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REPORT
OF
THE PRINCIPAL'S COMMITTEE
OF THE
FACULTY OF AGRICULTURE
1931

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DEPARTMENT OF BACTERIOLOGY
PROFESSOR E. G. D. MURRAY

July 27th, 1931.

The Principal,
McGill University,
Montreal, P. Q.

*Survey
Macdonald College*

Dear Mr. Principal:

I have read the Report on which you desired my opinion.

I offer no criticism of the courses of instruction in Bacteriology provided at Macdonald College which occupy the bulk of the Report of the Department of Bacteriology, as I believe Professor Gray must be allowed to determine the curricula for the various classes of students he is required to teach.

Leaving out of consideration the desirability of a university providing a "Homemaker Class" and a "School of Household Science," I am convinced that the courses in bacteriology given to these students should only be tolerated on condition that they in no way interfere with the serious teaching of agricultural students, and, above all, the time available for research work by Professor Gray and his staff.

Judging from what I saw on visiting Macdonald College, on two occasions, Professor Gray's report does not represent the difficulties he has to contend with. If I may be allowed to make a suggestion, I would advise that Professor Gray be asked to make a full report on the personnel and equipment of his department, the facilities with which he is provided, and to outline what alterations and support he considers necessary to enable him to develop the Department to be a credit to the University. To emphasize the need for this enquiry I shall give one example: I cannot conceive of any excuse for circumstances which force the head of the department to make with his own hands the media and all other preparations for class purposes. His time should be more valuable than to be employed in work ordinarily performed by a technician. In my opinion, Professor Gray very much understates the case when he says (p 49) that "with the present assistance the direction and scope of research work is limited."

The record of research (p 8) is not remarkable and this should be taken in connection with the last two paragraphs of page 19 of the Report. I disagree completely with these two paragraphs and I would emphasize the world wide experience that the very best "student material" is attracted almost entirely by the quality of the research output of a scientific institution. In my opinion,

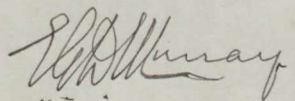
the most inspiring teaching and that which has the greatest appeal to all students, is given by the men of the highest attainment and greatest reputation in research. The exceptions to this general rule have been rare, and, as in the case of Michael Foster, they have usually succeeded in selecting the men associated with them and in inspiring them to high attainment in research. This is a matter for serious consideration, particularly in view of the claims made in the last paragraph of page 22 of the Report. It is true scholarships will attract some good men on the lines indicated in the first paragraph of page 20, but if offered by a place with a reputation for research they will attract more and better men. In fact, I believe the very best men, if they are in the position to do so, will rather work without a scholarship in a department noted for research than hold a well endowed scholarship where research is nominal.

The cooperation between the Departments at McGill and Macdonald, indicated on page 15 of the Report, is most desirable and though there are several paths by which such coordination can be approached none of them are discussed.

I trust I have covered the subject on which you desire my opinion and

I have the honor to be,

Yours obediently,



January 7, 1930.

I attended in Dean Barton's room the first meeting of the Principal's Special Committee at Macdonald College;

Present, Dean Barton in the chair
Professor Brittain
Professor Summerby
Professor Snell
Professor Lattimer.

As in other meetings I have attended, the Principal's letter well received. Following suggestions and remarks seemed at the moment to have some general as well as particular significance:

1. Here, as elsewhere, question of improvement in any direction carried the discussion right into secondary schools. Dean Barton and others expressed concern at the increasingly small supply of boys attending rural Quebec schools in grades 10 and 11; the dropping-off was attributed to urbanization.

Dean Barton seemed hopeful that "consolidation" in Eastern Townships would help matters. From things he and others said it was apparent that many of the instructors at Macdonald were concerning themselves with this and kindred questions and attempting to shove things in the right direction by advice given, while they were doing field work, to agronomes, Women's Institutes, school principals and even the clergy.

Complaints were made by one or two - in a good-humoured way - that Bishop's was debasing the currency by strenuous advertisement of easier courses labelled with the same degree.

2. The neglect of French in the Macdonald curriculum.

(a) It was pointed out that this might be considered a weakness in itself.

(b) It had been Sir Wm. Macdonald's intention that his institution should supply the Province with agronomes, but as these officers had to be bi-lingual and as English speech is losing ground in most of the counties, this office, now taken over by the provincial government, was going more and more to men who were not trained by Macdonald College. Consequently, this influence is going on in geometric ratio.

