the matriculation requirements or are excluded from a full course in forestry by financial considerations. A dozen or more men in Eastern Canada every year go to forest ranger schools in the United States because they cannot get that type of instruction here. This state of affairs ought

not to exist. Such men should be encouraged by the educational institutions of their own country to improve their condition and to make themselves more useful to their employers.

A ranger course would doubtless be very acceptable to the Provincial Government as part of their plans for the improvement of the administration of the timber limits. The instruction in such a course should be given entirely in the forest. The practice tract, if granted us, would furnish the working field and the practice camp most of the equipment needed. If it were considered desirable to give a six or eight weeks' course each year to a limited number, say, 25 or 30, of the more intelligent and progressive fire rangers and timber scalers, the term would have to fall in the period of the year when their duties in the forest were the least urgent. This would doubtless be in late fall or early spring. They would be on duty in August and September when the practice work for the forestry students is given, and during the best time for the rangers the teaching staff of the forestry school would be on duty in Toronto. So it would probably not be feasible to give the ranger course and the practice camp instruction of the forestry school at the same time. Therefore, another member of the staff would need to be provided to take charge of the ranger course, and when not thus engaged he could give courses to the students at Toronto.

4. *A Forest Products Museum*—The teaching in tree identification, wood identification, timber phsyics, and forest utilization is seriously handicapped from lack of illustrative material. More of such material, however, is on hand and in use than can be properly displayed because of lack of space in the old Botany and Forestry Building. A full exhibit illustrating the uses to which Canadian woods are applied in industry is necessary for the proper presentation of a course in forestry. It is possible that such an exhibit might be developed in the Royal Ontario Museum and thus serve the public as well as the forestry students. It is not generally understood by the public that the forests of Ontario have yielded revenues to the provincial treasury since Confederation four times greater than the revenues from the mines during the same period—and the mines, when they are once exploited, cease to be producers, while the forests, when properly treated, are restorable, and their productiveness goes on and on. The importance of the forests in serving the timber-using industries of the Province would justify the expenditure of considerable sums in a forest products museum.

ESTIMATE FOR THE DEVELOPMENT OF THE FACULTY OF FORESTRY.

I.	(1) New Building	.....
	(2) Practice Camp and demonstration Forest	$10,000
	(3) Equipment for Teaching	3,000
		$13,000
II.	Additional Staff	$7,000
III.	Maintenance and Apparatus	6,000
		$13,000

It is probable that the Provincial Government would construct the buildings for the practice camp.

SCIENTIFIC RESEARCH

Summary

Development of Research in other Countries.

Industrial Development depends upon advances in Pure Science.

Universities rather than Special Institutes must train scientists and deal with fundamental aspects of Scientific Research.

It is special duty of University to select men who show aptitude for scientific investigation, *i.e.*, it should have a well equipped graduate school. For lack of this Canada has lost hitherto many of her most promising men.

This involves library, laboratories, and instructors who have proven themselves investigators. These investigators have enthusiasm and attract the undergraduate into graduate work.

Expense of Graduate School proportionately greater than undergraduate.

Attempt to divide graduate work among several universities unsatisfactory. In a large group men stimulate one another. Concentration in Provincial University should not be interfered with. Toronto has good Libraries —University, Royal Canadian Institute and Academy of Medicine. Work of a high order is already being carried on in University Laboratories, but great development is necessary.

Graduate Students number 150. Good nucleus for Graduate School.

There is a flourishing Research Club. Lists of Research Publications in the Annual Reports of the President, also Series of University of Toronto Studies. The Bulletin of School of Engineering Research and the Canadian Historical Review.

The demands of undergraduate instruction on the staff are too heavy. Additional staff needed to free senior men from routine work.

In the past in the face of serious difficulties arising from insufficient equipment and numerically inadequate staff the University has with some success carried on research, but as the special ward of the State it must be enabled to fulfil in greater measure the services the State has a right to expect from it.

Memorandum on Scientific Research

The experiences of the Great War and after have rendered unnecessary any extensive advocacy of the value of scientific research. It was her encouragement of scientific research that was largely responsible for the remarkable development of Germany's power during the years preceding the War; it was the application of the results of scientific research that contributed largely to the successful conduct of the war; and in the present period of reconstruction research in all fields of science is being demanded as never before.

For the organization and development of scientific activities the British Government has established a Commission on Scientific and Industrial Research and has included in its budget for the current year an appropriation for scientific investigation amounting to $208,000 (as compared with approximately $114,000 for the preceding year), and a further appropriation for scientific and industrial research of over $500,000 (as compared with $243,000 for the preceding year). The United States has a National Research Council for which a permanent home in Washington is now assured. France, in addition to the Department of Scientific, Industrial and Agricultural Research and Inventions attached to the Ministry of Public Instruction, is organizing an Institute of Theoretic and Applied Optics, with a view to building up a great optical industry in the Republic. Italy, giving special attention to the development of industrial scientific research, has already established five Institutions for the scientific investigation of problems connected with as many special industries and is planning for three more similar institutions. And Japan has established an Institution of Physical and Chemical Research with an endowment of approximately $5,000,000.

Such items are a sufficient indication of the rapidly increasing appreciation of the value of scientific investigation to the State. Popular interest is naturally chiefly concerned with the application of the results of scientific investigation to the solution of industrial problems. But it must not be forgotten that the applications of science to any industrial problem rest and must rest upon knowledge of the fundamental scientific principles involved. It is obvious that for the successful application of scientific principles to the solution of industrial problems a body of men, thoroughly trained in the principles of the various sciences, is necessary, and if progress is to be looked for, it is essential that there should also be a body of men devoting themselves to original research in all branches of science. It is to the Universities that the State must look for the supply of these two needs. It may

be that special institutes can be established for the intensive and continuous prosecution of researches having industrial bearings in their intermediate and later stages, but the foundations for the successful development of such institutes must be laid in the Universities. Whether it be in pure Science, Engineering, Agriculture, Forestry, Domestic Science or Medicine, the Provincial University already possesses investigators and co-workers in training, who by their attainments and environment are better fitted and better situated for dealing with the fundamental aspects of scientific research.

The need of adequate facilities for undergraduate instruction in the various sciences is so evident as to require no discussion here. In this Age of Science a knowledge of the fundamental principles of at least one science, and, more especially, a familiarity with the methods of science should be a part of the intellectual equipment of every University graduate. But such training as may be afforded in undergraduate courses must be planned primarily for laying a broad foundation of general culture and must, therefore, be insufficient in the majority of cases, for the proper equipment of men for scientific research. Scientific investigation has become so specialized and at the same time so complex, that it is only men of special training and with special aptitude for the work who will be successful as investigators. It is the duty, therefore, of the University, as distinguished from the College, indeed, it is the most important duty of the University, to select the men who show special aptitude for scientific investigation and to give them the training that will fit them for successful careers in any branch of scientific work.

In other words an essential part of the organization of the University should be an adequately manned and equipped Graduate School. In the past it was the custom for Canadian students desiring post-graduate instruction to go abroad that they might profit by the opportunities for advanced instruction offered by the Universities of Great Britain, Germany or especially the United States, no adequate provision for such instruction being furnished in their home Universities. As a natural result many of the most promising of these young men remained abroad, giving their best to the country of their adoption, to Canada's loss. How great this loss has been cannot be calculated, but it is manifestly a serious detriment to the State when it is deprived of the services of its most promising sons. The Provincial University should be in a position to offer advanced instruction in all departments at least equal to that to be obtained abroad, so that none of its alumni should feel obliged to go elsewhere for any special training that may be desired.

What does this mean? It means a library or libraries in which the student may have access to all the important literature bearing upon his particular topic of study. It means laboratories with ample space for graduate work and fully equipped with all needful apparatus. But above all it means the services of instructors, themselves proven investigators, sufficiently free from the routine of undergraduate teaching to give adequate attention to advanced students.

This is a programme of some magnitude but one that must be carried out if the Province is to keep pace with present-day educational requirements. When the Johns Hopkins University, on its opening in 1876, made graduate work its chief concern a new ideal was established for the Universities of the United States and it was not long before other leading institutions took steps to realize that ideal, with the result that now all the greater American Universities have well organized and well equipped Graduate Schools, in many cases with teachers upon their staffs who devote their entire time to research and to their graduate students who are being trained to become independent research workers. The experiences of the War have given a powerful stimulus to the development of such schools and of the type of work they encourage, and now more than ever before the American Universities are offering facilities for research and graduate work which cannot fail to attract earnest and capable students. Nor is the movement confined to the United States. Since the War, too, several of the British Universities, Edinburgh, London, Dublin, have announced the establishment of Graduate Faculties and are endeavouring to attract students to their graduate courses. Their conservatism has yielded to the demand for men with the advanced training which only an adequate course of graduate instruction can give. It is evident that unless the Provincial University can offer courses of graduate instruction equally attractive with those available in the better Universities of the United States the Province and Canada, as a whole, will continue to lose the services of some of her most promising young men. Nor should the paedogogic value of research work by instructors engaged chiefly in undergraduate be forgotten. It raises the status and authority of the instructor in the eyes of his students, it enables him to bring fresh enthusiasm to his work; and, above all, it stimulates him to be on the look-out for promising students who may be trained to enter the research field. It is from among undergraduates that the research workers of the future will be recruited.