(c) Dean Barton himself, with his political contacts, hinted that while Mr. Perron and others had shown no enthusiasm ~~for~~ when French instruction at Macdonald had been suggested, its absence provided them with many an argument, and not merely in connection with agronomes.

(d) Other Canadian provinces and departments in Ottawa always take it for granted that Macdonald College, situated in the Province of Quebec is a liason between English-speaking Canada and French-speaking Canada. Macdonald is looked to by certain Ottawa departments for furnishing men for certain positions, yet always in Ottawa it is pointed out that bi-lingual men are needed, and not only in Quebec. So here also Macdonald loses not merely in prestige but also in usefulness.

3. Certain things mentioned by Dean Barton and Professor Lattimer drew from me the remark that, travelling in many parts of Canada, one who has travelled in Germany, France, Holland and Mid-Lothia, is struck by the great discrepancy between the status of

agricultural science in Canada and the actual practice of agriculture. Agricultural science in Canada cannot be much below that in Germany, Denmark or elsewhere, yet there is no such application of theory to practice as in these other countries. Granted that they have never yet been compelled to make up this lee-way; granted that the economists may be right in saying that it would be bad business to do so, should we perhaps be asking ourselves whether the time is approaching when we shall be justified in doing so? Otherwise, are not those ~~XXXXXXXX~~ engaged in agricultural research and instruction obliged, in honesty, to feel themselves something of a sham?

The discussion on this point was so interesting that I felt a verbatim report of it might well have been taken.

January 7th.1931.

The next hour and a half was spent in a committee called by Professor Brittain at the suggestion of Dean Eve to help on the Graduate Faculty Committee. Interesting points here:

1. Gratification expressed by several departments over collaboration with Professor Huskins.
2. Most of the men spoke modestly about their capacity for doing genuine graduate work, but in reply to a suggestion from *Dean* Barton that by pooling resources they might do more of it several agreed that it could be done, especially if closer co-operation with McGill Science Departments were possible. On this point, again,

Huskins' visits and the new vista opened up in genetics were mentioned.

3. Biometrics was mentioned in several connections and the Physics Professor (Rowles) began to deal with this and other matters in a very suggestive way, talking of the mutual assistance of certain physical studies and certain biological studies. I asked whether if McGill had an Honours Course in Biology and Physics most of these special things he was dealing with could not be accommodated. He answered with no hesitation that every single one of them could be properly dealt with in the undergraduate course and that if there were such an Honours Course there would be many subjects for graduate study in which Macdonald College and the two Departments at McGill (Biology and Physics) could co-operate.

C.S.

Handwritten notes:
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THE PRINCIPAL'S COMMITTEE

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THE FACULTY OF AGRICULTURE

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SURVEY OF ACCOMPLISHMENTS

Macdonald College, of which the Faculty of Agriculture of McGill University is a part, was founded, erected, equipped and endowed by the late Sir William Macdonald for the following among other purposes: "The advancement of education, the carrying on of research work and investigation, and the dissemination of knowledge - all with particular regard to the interests and needs of the population in rural districts." It might, then, be of value, in reporting on the activities, achievements and progress of the Faculty of Agriculture during the twenty-four years of its life, and more particularly during the past ten years, to consider how nearly the faculty has approximated to the ideal of its founder and directors.

With the pressing need everywhere apparent of a fuller knowledge of the principles of agriculture if farming in Canada, and more locally in Quebec, is to take its rightful place as an industry, a business and a profession, the Faculty of Agriculture has felt that first place in its activities should be given to teaching. It is with this phase of the college work, therefore, that we shall begin our survey.

The Training of Men

When the courses in agriculture were first planned a quarter of a century ago, provision had to be made to meet the needs of two types of students: first, those who, lacking the educational foundation that would enable them to pursue a course of university standard and leading to a degree, were

in search of some general training in the sciences and practices of modern agriculture that would fit them for the more intelligent pursuit of their calling, farming; and second, men desirous of university training (and degree) in the science of agriculture as a foundation for professional or other work in that field. Following the procedure established at other agricultural colleges, and more especially at the Ontario Agricultural College, therefore, an attempt was made to devise a course that would meet the needs of those two types. In the first two years, an attempt was made to give a general training in the many phases of agriculture, after completing which a student might receive a diploma; while in the final two years, more advanced work in the sciences relating to agriculture was given to those qualified to go forward to the degree.