A Graduate School adequately equipped and efficiently staffed calls for an expenditure proportionally much greater than that required for undergraduate work, and the development of more than one such school in this Province, would, at present, entail an unreasonable strain upon its financial resources, unreasonable because this

would result in an unnecessary duplication of an expensive staff and equipment. Nor would an attempt to divide the graduate work among several Universities prove satisfactory, since this also would involve a certain amount of duplication and would prevent the collaborative work, which, under modern conditions, is essential in scientific research. The frequent meeting of Investigators in the more or less closely allied fields of science for the discussion of problems and for the comparison and criticism of results, is a most important factor in research endeavour. The segregation of workers in different localities must necessarily interfere with effective team work.

It is not intended to suggest that research should not be undertaken in Colleges that are not a part of a University having a fully equipped graduate school. Far from it; such independent investigation should be encouraged and supported. Its paedogogic value has already been indicated and the State cannot err in supporting serious and promising research wherever it may be effectively carried on. But this support may be afforded by special individual grants and should in no way interfere with the more extensive development of a Graduate School in the Provincial University. Under the existing conditions as regards population and resources in the Province concentration of effort in one good school is essential and where could that concentration be made with greater propriety than in connection with the Provincial University, especially when in that University there already exists a foundation upon which such a school may readily be built up?

The University of Toronto already possesses a Library of considerably over 150,000 volumes, together with some 50,000 pamphlets, and there are in addition and readily accessible the valuable library of the Royal Canadian Institute, rich in technical periodicals, and that of the Academy of Medicine. A relatively modest increase of the Library appropriation would place the University Library in a position to supply the ordinary demands that may be made upon it in connection with research work.

The Laboratories of the University of Toronto which, not very many years ago, were thought to be ample, now, owing to the increased demands for space for both undergraduate and research work, more especially the latter, are in need of enlargement; and in some departments, indeed, the need for new buildings adapted to modern conditions is urgent, if these departments are to meet the demands that are being made upon them and are to afford facilities equal to those of the Universities of other lands. But in her existing laboratories the University has assets whose value must not be neglected. Work of a high order is being carried on in them, often under great disadvantages, and a concentration of effort upon their extension and equipment, to bring them fully up to present-day requirements would, manifestly, most effectively meet the continually growing demands for higher education and investigation in the Province. If the Provincial University is to fulfil its obligations to the Province and the Dominion, as a whole, it must have an equipment in laboratories and apparatus second to none. In recognition of the demand for advanced courses of instruction, and to encourage and organize graduate study in the University, the Board of Governors in 1909 established a Board of Graduate Studies whose duties were the organization and supervision of graduate instruction and the formulation of requirements for higher degrees (M.A., Ph.D., M.D.). Under the auspices of this Board the number of students pursuing graduate courses in the University rapidly rose until in 1917-18 they numbered 93 and in the current year, when registration is complete, will fall but little, if any, short of 150. In its Board of Graduate Studies the University of Toronto has been the nucleus from which a successful Graduate School may readily be developed. The University has shown an active interest in the development of advanced courses and research, and if certain disabilities that now hamper such work be removed there is ample reason to believe that the University of Toronto will be able to hold its place in the movement towards the development of research that forms so marked a feature in modern education.

The needs of the Library and the Laboratories in this connection have been briefly mentioned, but attention must be especially directed towards the difficulties encountered by the members of the staff who endeavour to carry on research and graduate work. The University of Toronto has always had upon her staff men who were interested in the advancement of knowledge in their particular branch of study, but in the earlier days research work was a matter of individual predilection. To-day conditions have changed; the University staff has been recruited by men who, for the most part have been trained in an atmosphere of research and feel that the conduct of research work is an important part of their duty. Indeed, many have entered academic life because that seemed to offer the greatest opportunities for pursuing a career in investigation. In the olden days the investigator was more or less isolated, he worked alone; to-day he is surrounded by men pursuing similar aims and with similar enthusiasms. So much is that the case that a flourishing Research Club now exists in the University, whereby members of the staff and graduate workers have opportunities for learning what is being done in other lines of research, thus gaining new viewpoints and suggestions of new methods of attack for their own problems. How extensive the productivity of the University in research has been in recent years may be seen in the lists of publications by members of the staff that have formed part of the President's Report for

several years past and in the various publications maintained by the University, such as the *University of Toronto Studies, The Bulletin of the School of Engineering Research* and *The Canadian Historical Review*. A statement of the problems now being investigated will be found in Appendix A of this Report.

But research work can be carried on successfully only if the worker can be assured of sufficient leisure from other duties to devote himself exclusively to his problem during definite periods of his time. To the majority of the members of the staff this leisure is lacking. The demands of undergraduate instruction, participation in the work of numerous committees and executive work connected with the supervision of a large department leave little time for the prosecution of research, and in several departments the instruction of graduate students can be carried on only by the sacrifice of time that would otherwise be devoted to research. The University is understaffed even for the undergraduate work that is demanded of it and as a result graduate work and research suffer. Additional assistants are necessary all along the line that the senior men may be freed from much of the routine work now required of them; indeed, the time has now arrived when senior men who have shown their ability to successfully carry on research work should be enabled to devote all their energies to that work and to the instruction and guidance of graduate students.

The growing demand for fundamental research in all branches of knowledge, and the increasing need for men competent to direct the application of scientific principles to the development of the abundant resources of the Province, are yearly placing additional obligations upon the Provincial University. As the capstone of our educational system it must not only furnish opportunity in its undergraduate courses for a broad and thorough foundation in all departments of knowledge, but it should do its share both by precept and example in adding to the store of knowledge, and it should be in a position to give adequate special training to those graduates who show special aptitude for scientific research. It has endeavoured in the past, with some success, to fulfil these obligations, even in the face of serious difficulties arising from insufficient equipment and especially from a numerically inadequate staff. The Provincial University is the special ward of the State and it is to the State that it must look for the support necessary for the fulfilment of the services the State has a right to expect from it.

APPENDIX A.

Statement of the problems now being investigated in the Laboratories of the University of Toronto.

The following is a statement of the various researches now being carried on in the Laboratories of the University of Toronto, the statement being collated from reports made by the Heads of the Scientific Departments.

Faculty of Arts

Department of Geology

Dean Coleman—*Glaciation and Glacial Deposits in British Columbia.* This is part of a study of glaciation and glacial deposits in Canada. It has important economic bearings on the character of soils and on the occurrence of sand and gravel beds.

Professor Parks—1. *The great Fossil Reptiles of Alberta.* A continuation of studies that have been in progress for some years, and have an interesting bearing on the doctrine of evolution.

2. (With students) *Studies of the Fossil Representatives of certain Invertebrate Types occurring in the Toronto District.* Part of a revision of the Geology and Palaeontology of the District, having bearings upon its stratigraphical relations and its geological history.

Professor MacLean—1. *A Study of Colloidal Clays.* This study bears on the utilization of such clays in the manufacture of brick and porcelain and also considers their relations to landslips and subsidence under heavy loads and in railway cuttings and embankments.

Department of Mineralogy

Professor T. L. Walker—1. *Ores from Cobalt and Boston Creek, Ont.* The identification of associated minerals from these localities with a consideration of the origin and relationships of these materials.

2. *Felspar from Penticton, B.C.* A study of an unusual variety of crystal types of this mineral, which may throw light on the conditions of their formation and those affecting crystallization in igneous magnas.

Professor Parsons—1. *Calcite from Shangoinah Island, Lake Superior.* A study of the type of crystallization of this mineral associated with definite stages of ore deposit.

2. (With Mr. Thomson) *Silver Ores from Silver Islet, Lake Superior.* The application of new methods to the determination of the constituents of mixed ores. The study may throw light upon the genesis of ore deposits.

Department of Mathematics

Professor Fields—*A Basis for the Theory of the Algebraic Ideals.* In this study a new foundation is laid for the study of an extended territory in the theory of the algebraic numbers, New results have been obtained and new lines of investigation are suggested.

Professor Beatty—*Algebraic Theory of Algebraic Functions.*

Department of Chemistry

Professor Lash Miller—1. (with students) *Physico-chemical Studies of the Growth and Death of Micro-organisms.* An application of physico-chemical methods to the study of the conditions determining the growth of yeast cells.

2. (With Professor Burt-Gerrans and student) *On Concentration Changes at the Electrode during Electrolysis.* The experimental testing out of the mathematical theory of the rates at which these changes should take place. It is a continuation of work previously carried out, the results of which have been published in part.

Professor Allan (and students)—*A New synthetic method arising out of the Friedel-Crafts Reaction.* This reaction has been found to yield under varying conditions varying amounts of phythalides; these conditions have been determined and thereby a new method has been obtained for the production of phthalides and, incidentally, other organic compounds. This method is being applied.

Professor Kenrick (with students)—1. *The Scattering of Light by Dust-free Liquids.* The study involves the preparation of dust-free liquids and the determination of the extent of the scattering and polarization of light passing through them under varying conditions of temperature, etc.

2. *The Superheating of Liquids.* A determination of the conditions under which the heating of liquids above their ordinary boiling points without ebullition may occur.

3. *The Vapours of Liquids containing two Volatile Components.* The determination of the composition and pressures of the vapours of such liquids by new apparatus devised for the purpose. The study is of importance from the standpoint of chemical thermodynamics.

4. *Solubility and Crystal-habit.* A study of the relative solubility of the different faces of a crystal which may throw light on the question of crystal formation.

Professor Ferguson (with students)—1. *The Reaction between Iron, Hydrogen and Steam at High Temperatures.* A study of the composition and chemical nature of the various oxides of Iron, which may have bearings on the smelting of iron ores, on the development of rust-proof coatings and on the preparation of Hydrogen by the action of iron on steam.

2. *The Permeability of Silica-glass to Hydrogen.* A study of the occurrence of such permeability at high temperatures, to be followed, if the phenomenon is confirmed, by a study of its nature, whether it is mechanical or chemical. Of importance in connection with the construction of Hydrogen containers and also of great theoretical interest.

3. *The State of Combination of the Water of Hydration in Minerals.* Apparatus is being devised to determine this question in the cases of a hydrated zinc phosphate and other minerals. The study bears upon the conditions under which mineral deposits have been formed.

Professor Burt-Gerrans (with students)—1. *The Regulation of the Current in Electric Furnace Arcs.* A continuation of observations on direct current arcs made by a new device; it is intended to extend the observations to alternating currents. The observations bear upon the proper regulation of the currents for the greatest efficiency of such arcs.

2. *Various Problems in Electro-chemistry*, such as the recovery of precious metals from the anode deposits of a nickle refinery; the electrolytic preparation of iodoform; the effects of modifications of the composition of the paste used in "forming" storage-battery plates; the standardization of the chemical treatment of separators for storage-battery plates.

Professor Rogers (with students)—*Various Problems in analytical chemistry*, such as the devising of satisfactory methods for the determination of the copper content of white metals and babbits; for the rapid and accurate estimation in metallurgical processes; of the nitrate content of Chili nitre; and of zinc in the tailings from concentrators.

Department of Physics

Professor McLennan (with students)—1. *Various Problems in Spectroscopy*, such as the carrying of the series spectra of various elements into the extreme ultraviolet portion of the spectrum; the identification of the series spectra of Lead, Tin and Thallium; the relation between the series spectrum of Mercury and the configuration of the electron systems in its atoms; the determination of the frequency differences of the doublet lines of Hydrogen. All these problems bear on the question of the constitution of the atoms of the elements.

2. *On the Production of Nascent Hydrogen by the Action of Light from an Electric Arc in Helium on a Stream of Hydrogen Gas.* The object of the study is to determine the value of light waves of short length as a catalytic agent.

3. *On the Disintegration of the Atoms of Oxygen by Cathode and Gamma Rays from Radium.* The object of this study is to obtain a basis for the development of a method for tapping the stores of energy known to be stored up in the atoms of the elements.

4. *A Study of the Magnetic properties of the Heusler Alloys and of varying mixtures of their constituents (aluminum, manganese and copper).* The results should have a direct bearing on the solution of the general problems of ferromagnetism.

5. *A Study of the Pressures generated by explosions of mixtures of various gases with air and with each other, including mixtures of the various constituents of paraffin oils with air.* A continuation of work begun last year and involving an inquiry as to whether paraffin oils may be conserved by the use of the products of their fractional distillation.

6. *The Electric and Thermal Properties of fused Mixtures of Mica and Copper and other Elements.* A continuation of work begun last year.

7. (With Mr. Dobson. Director of the Ontario Hydro-electric Laboratory, Toronto). *The Behaviour of Helium-filled Incandescent Lamps and of Helium-enclosed Arc Lamps.* To determine if Helium can with advantage be employed in the construction of illuminating agents.

8. *The Liquefaction of Helium.* If this can be accomplished it will furnish a means of obtaining temperatures approaching the absolute zero and so yield opportunity for studying the properties of materials at extremely low temperatures.

Professor Burton (with students)—*Various Problems connected with the Physical Properties of Colloids*, such as the coagulation of colloids by electrolytes; the laws of concentration of colloidal particles in suspension; and the determination of the absolute mass of colloidal particles and of the electric change borne by them. A thorough knowledge of the physical properties of colloids will contribute to the solution of many physiological problems as well as of problems connected with such industries as tanning, rubber making, ceramics, etc.

Professor Gilchrist (with Miss McCullough)—1. *A Study of the Relation of the Intensity and Duration of an Electric Stimulus to the Effect produced by it in Muscle Contraction.* An attempt to obtain a basis for the standardization of electric currents employed for therapeutic purposes.

2. *An Experimental Testing of the Mathematical Theory of Radiation.*

3. *A Study of the Width of the X-ray Spectrum Lines and the Effect of the Temperature of the Target on the Lines.*

Professor Satterly—1. *The Advance of the Ripple which appears in front of an Ascending Column of liquid.* A study of the formation and advance of the ripple in relation to the velocity and nature of the liquid, the diameter and nature of the tube, etc. The work may have application to the flotation process of ore separation.

2. *Determinations of Radio-activity in Samples of Minerals, Rocks and Water, brought from time to time to the Laboratory.*

Professor McTaggart—*A Study of the Electric Effects at the Surface of Aqueous Solutions in contact with Air or any Gas.* The work has a bearing on such questions as the purification of a water supply, the production of stable suspension in liquids, the action of mordants in dyeing, etc.

Department of Astronomy

Professor Chant—1. *The Measurement of the Radial Velocities of Stars from Photographs taken with the Objective Prism.* The use of a prism placed over the objective of a telescope enables spectrograms of a number of stars to be taken simultaneously and quickly. Measurements of these plates give information as to the velocity with which a star is approaching or receding from the Sun.

2. *A Study of the Relation between the Velocity of Light in an Electrolyte and a Current traversing it.* The investigation bears directly on the fundamental nature of light and of the electric current. It has been on hand for some time but its progress has been hindered by other duties.

Department of Biology

Professor Bensley—*A Research Index of Literature on the Comparative Anatomy of the Rabbit and the wild Leporidae.*

Professor E. M. Walker—1. *The Anatomy and Development of a recently discovered insect, Grylloblatta campodei formis, which represents a new order.* It is of special interest as being one of the most primitive of living insects.

2. *A Monograph of the Somatochlora group of Dragonflies*, a dominant group in Northern Canada.

3. *A Study of certain Flies, whose larvae sometimes occur in human subcutaneous tissues.*

Professor Piersol—*An embryological study of the aberrant Salamander Plethodon erythronotus.* A study of the development of a salamander with terrestrial ova.

Professor Huntsman—1. *The Faunal Characteristics of the Bay of Fundy.* The fauna of the Bay is being studied in relation to the peculiar conditions presented by its waters.

2. (With Mr. Leim)—*The Life History of the Shad.*

3. (With Mr. Leim)—*A Systematic study of the Decapod Crustacea of the Bay of Fundy.*

4. (With Miss Chant)—*The Life History of the Smelt.*

All these studies have important bearings on fishery problems.

Professor Clemens—1. *Investigation of the Life History and Growth of the Herring in Lake Erie.*

2. *A Study of the Food of the Trout.*

3. *The Rate of Growth of Pickerel.*

4. *A Study of Classification and Distribution of Mayflies.*

These are all studies having a bearing upon problems connected with our Canadian fresh-water fisheries.

Professor Coventry—*Studies on the Experimental Modifications of Growth.* A study on the growth interrelations of organs and the effects of disturbances of these.

Dr. MacArthur—*Experiments on the Inheritance of Sex Dimorphism.* A study of the inheritance of certain structural characters in fishes; has bearings on the principles of animal breeding.

Dr. Baillie—*A Study of the Variation of the Composition of the Blood of the Rabbit in connection with Transplantation Operations.* This study is expected to throw light on the interaction of organs.

Dr. Craigie—*A Study of the Relative Vascularity of the Brain Cortex in the Rat.* This study bears on the question of the relation of the blood supply to functional activity in the brain.

Department of Botany

Professor Faull—1. *Studies on the Life Histories of certain Fungi.* Mainly of purely scientific interest forming a contribution to the fundamental understanding of the fungi.

2. *An Investigation of the Needle Blight of White Pine.* This investigation has been in progress during the last three years and has revealed the cause of the disease, its main course and the age of the timber most susceptible. It has an immediate bearing on the steps to be taken to combat the disease, of which series outbreaks have occured in the forested areas of Ontario.

3. *The Polyporaceae of Ontario*—A monographic study of a group of fungi, having important relations to timber diseases.

4. *Studies of the Diseases of Canadian timber trees.* Data have been accumulated especially in regard to the diseases of pines, balsams and other coniferous species.

5. (with Mr. A. B. Jackson)—*The strains of Wheat Rust in Ontario.* It has been shown that different strains of rust occur and that wheats immune to one strain may be seriously affected by another. The object is to determine what strains occur in Ontario.

6. (with A. B. Jackson and H. D. Brown)—*Studies on Fusarium.* Studies of species of fungi that attack cucumbers and asters. The purely scientific side of the problem is engaging attention at present, but it is hoped later that the question of resistance may be taken up.

7. (with E. H. Moss)—1. *Life History Studies on Coprinus.* The object of these studies is to throw light from the developmental standpoint on the classification and relationship of the gilled fungi.

8. *Studies on Crown Gall and Canker of the Maple and Poplar.* These diseases produce malformations of our timber and ornamental trees and the studies are being made with a view to determine the causes of these malformations and the mode in which they are transmitted.

9. (with A. R. Walker)—*A Study of Keithia thujina.* A study of a fungus which affects cedar saplings with a view to the determination of its systematic position, its life-history, its mode of infection and virulence.

10. (with Miss M. E. Currie)—*Studies on the Slime Molds.* A systematic study of the Slime Molds was completed last year and Miss Currie is now extending her studies to their physiological behaviour, especially their nutrition and their parasitism.

11. (with Miss C. W. Fritz)—*A Study of the Cultural Diagnostic Characters of certain Timber-destroying Fungi.* The identification of the fungi that are the cause of heart-rot in trees is beset with difficulties and this study is an endeavour to discover specific diagnostic features for them by applying to them the cultural methods made use of in the study of micro-organisms. This research is a continuation of work begun last year.