This compromise arrangement, while fairly satisfactory for a time, did not permit proper development for either class of students - and more particularly for those going forward to degrees, who were unable to get sufficient fundamental work in their first two years (in chemistry, physics, mathematics, English, botany and biology) to enable them to make the progress desired in the more specialized fields of study later. So, in 1920, a separation was effected between the students pursuing studies of a vocational nature and those working towards the degree - and with benefit to both.

In considering, then, what the Faculty of Agriculture has accomplished in the training of men in agriculture, it must

be recognized that by far the greater proportion of the four thousand students that have come to Macdonald for some training during the past twenty-four years have been those following the shorter vocational courses that would fit them for farm life. But since practically all of these are now farming, either in Quebec or elsewhere in Canada, they represent an important constituency influenced by the teachings of the faculty.

A more complete record is available of those who have been graduated with the degree of B.S.A., and of her graduates Macdonald is justly proud. In the twenty years that have passed since the first class was graduated, Macdonald's alumni have achieved a prominence in the political, professional, and industrial fields of agriculture, both in Canada and throughout the Empire, that is out of proportion to their numbers. Important administrative and research posts in Federal and provincial departments of agriculture, professorships and lectureships in many colleges, positions in the research and business departments of many of our industrial concerns - these are some of the places now occupied by Macdonald's graduates. (A complete list of the graduates in agriculture, with the positions now occupied by them, will be found in Appendix B (1).)

Classified occupationally, of the 287 obtaining the degree of B.S.A. from McGill up to June 1929, inclusive, the figures are as follows:

Farming	53
Professorial or Teaching	46
Governmental Positions	110
Industrial and Business Positions	39
Other occupations	22
Deceased	17
Total	<u>287</u>

The rapidly advancing science of agriculture, in Canada as elsewhere, has tended during recent years to become more highly specialized as more fundamental problems have been attempted. The result has been an increasing demand for more highly-trained workers than could be found amongst those holding the baccalaureate degree only. To meet this need, Macdonald College has, within the past few years, given the lead to the other agricultural colleges of Canada in two ways: first, by a strengthening of the work leading to the bachelor's degree; and second, by developing graduate work in many phases of agricultural science.

Drastic changes in entrance requirements and in curricula, and more especially in those laid down for the first two years' work in agriculture, have been made at Macdonald. Entrance standards are now those of the University itself; while the course work required in the first two years has been put on a par with that given in the other University faculties - sound fundamental training being given in chemistry, physics, mathematics, English, botany, biology, so that the student may, in his third and fourth years as an undergraduate, be better equipped to pursue honours work in his chosen field, and, further, as a graduate, be able to go on to advanced work and studies without the handicap that many former students in agriculture were faced with when they attempted to pursue post graduate courses in science.

And hand in hand with the strengthening of the undergraduate work at Macdonald has gone the provision of opportunities for sound graduate work in many of the departments

of the Faculty. Macdonald, incidentally, was the first agricultural college to institute graduate work, and to date has achieved more in this field than all the other agricultural colleges of Canada together. Sixty-nine men have already completed work leading to M.Sc., M.S.A., or Ph.D. at Macdonald College under the Faculty of Graduate Studies, their contributions in the way of thesis projects being quite important to the, as yet new, body of research work in Canadian Agriculture. (A complete list of the post graduate students in agriculture, with the positions now held by them, will be found in Appendix B (2).)

Services to Agriculture

Extension Work - The service to farm people through what is called extension work was begun before the college opened. Members of the staff began at once to study farm conditions, to advise individuals and groups of farmers and to assist them in their organizations. Prior to the establishing of Macdonald College, the farmers in Quebec Province had received very little of such help. The information available was greatly needed; it was eagerly received: hence the extension work assumed an importance second only to that of teaching.

Through various forms of activity too numerous to mention, and the organized effort that resulted therefrom, Macdonald College has influenced and helped thousands of farmers in Quebec and other parts of Canada. The co-operative system, under which Canada's wools are marketed, had the way paved for it by pioneer work in wool grading and marketing started in

this province by Macdonald College. The Quebec Agronomist Service, under which the Provincial Department of Agriculture maintains a representative in each county, was built upon the foundation laid by Macdonald College in the establishment of a system of "district representatives". School Fair work was inaugurated in this province by Macdonald College. The conception of the advanced registry of purebred dairy cattle, now Dominion wide and being adopted in other countries, had its birth at Macdonald College.