Mr. G. H. Duff—1. *Studies of Life Histories in the Geoglossaceae.* These studies have revealed such an extensive and close parallel in the developmental histories of these fungi to those seen in lichens that an essentially new theory of general relationship between the two groups can now be formulated.

2. *Investigations on the Fundamental Phenomena of Growth.* A technique is being devised which will permit of accurate analysis of the growth phenomena of plants with particular relation to their chemical and time relations. It is expected that the results will be of interest in connection with a recent theory of the chemical constitution of protoplasm.

Professor R. B. Thompson (with assistants)—1. *Studies on the Development and Distribution of Resin Canals in the Conifers.* These are studies on the preservative tissues of cone-bearing plants.

2. (with Assistants)—*Studies on the Minute Structure of Woody Conducting Tissues.* Important in their relation to timber physics, wood identification and wood preservation.

3. (with Miss Haining)—*A Study of the Reproductive Processes in Local Calkin-bearing Plants.* Has bearing upon the inter-relationship and classification of the lower seed-bearing plants.

4. (with Miss Pelluet)—*A Comparative Study of Fossil Canadian Representatives of the Lower Vascular Seed Plants.* Such studies are necessary to complete the work that is being carried on with recent forms.

5. (with Assistants)—*Studies in Plant Breeding.* These studies bear on the question of heredity in plants and on the principles underlying plant improvement.

Mr. H. B. Sifton—1. *A Study of the Structure and Effects of Poisonous Weed Seeds.* The object of the study is to obtain data for the correct identification of the poisonous weed seeds named in the "Feeding Stuffs Act" of 1920; and also to determine the action of the various seeds. The latter part of the work is being carried on in coöperation with the Department of Pharmacology.

2. *The Seed Coats and Embryo Characteristics in connection with Delayed Germination.* A study in the physiology of seed Germination.

Department of Psychology

Professor Bott—1. *Measurement of the Speed of Simplex Movements of the Upper Extremity by Opposed Muscle Groups.* This study has a direct application to the problems of movement efficiency in industries.

2. *Measurement of the Illusion of Parallel Lines in Visual Perception.* Has a bearing upon the laws of perspective.

3. (with the members of the staff)—*An Application of Group Intelligence Tests to 500 Arts Students of the First and Second Years.* The results of the tests will be compared with the ranking of the students according to their final standing for the year's work and may indicate a method for supplementing the examination method of promoting and admitting students, especially in doubtful cases.

Faculty of Medicine

Department of Anatomy

Professor McMurrich—1. *The ultimate embryonic origin of the tissues of the Vertebrate Fore-limb.* A study begun several years ago but interrupted by other duties. It promises to throw light on certain obscure problems in the morphology of the vertebrate limb as well as on other more general problems of Vertebrate Morphology

2. *The Anatomical Work of Leonardo da Vinci in its relation to the Scientific Renaissance of the fifteenth and sixteenth centuries.* A study in the history of Anatomy.

3. (with Dr. Herbert B. Willson)—*The Arrangement and Plan of the Terminal Branches of the Respiratory Bronchi in the Mammalian Lung.* The object of this study is to clear up certain differences of opinion that exist as to this matter and so obtain a more accurate knowledge of the anatomical conditions under which the respiratory exchange of gases takes place.

Dr. Watt—*The Precipitction of lime salts in colloid media.* An attempt to obtain some definite knowledge of the physical and chemical conditions which influence the deposit of lime salts in animal tissues and so throw light on the phenomena of bone-formation and calcification.

Departments of Physiology

Professor Macleod (with assistants)—*The Physiological effects of decreased Oxygen.* A study of the action of decreased oxygen in its effects on the respiration, on the reaction and gases of the blood and on blood pressure. Results have been obtained indicating the method in which oxygen should be administered in such diseases as pneumonia.

2. *A Study of Surgical Shock.* To determine whether the production of an organic acid (lactic) in the blood and tissues could be the cause of this form of shock. The results were negative, indicating that the suggested treatment of persons in shock by the administration of alkali is not rational.

3. (with Miss Lang)—*A comparison of the Excitability of Muscle with and without its Nerves.* It is expected that this study will throw some light upon the supposed "trophic" influence of nerves.

4. (with Dr. Prendergast)—*The Glycogen Content of the Heart and other Muscles.* Previous observations had shown that the heart always has an abundance of glycogen even when other organs are poor in it. The present research was to discover whether starvation would have the same effect on the glycogen stores of the heart as on that of other organs. The results showed that the heart continued to retain its supply in this condition.

5. (with Dr. Fidlar)—*Have the rare gases of the Atmosphere any Physiological Effect?* A study of the respiration, energy exchange and body temperature of animals living in mixtures of pure oxygen and nitrogen or in air containing excesses or deficiencies of the various rarer gases (helium, etc.). The great technical difficulties encountered have been overcome, and it is hoped that definite results on the main problem will soon be forthcoming.

Dr. Olmsted—*Regeneration in Nerves with especial regard to the Effect on Sense Organs.* A continuation of work already started looking to the investigation of the restoration of function in the sense organs after destruction of their nerves and the condition of the sense-organs during the ensuing changes.

Dr. N. B. Taylor—1. *The measurement of Blood-flow in the Hands and feet in Relation to certain Therapeutic Measures.* A study of the effect of massage, heat and cold, and muscular exercise on the blood-flow, to determine the value of such measures in augmenting the circulation in a given part of the body.

2. *Investigation of the Spread of Artificial Heat in Animal Tissues.* A study of the degree to which heat spreads from the superficial to the deep tissues. As heat is employed as a therapeutic agent it is of importance to know to what extent it penetrates animal tissues.

Department of Pharmacology

Professor Henderson—*The Action of Atropine.* The object of this study is to standardize the dose necessary for definite effects.

Professor Sharpe—*An investigation of the toxic principles of certain weed seeds.* Poisonous seeds have been found in mill and elevator waste and as food for stock and the study is concerned with the indentification of these seeds and the nature of their effect.

Department of Biochemistry

The various investigations now under way in this Department centre around one general problem, that of the chemical structure of the protein molecule. A knowledge of this is fundamental for the understanding of the chemistry of vital processes.

The individual problems now being studied are as follows:

Professor Hunter—1. *A Study of the Action of Trypsin on Casein.* The application of a method not hitherto employed for this purpose in the determination of the order and rate at which the various amino acids are liberated from the protein molecule.

2. (with Mr. N. S. Clark)—*A Study of the Trypic Digestion of Edestin.* With the same object as the preceding study.

3. (with Mr. Morrell)—*An Examination of the Arginase Method of determining Arginine in Protein.* An application of this method with the same object as the preceding studies.

4. (with Mr. Green)—*A Study of the Rate of Formation of definite Peptones in Protein Hydrolysis.* With the object of determining more accurately those peptones which have a shock producing effect and the stage at which they produce their maximum effect.

5. (with Mr. Urquhart)—*A Study of the Action of Paratyphoid Bacilli in producing Urocanic Acid* from Hestidine. A study of the production of unsaturated acids by the bacterial decomposition of amino acids

6. (with Mr. Borsook)—*The separation and Characterization of Proteoses formed during the Peptic Digestion of Gelatin and other Proteins.*

Mr. G. C. Robinson—*A Study of the Action of the Acetone-producing organism upon Proteins.*

Mr. G. H. Berkeley—*A Study of the Biochemistry of the Grey Mold Botrytis.*

Department of Pathological Chemistry

Professor Harding (with Dr. Hart)—1. *The Respiratory Exchange in Whooping Cough in Children.* An attempt to determine the compensatory mechanism that must act in the body during the spasm, and so acquire means for calling it more rapidly and effectively into play.

2. (with Mr. Potter)—*The Excretion of Acetone Bodies in Pregnancy.* A continuation of earlier work that indicated disturbances in the fats of the body as the cause of vomiting in pregnancy. The formation of acetone bodies is an indication of fat disturbance and the present study is an attempt to determine the extent of the disturbance.

3. (with Mr. Gaebler)—*The Investigation of some Conditions of Cretinuria.* Previous work had shown that a portion of the creatine formed in the body was formed by the body cells independently of the nature of the food. This study is to determine whether this creatine factor can be controlled and whether the excretion of creatine in pathological conditions may be taken as a guide in diagnosis and prognosis.

Department of Pathology

Professor Mackenzie (with Dr. Warner)—*A Research upon the Changes in the Adrenal Glands in various Pathological Conditions.* An attempt to establish a relationship between acute infectious conditions and microscopic changes in the glands, and through this to contribute to a determination of the exact function of the glands.

Professor Maitland (with Dr. Cameron)—1. *A Research into the Characters of the Bacillus of Influenza.* A study of a number of different strains of the influenza baccillus to determine the causes of the variations it exhibits and the probable relationship of the organism to epidemic influenza.

2. (with Miss Cowan)—*A Research into the Antigenic Characters of Pathogenic Streptococci.* A study of the immunity reaction of a large number of strains of streptococci in an attempt to determine the relationships of individual strains to endocarditis and to each other.

Dr. H. S. Thomson (with Miss Fraser)—*Studies on a number of problems bearing upon practical Dentistry* such as the permeability to certain bacteria of the various filling materials; the germicidal properties of these materials; the analyses of commercial dentifrices; the preparation of vaccines for use in dentistry; and the effects of diet on degenerative changes in the tooth structure and in the structures of the oral cavity. These studies are being carried on under a grant from the Canadian Oral Prophylactic Association.

Department of Zymology

Professor Speakman—*A Study of the ferments produced by the Acetone Organism.* Certain of these ferments have the power of converting complex carbohydrates into sugar and their study has interest not only from the theoretical standpoint but because it may assist in the research for a bacterial ferment that will convert cellulose into sugar.