The Agronomy Department has taken an important part in the work of the Canadian Seed Growers' Association, and in the Provincial Seed Board, in fact in all provincial activity pertaining to field crops. The production of elite stock seed at the provincial farm has been directed by a representative of the department. The Animal Husbandry Department has done similar work in its field with the Dominion Live Stock Associations, the Provincial Feed Board and various other organizations. The Departments of Horticulture and Poultry have had a large share in the development of fruit and poultry. Recent important activities in the province include: the direction of the spray service inaugurated in the summer of 1929, the first service of the kind in Quebec, and undertaken by the Plant Pathology Department for the Provincial Government; the investigation of the cost of milk production by a committee appointed by the Minister of Agriculture in 1929, of which committee the Professor of Farm Economics is a member; extensive drainage work in Pontiac county, assisted financially by the Provincial Department of Agriculture but organized and supervised by the

Agricultural Engineering Department; and participation in poultry disease and parasite work in the province by the college veterinarian. Work has been carried on through a multitude of organizations, provincial- and Dominion-wide, and to practically all the divisions of provincial service in agriculture and to many of the Dominion, the College has made and continues to make substantial contributions.

Information Developed - A second type of agricultural service provided by Macdonald College is that of information developed through various kinds of research and investigation-al work; and while the Committee do not believe that an exhaustive statement is called for in the present historical survey, they feel like mentioning a few of the more important contributions in this line.

The Animal Husbandry Department, for example, has made contributions not only to many phases of farm management practice but also, and more specifically, to the general fund of knowledge regarding feeding practices and the nutritional value of feeds with special reference to the requirements of hogs and dairy cattle, and has, in addition, effected considerable improvement in experimental methods as applied to livestock investigation-al work. The findings have been widely distributed, not only to feeders but also to technical workers in the field, through the medium of scientific papers (See "Literature", Appendix C); and their value has been widely recognized in both fields. Similarly, the work in poultry has resulted in important contributions to the growing fund of knowledge in the fields of nutrition, feeding and general management practices.

In the earlier days of the college, the Agronomy Department found itself called upon for much information, not at that time available for the Province, regarding optimum rates and dates of seeding, the suitability of varieties of grain and forage crops to our conditions, and preferred soil management practices. More recently, the whole technique of plant improvement methods has advanced rapidly, and to this advance the findings of the Agronomy Department at Macdonald College have made valuable contributions. The experimental methods and system of interpretation of results developed at Macdonald have received wide recognition in Canada and abroad.

In Horticulture, while little has so far been attempted in the way of strict research, a wealth of information has been made available to our fruit and vegetable growers as a result of work carried on by the Department in varietal tests, pollination studies, fertilizer tests, thinning fruit, top-grafting, seed production, plant improvement and other lines of investigation.

Work of special value has been done in the Bacteriology Department in connection with the milk supply of Montreal. The report published had much to do with the development of the present regulations. This department also did some very important research with fish. Solutions for a number of problems, particularly in the canning process, were discovered, greatly to the advantage of the industry.

The Department of Plant Pathology has contributed to our knowledge regarding the virus diseases of plants, and more particularly those of potatoes, tomatoes and tobacco - all

crops of great importance in this part of the country. Investigations on the methods of action and value of various chemicals as seed disinfectants against seed-borne parasites causing disease have proved profitable, as have studies of the effects of one pathogenic organism on another (both of which are common disease organisms to one plant). A beginning has been made in investigating the factors determining winter hardiness in plants, a study that is of great importance to Quebec and to Canada generally.

Apart from numerous papers that have been published by members of the Entomological Department on insect morphological and taxonomic problems, including an extensive treatise just now being published on the morphology and classification of the Pentatomidae, information of direct value to the agricultural workers has been discovered and made available. Following a considerable amount of work on the onion maggot, a study of the bionomics of this pest has been made and the results published. A much-needed survey of part of the Province has been made with regard to the animal parasites common to our poultry flocks, and findings of direct value both to the farmers and to the college workers in parasitology secured. And since 1928 the head of the Department has been in charge of a research problem dealing with the factors affecting the set of fruit in apples, with particular reference to pollination - an investigation that is being carried out in Nova Scotia, and that is financed jointly by the Dominion and Nova Scotian Departments of Agriculture.