2. (with Dr. Wynne)—*A Quantitative Study of the Results of Starch Fermentation in Acid Media.* It has previously been shown that the addition of certain organic acids to a medium in which starch is undergoing fermentation results in a portion at least of acid being converted into the corresponding alcohol. The study is an attempt to collect accurate quantitative date on this reaction.

3. (with Mr. Robinson and Mr. Berkeley)—*A Study of the constituents of beet-root molasses and sulphite liquor, in their relation to the fermentation of these liquids.* The study includes a determination of the alcohol yields from the different sugars present, the effects of the mineral acids occurring in the liquids and the amount of available nitrogenous compounds present. It is hoped that the results obtained may lead to a better utilization of these waste products from important industries in the production of industrial alcohol.

Department of Hygiene

Professor Fitzgerald—1. *An Investigation of Diphtheria Mortality in Ontario.* A statistical study having for its object the determination of the factors which contribute to the present diphtheria mortality rate. It is hoped that the study will lead to the inauguration of an educational campaign throughout the Province whereby a reduction of the present excessive number of preventable diphtheria deaths may result.

2. (with Mr. Maloney and Mr. Hanna)—*A Study of Diphtheria Toxin.* The properties and nature of the diphtheria toxin are being studied and the relation of the toxin to those produced by other bacteria. The study also includes an investigation of the conditions under which a supply of potent toxin may be prepared.

Professor Defries—*A Study of Small-pox Vaccine.* A study of the effects of an increase of temperature and the use of certain new antiseptics on the determination of Vaccine virus. The study has already led to the introduction of certain improvements in the methods used in the production of the vaccine in the Connaught Antitoxin Laboratories.

Dr. Caulfield (with Dr. Hodge and Dr. Fraser)—*Investigations on the Lower Respiratory System.* These investigations include (1) the testing of the value of three biological tests in the early detection of tuberculosis in determining the proper curative adjustment of work and rest and in distinguishing "quiescent" from "cured" cases; (2) a study of the proteins and pollens that may be the cause of such non-infectious diseases as asthma and hay fever and a determination of the correlation that exists between these diseases and the phenomena of anaphylaxis; (3) a study of the effect of high pressure within the chest on the absorption of fluids from the bronchi and the pleural space.

Department of Medicine

Professor Graham and members of staff—*An Investigation of the Methods of Physical Diagnosis with Special Reference to Diseases of the Chest and Abdomen.* An inquiry into such problems as the conduction of sound in the chest and the physics of percussion with the object of securing a better foundation for the interpretation of the findings obtained by physical diagnosis.

Dr. Detweiler and assistants—*Researches in Internal Medicine with special Reference to Infectious Diseases.* Several problems that come under this heading are being investigated, such as (1) the experimental pathology

of pneumonia, to clear up obscure points as to the manner of infection, especially in lobar pneumonia; (2) a comparison of the value of Rosenow blood-cultures and those obtained by other methods, to determine the most accurate available method for ascertaining the presence of bacteria in the blood-stream; (3) the prevalence of Syphilis as indicated by the Wassermann reaction, a statistical study of the records of the syphilis clinic; (4) the Wassermann test in pregnancy and pneumonia, a study of the probability that certain cases of pneumonia and pregnancy yield positive results to this test, which has hitherto been regarded as specific for syphilis.

Dr. W. R. Campbell with Dr. Gallie and assistants—*Researches in Internal Medicine with special Reference to Diseases of Metabolism and Diseases of the Kidneys.* Under this heading the following problems are being investigated: (1) a study of methods of treatment other than surgical on goitres of the toxic variety; (2) a study of kidney efficiency in aged persons, to clear up the difficulty in distinguishing in such persons symptoms due to kidney disease from those due to the natural decline of physiological activity in the later years of life; (3) (with Dr. Gallie) An Experimental Study of the production of the fatal condition known as Calculuc Anuria in the hope that light may be thrown upon its causation and treatment; (4) a study of substances occurring in certain kidney diseases which interfere with the accurate estimation of creatinine excretion; (5) a study of certain features of a type of diabetes known as Renal Diabetes; (6) a study of changes in the blood pigment produced by certain pathogenic bacteria; (7) an investigation of the solubility of carbon dioxide in solutions of comparatively low hydrogen concentration, a question that has a bearing on the general problems of metabolism.

Dr. A. A. Fletcher and assistants—*Researches in Internal Medicine with Special Reference to Diseases of the Joints.* These researches include (1) a study of the various types of arthritis; (2) an investigation into the cause and treatment of disturbances of sugar metabolism in chronic arthritis; (3) the experimental production of disturbances in sugar metabolism by diets deficient in certain food factors.

Dr. Oille with Dr. Jamieson—*Researches in Internal Medicine with special Reference to Diseases of the Cardio-Vascular System.* These include (1) the determination by clinical and X-ray examinations of the relationship of the heart impulse as seen on the chest wall to the left border of the heart, a point of importance in physical diagnosis; (2) in inquiry into the discrepancies between experimental and pathological lesions of the conducting tissues of the heart shown by electrocardiograms.

Dr. W. F. McPhedran—*A Study on the Dietetic Treatment of Pneumonia.*

Dr. W. A. Dixon—*The Classification and Culture of various organisms other than Bacteria, causing Diseases of the Skin.*

Dr. Alan Brown (with assistants)—*Researches in Internal Medicine with Special Reference to the Diseases of Children.* These include (1) a continuation of studies on the causation on rickets and tetany; (2) a study of the chemistry of the blood and urine in nephritics in children. An attempt to classify the varieties of nephritis in children; (3) a study of sugar-tolerance in children; (4) a study of the blood volume in infancy; (5) further studies (bacteriological) in infectious diarrhoea; (6) studies of the metabolism in cases of chronic intestinal indigestion occurring in older children; (7) studies of the metabolism in a case of epilepsy with an associated intestinal intoxication; (8) a study of the malnutrition existing in children of school age, this investigation being made possible by a private contribution.

In addition opportunities offered by the Out-patients Department for the study of minor signs and symptoms of disease are being utilized by members of the Out-patient Staff.

Department of Surgery

Dr. Gallie—(1) *A Study of the Clinical Problems of Inflammation and Repair in Tendon and Fascia*, including a study of the changes in these tissues after transplantation.

2. (with Dr. Janes)—A Study of Problems in the Surgery of the Testes including observations on (1) the effect on the testes of the severence of the main duct and the main artery; (2) the possibility of the restoration of function after such procedure; (3) the functional activities of testes transplanted into abdominal positions. The investigation is of importance in connection with the surgical treatment of children with abnormal development of the testes.

Dr. R. R. Graham (with Dr. Detweiler)—*A Study of Infection in the Intestinal Tract with Reference to its Causation and to the Disturbances in other Parts of the Body which result from it.*

Dr. L. B. Robertson—1. *A Research into the Causes of Fatal Poisoning which follow Severe Burns in Infants and Young Children.*

2. *A Research into the Poisons produced in certain Cases of Intestinal Obstruction (Intussusception).* It is hoped that these last three researches will yield results indicating the methods of treatment to be adopted to diminish the mortality in such cases.

Department of Obstetrics and Gynaecology

Dr. W. A. Scott (with Dr. Cosby)—*A Study of the Blood Supply of the Pelvic Organs.* To obtain light on the causes of excessive bleeding that may occur from these organs in females.

FACULTY OF ENGINEERING

Department of Applied Chemistry

Professor Bain—1. *The Decomposition of Wood at Low Temperatures.* An inquiry into the possibility of modifying the distillation process and so obtaining some of the products in a purer state. The study bears indirectly upon the conservation of our forests by improving the utilization of them.

2. *An Investigation into a New Method of producing Sodium Sulphite,* with the object of discovering a method of preparing this substance, used in large quantities in the paper industry, from materials readily accessible in eastern Canada.

3. *An Inquiry into a Method for Separating the Potassium Carbonate occurring in Wood Ashes.* An attempt to work out a method of making available the potash contained in wood-ashes, in view of the fact that no considerable source for potash has yet been discovered in Canada.

Professor Boswell with assistants—1. *The Direct Determination of Oxygen in Organic Compounds.* A continuation of work previously done looking to a simplification of the procedure and an extension of its applicability.

2. *The Determination of Magnesium.* It was found that the determination of Magnesium by the ordinary method was unreliable in the presence of potassium. The conditions determining the inaccuracy were made out and the nature of the reaction that vitiates the result is being investigated.

3. *The Production of Absolute Formic Acid on a Large Scale.*

4. *A Study of the Constitution of Rubber.* A new formula for the constitution of rubber has been worked out and experimental evidence is being gathered to either confirm or refute it. Important in connection with the synthesis of rubber.

5. *A Study of the Mechanism of Catalysis.* An attempt to throw light on the mechanism by which the velocities of certain reactions are increased by the mere presence of a substance, which, itself, in many cases, remains unchanged. This phenomenon has assumed great importance in both pure and industrial chemistry.

6. *A Quantitative Study of the Complete Carbon Metabolism of the Oat Plant up to the Seedling Stage.* A study of the chemical processes concerned in plant growth.

7. Various problems which, together with some of those mentioned above, bear on the Theory of Solution have also been studied. These are mainly of scientific interest but have given results which make possible an increased yield in certain industrial processes, such as the manufacture of carbolic and oxalic acids.

Professor Ardagh—1. *A Research into the Cause of Activation of Carbon.* An effort to render wood charcoal of use in removing the colouring substances from sugar solutions, petroleum products, etc., for which large quantities of bone-black and Fuller's Earth are now imported.