Reference has already been made to animal parasite investigations. This work, at Macdonald, is partly under the

direction of the Veterinary Department and partly under the Entomology Department. Information has already been brought to light regarding the parasites affecting poultry, sheep, hogs and fur-bearing animals, and an important five-year project in this much-needed work has been inaugurated. Studies, conducted in the Veterinary Department, in the genital diseases of cattle have likewise contributed valuable knowledge to breeders of farm animals.

Diagnoses of soil conditions over a large part of the Province have been made in the Chemistry Department, bringing to light much information that is vital to the understanding of many of our cropping difficulties. Work, too, of value to the producers and to the trade has been in progress with maple products for a number of years. Improved methods of analysis for the detection of adulteration have been worked out, and a new method of moulding maple sugar so as to prevent hardening and mottling has been invented.

Despite the fact that only one man's time is available in the Department of Agricultural Economics, and the heavy load of teaching and extension work falling within this field, data of various kinds have been analysed and their significance made known to farmers and the public generally. Beginnings have been made, too, with survey work that is badly needed in this Province, and, with the further development of this type of investigation, we look forward to supplying information of an economic character to Quebec and Canadian workers in agriculture.

And finally, the Department of Agricultural Engineering has contributed knowledge new to this Province in various fields as a result of work done in testing out drainage methods, ventilation schemes for farm buildings, and various types of equipment used in water supply and sewage disposal. The hundreds of requests for blue prints made annually to this department by Quebec farmers indicate the worth of this phase of the work.

Improved Plants and Livestock - A third, and extremely valuable, service to agriculture by Macdonald College has been the development and dissemination of improved strains of seeds, plants and livestock.

Space will not permit an enumeration at this point of the many superior strains of crops that have been developed in the Agronomy Department (a brief statement of these will be found in the Department's report in Appendix A), but a few of the more outstanding might be mentioned. Banner 44 M.C. oats is probably first in importance, in view of the place held by the oat crop in Quebec. This oat now forms the bulk of the seed produced in the organized seed centres of the Province, several hundreds of thousands of acres being sown to it annually. Kharkov 22 M.C. wheat - a hardy fall-sown variety - is extensively grown in various parts of Canada. Improved North Western Dent and Quebec 28 are two varieties of corn developed at Macdonald that are widely grown in the Province, the former for silage and the latter for seed. And similarly with barley, swedes and mangolds, Macdonald strains have taken an important place in the lists of varieties recommended by the Provincial

Seed Board. Work is far advanced with the development of hardier and heavier-yielding strains of red clover, timothy and alfalfa - work that should prove of great value in view of the importance of these crops in this part of Canada.

The Macdonald rhubarb, originated and developed in the Department of Horticulture, has now become of considerable importance in the commercial trade, while numerous new and improved varieties of fruits, vegetables and flowering plants have been multiplied and distributed by the Department. As an instance of this, in 1928 over 40,000 strawberry plants were distributed to some four hundred farmers and gardeners. Many yields at the rate of over 5,000 quarts per acre, more than double the average yield, and one at the rate of 13,130 quarts per acre, were reported with these plants.

In the livestock field, too, this type of service has been provided. Macdonald introduced to Canadian breeders the Cheviot sheep, a breed that has proved its value on the markets of this part of Canada; Macdonald-bred Yorkshire swine have played a large part in the development of the bacon industry in Eastern Canada - and more particularly in Quebec and the Maritime Provinces. The purchase of a Macdonald-College-bred boar for breeding in Prince Edward Island affords a notable illustration. The offspring from that boar and their immediate descendants have won the bulk of the prizes in the live- and dressed-hog competitions in the Maritime Provinces in recent years, and through the introduction of that blood the level of hog breeding was appreciably raised. Some hundreds of animals

have been distributed. Similarly Macdonald has been the source of many of the heavy-laying poultry flocks throughout the Province. The results of this type of work are not easily computed.

Literature - In Appendix C is given a list of sixteen complete text-books and four partial text-books, prepared by members of the staff, and another of some 275 scientific papers contributed by them and students to scientific societies and periodicals. In addition to these, nine technical bulletins have been published by the College, and a few similar bulletins have been published in the United States while the authors have been attached to our staff.