2. *A Research to Discover a Method of determining Sulphate accurately in the presence of Potassium.* Such a method, if found, would be of great value in the valuation of fertilizers.

Department of Electrical Engineering

Professor Rosebrugh with assistants—*The Devising and Application of Methods for the exact Measurement of signals received in Wireless Telegraphy.* The method devised was independently developed by the engineers of the Marconi Co. and a study of its application is now being made. It is hoped that the study will yield better data for planning overhead radio communication in Canada.

Professor Price and Mr. Duff—1. *An Investigation of the Causes of Inaccuracies in Current Transformers.* The transformers are used for measuring in power lines and circuits. It is hoped that the study will make possible the construction of better transformers.

2. *A new Device for Exact Measurement in Alternating Current Circuits.*

3. *A New and Simple Plan for Automatically holding constant the frequency of Alternating Current Circuits.* Of value in research laboratories with probable application in power plants.

4. *A New Type of Electric Driving Mechanism for Astronomical Clocks.*

Department of Metallurgy

Professor Guess with students—1. ***The Possibility of the Recovery of Silver from the Residues of Zinc Retorts.***

2. ***A Determination of the conditions of Roasting of a Sulphide Ore that will yield sufficient sulphurous Acid Gas for the Manufacture of Sulphuric Acid.***

3. ***The value of the "Caron Roast" in the Recovery of Silver from Ores containing considerable Manganese.***

These are problems assigned to students for their graduation theses

Department of Mining Engineering

Professor Haultain (with Mr. Dyer)—1. ***The Analysis of Ball-paths in Ball Mills by Photography.*** A study bearing on the variations which occur in the capacity and efficiency of these mills used in the crushing of ore.

2. (with assistants)—***On the Refining of Graphite.*** A continuation of work on this problem, the present work being concerned with the separation of the finer sizes of Graphite from Canadian Ores.

3. (with assistants)—***Studies of the Concentration of ores by Flotation and the Hydraulic Classification of crushed ore.*** Valuable results have been obtained in the concentration by mechanical means of the low grade ores of the Sudbury district.

Mr. King—1. ***On the Assay of Platinum.*** A research into methods for obtaining an accurate assay of platinum

2. ***On the Assay of Graphite.*** An attempt to devise more rapid and simpler methods the determination of graphite in its ores

Mr. Dyer—***An Apparatus for the rapid and accurate determination of Magnetic Minerals in Ore Samples.*** Such an apparatus is needed for the determination of the magnetic contents of the low grade magnetic deposits of Ontario.

Department of Applied Mechanics

Professor Gillespie—1. ***An Experimental Investigation into the Strength and Behaviour of Reinforced Gypsum Slabs for Roof Construction.***

2. ***An Experimental Investigation into the Effect of varying the proportions of the Various Ingredients of which Portland Cement Concrete is made.***

Professor Young—***An Experimental Investigation into the Resistance of Reinforced Concrete Beams to Torsion or Twisting.***

Department of Surveying and Geodesy

Professor Stewart—***A Determination of the Effect of Meteorological Conditions on Latitude Observations.*** A study of the effect of meteorological changes in altering atmospheric refraction and so producing discrepancies in determinations of latitude

Department of Thermodynamics

Professor Angus—1. ***A Study of the Insulating values of different Building Materials.***

2. ***A Study of the Efficiency of House Heating Boilers and the best Methods of Operating them.***

Professor Parkin—1. ***An Investigation of Air Speed Indicators for Wind Channels.***

2. ***The Effect of Wing Tip form with constant Aspect Ratio and the (a) Aerofoil on the Aerodynamical Characteristics of the Section.*** A study of the relative merits of different wing tips now used in aeroplanes with a view to developing other forms of higher efficiency

Faculty of Domestic Science

Department of Household Science

Professor Baird and assistants—1. ***On the Extent to which Textile Fabrics are being misbranded in Stores and on the extent to which Silk Fabrics are adulterated with injurious chemicals.***

2. ***On Malnutrition in Children.*** A study of the dietetic causes of malnutrition in children as part of a larger plan for the investigation of malnutrition.

3. ***On the Use and Dietetic Value of so-called Egg Substitutes***

Department of Food Chemistry

Professor Benson and assistants—1. ***A Study of the Composition of Infusions of Tea and Coffee.*** An examination of the actual amounts of stimulant substances and astringents in infusions of tea and coffee prepared in various ways.

2. ***On the changes occurring in the Flesh of Fishes as the result of keeping and of Cold Storage.*** This study is being carried on in co-operation with the Biological Board of Canada.

3. ***Studies on the Normal Basal Metabolism of Women of different ages.***

Faculty of Forestry

Professor Howe—*An Investigation of the unburned, cut-over Pulpwood Lands, with special Reference to the Regeneration and Rate of Growth of Balsam Fir and Spruce in certain Districts in New Brunswick, Ontario and Quebec.* This investigation includes the making of surveys of forest regeneration and growth on permanent sample plots and observations in experimental cutting areas to determine the most profitable logging methods which will yet insure another growth of spruce or balsam on the same ground.

Dr. White—*A Study of the Present Condition of the much burned old Pineries of Ontario with special Reference to the regeneration of White Pine.* In this investigation some 75,000 acres in Central Ontario have been covered and it will be continued on representative areas throughout the Province.

Professor W. N. Millar—1. *A Study of the Cypress Hills Forest Reserve.* An investigation of the amount of timber present and of its annual rate of increase with the object of obtaining data for a plan of cutting and marketing that will render the Reserve continuously productive.

2. *A Study looking to the Replacement of Pine by Natural Methods on the severely burned Areas of the Petawawa Military Reservation.* This Study involves an investigation on permanent sample plots of the conditions which favour or prevent reforestation by pine in burned over areas.

3. *Field Studies for the Preparation of Volume and Growth Tables for White Pine and Red Pine in the East and for Engelmann Spruce and Lodgepole Pine in the West.* The object is to determine the average merchantable contents of trees of these species of a given diameter and height class. Such data are necessary in making plans for continuous production.

APPENDIX B

Statement as to the needs of the various Departments for the more efficient instruction of Graduate Students and for Research.

The following is a resume of replies received from the Heads of the University Laboratories in response to a request for a statement of the needs of the University for carrying on more efficiently work with Graduate Students and Research.

I. The need most frequently expressed is for more space. Graduate work and research cannot be carried on under the same conditions as the routine laboratory work for undergraduates. Quiet, the necessary space for the required apparatus and some guarantee that the apparatus will not be interfered with are essential, and these conditions can only be realized in private rooms or in small special laboratories accommodating only a limited number of research workers

Some of the laboratories are already so overcrowded with undergraduate students and so inadequate, according to modern standards, for what is required of them, that new buildings for their accommodation are urgently needed. This is especially true in the cases of the Departments of Anatomy and Botany. Anatomy at present occupies a portion of the Biological Building, but the space available for it is so restricted that even the development of the undergraduate courses along modern lines is at a standstill and accommodation for graduate work and research such as should be provided for, do not exist. Botany occupies what was originally a dwelling-house, and besides being hampered by overcrowding and the lack of a suitable lecture-room, is seriously in need of greenhouses necessary for studies in plant physiology and plant pathology.

The continually increasing demands of the clinical departments in Medicine for laboratory space call for a considerable enlargement of the Pathological Building, in which accommodation might also be provided for the Department of Pharmacology now confined to quarters that are altogether inadequate.

For several other departments there are expressions of a need for expansion. Thus the Department of Biology finds need for space to be devoted to animal breeding for embryological and experimental breeding purposes, and to an embryological laboratory; it also expresses a need for a Fresh-water Laboratory where problems especially connected with our fresh-water fisheries might be worked out. The Department of Chemistry needs additional space both for undergraduate and graduate students, the present insufficiency of space being partly overcome by the unsatisfactory method of using rooms in another building temporarily loaned by other departments. The Department of Applied Chemistry calls for space for graduate students and the Department of Geology for space to be devoted to a laboratory for Economic Geology.

II. Requests for additional laboratory equipment are not frequent but the hoped for development of graduate and research work will undoubtedly entail a need for special apparatus and facilities in several cases. The Department of Astronomy, however, finds itself seriously handicapped by an insufficient equipment as a result of which it is unable to prepare its own records in certain lines of work.

III. Several departments urge the advisability of a greater number of fellowships, scholarships and research assistantships, to attract men into graduate work. The demand for men with the quality of training which only graduate work can give has been referred to in the body of this report, and it is generally felt that every possible encouragement should be given men who desire to take such work. Specifically, requests for such foundations have been made by the following departments: Palaeontology, Mineralogy, Applied Chemistry, Metallurgy, Mining, Biology, Botany, Hygiene, Gynaecology and Household Science.

IV. A need quite as urgent as that for additional space is felt by several departments for the appointment of additional members to the teaching staffs so that senior members, and, indeed, the entire staff, should have greater freedom from undergraduate teaching and administrative duties to devote themselves to graduate work and research. This need has also been mentioned in the body of this Report, and in the case of certain departments, especially, it is the most serious obstacle in the way of the promotion of graduate work and research. The Department which have made special mention of this need are as follows: Palaeontology, Astronomy, Applied Chemistry, Medicine, Pathology, Pharmacology, Biochemistry, Anatomy and Food Chemistry. It must not be supposed, however, that these are the only departments, of those concerned with this Report, in which a need for a larger teaching staff is felt.

V. Closely connected with the need for additions to the teaching staff and desirable for the same reasons is that for skilled technical assistants. In every scientific laboratory much time must be spent in the construction and setting up of apparatus and in the performance of routine and, for the most part, mechanical operations in the preparation of material for study. Such work can be done by technical assistants and much time and energy saved thereby to the research workers for the working out of their problems. The departments making special requests for such assistants are: Palaeontology, Biology, Botany, Anatomy and Pathological Chemistry.

UNIVERSITY EXTENSION

The Department of University Extension finds almost unlimited opportunities for carrying university teaching throughout the Province, but is seriously handicapped in developing these opportunities because of lack of funds. The lines along which work is now being done may be summarised as follows:

1. TEACHERS' CLASSES, CORRESPONDENCE WORK, and SUMMER SESSIONS to enable teachers in service to secure the Pass B.A. degree. From the point of view of the youth of the Province there is possibly no more important phase of university activity than the improvement of teachers qualifications, and the teachers of Ontario are eager to take advanced courses. The enrolment this year is the highest on record because more teachers than before have learned of the existence of these courses. Increased publicity in the form of explanatory bulletins will augment the attendance at Summer Sessions and in Teachers' Classes far beyond the limits prescribed by the present size of the University staff. In a Province where there are almost 15,000 teachers it is not unreasonable to hope for enrolment in the near future of at least 1,000. A greater variety of subjects should be offered in summer courses, and by correspondence during the winter. The latter form of work necessitates, of course, a larger office staff.

The Extension Department does not confine its attention to holders of first class certificates only. Teachers with third class or second class certificates, or even with no certificates, are prepared by correspondence during the winter for the summer courses offered by the Ontario Department of Education; others are given assistance towards the commercial specialist's certificate.

When the degrees in pedagogy are included, it is no exaggeration to say that the Department of University Extension has something to offer to every teacher in Ontario. It is now serving two hundred teachers; with room for expansion it could serve ten times that number.

2. LOCAL LECTURES. There is a marked demand throughout the Province for single lectures and for courses of lectures. This demand would be very much greater were it more generally known that the University offers such service. The obstacles here are (*a*) the expense of publishing and distributing descriptive bulletins and (*b*) the meagre remuneration to lecturers. Most of the organizations that wish to have this lecture service have only limited funds at their disposal. By regulation of the Board of Governors the local organization is responsible for the lecturer's expenses and an additional sum of $5.00; to this amount there is added another $5.00 from the University's funds. Even the lecturer's expenses, plus $5.00, is to most societies a large sum and prevents them asking for as many lectures as they would like to have. On the other hand, the lecturer who receives his expenses, plus $5.00, from the organization and $5.00 from the University, feels that he is rather poorly repaid for the time and energy expended and the inconvenience attendant upon his trip.

3. TUTORIAL CLASSES. Evening classes in English literature and in economics are being carried on for those in Toronto who may wish to take advantage of them. The fee charged each student is $10.00 for the year's course and the number in any class is limited to twenty. The instructor receives $200.00 for fifty hours' class work. This rate is not attractive to professors who are anxious to have time for reading and self-improvement, and it does not seem possible to increase the fee without reducing greatly the attendance.

One example of the limitations imposed by lack of funds may be cited. A request came for a tutorial class in Streetsville for the members of the Junior Women's Institute and the Junior Farmers' Institute of the surrounding district. These rural young people were anxious for some course—they scarcely knew of what type. A class was arranged, but the financial difficulty again presented itself, and it is not yet clear where the funds to pay the instructor are to be found.

For both the local lectures and the tutorial classes the service of one or two instructors, giving full time to this work, seem to be absolutely necessary. As at present conducted the system, or rather lack of system, is wasteful of time and money in comparison with the results secured. There seems to be more than enough work for two men—in Peel County alone there are six centres similar to the one in Streetsville. The Province could be literally dotted with tutorial classes for rural young people if a sufficient staff were available.

4. WORKERS' EDUCATIONAL ASSOCIATION. Under this organization over one hundred and fifty men and women in Toronto, and over thirty in Hamilton, are being instructed by members of the University staff and others in such subjects as economics, political philosophy, psychology and logic, English literature, public finance, money and credit, civic administration. For lack of funds these courses have not been very fully advertised; more extensive advertising would treble the numbers. The instructors receive $150 for fifty or more hours of work in class, but they all regard this as a form of public service and cheerfully accept the duty. (It should be noted that the two hours per week spent with tutorial classes of any type are only the minor part of the time involved—the preparation for the class makes serious inroads on the little leisure available to any university instructor).

The beginnings of adult education in England were mainly by way of courses of lectures that went by the name of the University Extension Lectures. It happened that there were amongst the original lecturers one or two men of genius, and for the time the influence of the system was very considerable. In 1906, at a dinner of Dons in Oxford, the growing dissatisfaction of labour men in England was voiced by a young Scotch labour man who took the opportunity given to him of explaining to his audience the fact that the University of Oxford was not doing its duty by the labour world. Out of this grew the organization called The Workers' Educational Association the basis of which was tutorial classes. The tutorial class gives an opportunity for a group of men and women small enough to make general conversation possible, and aided by the presence of a trained tutor, to work and think together. The tendency in the English W.E.A. was, as it has been in Toronto, to devote its attention to economic subjects. In England that phase soon passed and a large demand grew up for the variety of subjects generally included in what constitutes a liberal university education.

In Toronto there was at first the same demand for economic subjects, and there is now the same tendency to branch out into other subjects such as history, English literature, and psychology. In the present session the largest of all the classes is the one in English literature.

There is in fact at this moment a crisis in the whole world of education. It is being discovered that the training provided by the schools and the technical teaching provided by that side of the universities have a tendency to leave out the most important part of education. Neither of them develops, as far as it might, the power of thinking nor of useful criticism, and, what is more important, neither of them goes as far as it might in building up a thoughtful, comprehending human spirit.

Some of the eagerness with which labour people are pursuing their material ends is now being transferred to a desire for a higher culture and above all things this should be encouraged. Nothing severs sets of people more completely than the existence of different and more or less unrelated standards of thinking and speaking. There is immense danger to a country in the existence of two languages, the language of the cultivated and the language of the street, neither of which is really comprehensible to the other. If it could be brought about that more or less the same proportion of every class could be found in the ranks of thoughtful cultivated people, an immense stride would have been made in the abolition of class differences.

There is another way of looking at this problem, too, and that is this: The working man after all desires not alone material betterment but a new status and a better life. There is only one way in which he can fit himself for that, and that is by filling his increasing leisure with the materials for better thought.

There is an extraordinary example of what can be done by way of the equalization of classes in such a discussion as that printed by the Garton Foundation in England, in which the method, quality and discussion among six people, of whom three were labour men and three men of learning who were University professors, were quite indistinguishable.

The whole basis of national unity rests upon the theory of the nation being an aggregation of persons who, on the whole, think alike, and it is very difficult for two sets of people to think alike who speak more or less different languages and think in different categories. In the past the reason for these differences has lain to a large extent in the necessity on the part of labour people of stopping their education at an early age, while persons of substance could continue their education for some years onward. This difficulty cannot altogether be cured but it can be greatly modified in one way, and in one way only, and that is by a large expansion of adult education.

5. A SHORT COURSE INTENDED PRIMARILY FOR MEMBERS OF FARMERS' CLUBS. This is being arranged in coöperation with the Executive of the United Farmers of Ontario. It is to be held for two weeks in February and the subjects to be offered are economics, public hygiene, architecture, English literature, and Canadian history. The attendance expected by the U.F.O. Executive is between one and two hundred men and women. This course should be made a permanent feature of extension work, and, if at all successful, will, no doubt, be largely attended each year. The U.F.O. representatives feel very strongly that this course, since it is given by the Provincial University, should be free of all cost except a nominal registration fee of $2.00.

Apart from the activities outlined above, the Department of University Extension is prepared to perform any service that any section of the public may require, so far as present facilities will permit. Opportunities for public service of this kind need not be sought; they come spontaneously. And it is most embarrassing to be compelled, for financial reasons, to be somewhat half-hearted at times in responding to some appeals. People everywhere seem to feel that, because they help to support the Provincial University, the cost of its services to them should be merely nominal at most. But in order to carry out even moderate and already urgent developments a larger office staff together with increased space accommodation, a teaching staff for winter and summer work, and a much larger budget to provide staff, equipment, and advertising, are necessary. With an available budget of $30,000 for the year 1921-22 present activities could be more adequately developed and the foundation laid for really large and effective work in the future.

A change is passing over the people of this country and it is a change for the better. There is an enormous demand for adult education in almost every class of society and this demand could easily be multiplied by judicious publicity and by compliance with the perfectly reasonable requests that are coming in almost daily. The public look to the University to supply this demand. The average citizen feels that the Provincial University is, in part at least, his own property and that he has every right to ask for such education as he requires.

The following quotation may serve to illustrate extension arrangements in United States universities, some of which have more than ten times as many students in their summer schools and evening classes as has the University of Toronto. This is from a letter written by the Director of Extension Service in the University of Michigan.

> "At the present time, there are in this country two general methods of conducting University Extension work. One is known as the Wisconsin plan, under which plan the Extension Division operates almost independently of the regular faculty of the University. For example, at Madison, Wisconsin, they have a separate Extension building and a separate Extension faculty. The plan pursued by the University of Wisconsin.....enables the Extension Division to carry on a very intensive type of work. I believe the Wisconsin budget (biennial) amounts to something like $250,000.
>
> "The other plan is that which is sometimes referred to as the Michigan plan. Here our Extension work is carried on through the medium of regular organized University channels. As far as possible, we use for this work men of the various departments of the University. This plan does not permit of as varied or extended a program as that in vogue at the University of Wisconsin; .....it tends, however, to secure a spirit of coöperation on the part of the entire faculty.
>
> "As explained in our General Bulletin, the University of Michigan Extension Division operates through the medium of twelve bureaus, each bureau touching some phase of our regular campus activities."

In the University of Toronto a combination of these two plans would seem to serve the purpose best. As extension courses in literature and history are in greatest demand, one or two regular extension instructors should be available for full time work in these two subjects and members of the regular staff might be asked to give occasional lectures in other subjects as required.

DEPARTMENT OF SOCIAL SERVICE.

Courses prescribed for all full time students: FIRST YEAR

*1. Evolution of Modern Industry (deals with industrial revolution, studies association of capital and labour, and general social and political reactions of modern industrial changes).

*2. Social Economics (elementary principles, relation of wealth to welfare, distribution of wealth and poverty).

*3. Introduction to Psychology (Psychological reactions of social significance).

*4. Social Ethics (Basal conceptions and application to personal conduct and social relations).

5. Social Treatment of Poverty (Causes and inter-relations, social diagnosis, methods of constructive relief and rehabilitation).

*6. Community Organization (development of associations and institutions for extending community life).

*7. Hygiene and Public Health (Communicable diseases and their control and prevention).

Each student elects three courses from the following;

8. The Municiapality: Its Work and Problems (Municipal and Citizen organization; Municipality; city government and education, etc.).

9. Recreation and Playground Work (Organization and administration; practical).

10. Child Welfare (The child and the family—care of dependent, defective and delinquent children).

11. Housing and Immigration.

12. Psychiatry (Relation to social work)—Study of symptoms and method of diagnosis.

13. Occupational Therapy (History and application).

14. Rural Conditions and Problems (Relation of rural and urban problems—corollary of courses on Municipality and Community Organization).

*Courses marked with asterisk given by members of Staff of University. Remainder given by city social workers and others.

Field Work.—In addition to 10 or 12 hours class room work a week, each full time student does 10 to 14 hours field work weekly.

Aim of Field Work.

1. To introduce student to various forms of social work.

2. To widen the student's environment by a wide experience of living and working conditions.

3. To provide concrete illustration of lectures—rounding out abstract theory by concrete experience.

4. To give some training in active performance of social work.

Method.

1. Individual students—studied and vocational guidance given.

2. One day weekly devoted to observation of social agencies, institutions, factories, department stores, etc., Numerous agencies, firms, etc., co-operate with Department in making this possible.

3. Each student apprenticed to suitable agencies to perform work under supervision (7 hours weekly).

16 city agencies co-operate with Department in this work. Those agencies appoint supervisors at the request of the director of field work, and methods of experience are discussed. American schools dealing with classes of this size provide payment for the supervisors in the agencies which thus co-operate.

4. Weekly field work discussion hour. Current events in social work considered. Special field work experiences discussed and relation of practical work to lectures amphasized.

50 full time students are registered in first year work.

295 part time students take selected courses.

SECOND YEAR

Continues lecture work of first year and allots large portion of time for field work—students being expected to choose some definite line in which to do intensive social work.

7 full time students are registered.

5 part time students are registered.

Special Features of Work.

1. *City Work*: Director of the Department and Director of Field Work active in various forms of city social work—public addresses, acting as members of Boards, etc.; this helps to develop co-öperation.

2. *Course of Public Lectures* on social questions,

3. *Special Extension Courses*, e.g., Mental Hygiene, Employment Management, etc.

4. *Consultation Service:* Department offers this to all interested in development of social work in Canada.

5. *Library:* Borrowing privileges for students and staff of Department of Social Service and Department of Public Health.

Reference privileges for social workers and any others interested in social work.

6. *Occupations:* An outgrowth of field work. Majority of students placed in positions in social work through Department; agencies from all over Canada consult Department in this regard.

THE ONTARIO COLLEGE OF EDUCATION

A Summary of its Immediate and Less Immediate Needs

The Ontario College of Education was created under an agreement between the University of Toronto and the Department of Education to provide:

A. Graduate courses in Education.

B. Courses for High School Assistants' and Specialists' certificates.

C. Such additional courses as may be instituted from time to time.

In the terms of the agreement the budget of the College is to be voted annually by the Legislative Assembly as a part of the estimates of the Department of Education, and the contents of the courses for teachers' certificates as well as the personnel of the staff are to be subject to the approval of the Lieutenant-Governor-in-Council.

A. As to the Graduate Courses.—B.Paed. and D.Paed courses are conducted by the College both intra- and extra-murally. Attendance during at least two summer sessions is compulsory in the D.Paed course. During the present Regular Session, intra-mural instruction is given in both the B.Paed. and D.Paed. courses. If, as is probable, the students registered in these courses in the former Faculties of Education transfer their registration to the Ontario College of Education, the total registration will be 221. The Summer Session of 1920 in these courses was attended by 51 students. These figures are evidence of the present demand for advanced or graduate courses in Education. The scores of Canadian teachers who attend Summer and Regular Sessions in Education at Columbia, Chicago, and Washington Universities are further evidence. The demand will increase. University laboratories are rapidly expanding the bounds of professional education and organizing it into a science. State systems of education and, in particular, the centralized systems of this continent need educational experts by the hundreds—principals, supervisors, inspectors, directors, and training school instructors. These educational leaders cannot be content with as much of the new science of Education as is imparted to the rank and file of teachers in the typical one year's course of the training schools.

The teachers of the United States realize this. In their universities Education probably stands first among university subjects in the number of registered graduate students.

Development of graduate work in Education will sooner or later involve:

1. An additional instructor in (*a*) School Administration, (*b*) Philosophy of Education.
2. Additional Lecture-rooms (2).
3. A Library in professional Education.
4. Complete Junior and Senior (Public and High) schools for experimental work, *i.e.*, the addition of Grades I and II and of the Kindergarten to The University Schools.
5. Half-a-dozen graduate scholarships or tutorships of $500 each.

B. As to High School Assistants' and Specialists' Courses.—These courses have been organized to include one, and not more than two, of the following subsidiary courses:

1. Course for the Elementary certificate in Physical Culture.
2. Course for the Elementary certificate in Art.
3. Course for the First Class Public School certificate.

Under difficulties by no means insignificant, due to distance and conflict in time-tables, the course in Physical Culture is given in the Household Science gymnasium (women) and in Hart House gymnasium (men). A gymnasium on the premises of the Ontario College of Education would save time and increase efficiency.

The course in Art is given by one instructor in one room. This, of course, can never be satisfactory. The greatest immediate needs are (1) a modelling room, (2) store-room for lockers, working material, and models.

The course for First Class Public School certificates is supplementary to the High School Assistants' course. Such a supplementary course is necessary. It provides a way—almost the only way—by which college graduates may train for Public School work and thus for the higher professional posts as inspectors, directors, training school instructors, etc. This course for Public School certificates, which will grow in popularity with an increasing attendance in the High School Assistants' course, requires for demonstrations and practice-teaching a complete and accessible Junior (or Public) School. Completeness here involves again the addition of the Kindergarten and Grades I and II to the list of classes, and of accommodations for physical training, in particular, a gymnasium.

C. As to Additional Courses to be Instituted.—Courses for the Ordinary and Specialist certificates in Household Science have already been instituted. It is not improbable that these courses will be paralleled later by courses for the Ordinary and Specialist certificates in Manual Training.

Temporary and very inadequate provision for the Household Science course have been made this year. Two small, badly-lighted, ill-ventilated rooms have been set apart for a service for which at least five approved rooms are needed—and one additional instructor. When, or if, courses for teachers of Manual Training are instituted, one additional instructor and five or six approved rooms with equipment (forge and stock room, machine shop, drafting room, woodwork room, locker room, etc.) will be needed.

D. As to General Conditions.—(1) The University Schools are the experimental, demonstration, and practice schools of the Ontario College of Education. They must be adequate for this function. They cannot be adequate without Kindergarten, Grade I, and Grade II classes. This will require at once three additional classes and three additional teachers and ultimately five of each. And the Schools must also be model schools. They cannot be model or modern schools, they cannot even comply with the minimum requirements of the Province until they are equipped with a gymnasium and an assembly hall.

(2) The attendance in the course for High School Assistants this Session is 69. When the Universities have begun to function regularly in the post-war period, this number will probably increase to the pre-war total of 125. Having regard to optional courses, 125 students will mean four classes and four classes will need four lecture-rooms. At present the Ontario College of Education has one approved lecture-room.

(3) All countries are suffering from a scarcity of teachers. Students do not throng the training schools. In the effort, a desperate effort in some countries, to provide an adequate supply of trained teachers, it is very probable that Departments of Education will take vigorous measures to reduce the cost of training. This would probably mean the cancellation of fees for tuition, provision for a supply of text-books and other material, and the establishment of residences or dormitories.

SUMMARY.

If the *Immediate Needs* of the College are met the budget will contain additional items as follows:

(1) Five rooms for the Household Science course, one additional room for the Art course, three additional rooms for the High School Assistants' course.
(2) A gymnasium, assembly hall, and educational library.
(2) A kindergarten and two class-rooms (Grades I and II).
(4) Salaries of four additional instructors.

When the *Less Immediate Needs* of the College are met, the budget will contain additional items as follows:
(1) Five rooms for Manual Training, two rooms for graduate work.
(2) Instructors in graduate courses 2, in Manual Training 1.
(3) Six graduate scholarships.
(4) Cancellation of fees, provision for expenses.
(5) Residences.