A much larger number of contributions of a more popular or practical nature have been made to farm journals, one of which, the Journal of Agriculture and Horticulture of the Province of Quebec (English edition), has been edited at the College since the beginning of 1908 and has depended largely upon the members of the staffs of the Schools of Agriculture and Household Science for its chief articles. A number of bulletins and circulars for the information of the farming community have been published by the College and by the Quebec Department of Agriculture, and a great many public addresses have been made to both rural and urban audiences. The editor of the Journal of Agriculture and Horticulture has for some years contributed an annual review of Canadian Agriculture to the Montreal Gazette. Articles have been prepared for such periodicals as the Journal of Commerce, and a few publications of a literary character have been made in book form or as contributions to magazines.

LOOKING FORWARD

The measure of success that has already been reached in these activities - teaching, extension work, research - and more particularly the progress that has been made during the past five years or so in strengthening the courses offered and in laying foundations for more fundamental work in the field of agricultural research, leads us to take an optimistic view of Macdonald's future.

In the Field of Teaching

Macdonald offers special advantages to students in agriculture, advantages which, when they become more widely recognized by their fruits, are bound to make an appeal to prospective workers in this field. First, perhaps, in order of importance, is the new curriculum of studies provided during the past few years. Breaking away from the older tradition in agricultural college work that attempted training in various sciences and in such cultural subjects as English while insisting on a smattering of every phase of applied agriculture, the Faculty of Agriculture at Macdonald has provided a curriculum that is based on the standards approved by other University faculties. In this, sound fundamental training is given, in the first two years of the student's undergraduate course, in chemistry, physics, mathematics, English, biology and economics, thus providing a firm academic foundation upon which to build the superstructure of more specialized work in the various fields of agricultural science followed in the third and fourth years.

This, it might be pointed out, is in accordance with the views of the Canadian Society of Technical Agriculturalists, who discovered, by means of a survey of graduate work and workers in the various universities of Canada, that the standard of graduate work, and more particularly of graduate work in the agricultural field, was lower than it might be if our graduates had received a sounder fundamental training in the subjects mentioned. Macdonald College was the first to bring its courses into line, and it will only be a matter of time until the results will make themselves felt by employers of graduates in agriculture and by those engaged in the further training of graduate students. We are confident that men trained as our students are will stand out amongst graduates from Canadian agricultural colleges, and when this has been recognized we shall reap our reward in the way of additional interest in Macdonald by prospective students.

A second advantage possessed by Macdonald, as compared with other agricultural colleges in Canada, is her close connection with the other faculties and departments of McGill University. This is of especial interest to post-graduate students. The ability to pursue work at Macdonald in one of the advanced fields of agricultural science and to supplement this with studies carried on under recognized authorities in other faculties of McGill is a feature of our graduate work that is attracting the attention of many Canadians in search of higher degrees in the science of agriculture. And recent developments, such as the linking up of the work in genetics at Macdonald with that offered at McGill, would indicate that

this feature will become even more important in the future.

One of the possibilities not now taken advantage of, but one that should not be overlooked, lies in our location. Situated in the Province of Quebec, a bilingual province, Macdonald has a unique opportunity to meet the growing demand, both in professional agriculture and in the business and industrial field that is allied with agriculture, for men trained as our students are - but with the additional equipment of French as well as English. Prospective employers of graduates in agriculture already look to us for such men, basing their expectations on our location; and we, as a Committee, suggest that provision be made in the course work offered at Macdonald College of some training in French to meet this demand. When this provision has been made, we shall have a further appeal to prospective students.

We feel, too, that there is an important field of activity for graduates in agriculture that is not as yet being exploited by our agricultural colleges but which calls for cultivation. We refer to the field of business and industry. There are those in positions of responsibility who at this time would turn completely from the sciences of production to studies of the purely economic aspects of agriculture; and while your Committee appreciate the fallacy of any such view, they are convinced that in the administrative service of the country, in the sound development of agriculture, and in many types of commercial business allied with agriculture, the need for economic information and for well-trained men to secure and use it is of the utmost importance. Many businesses, too, allied with

agriculture, such as fertilizer and insecticide distributors, farm equipment and machinery companies, grain broking and milling organizations, are discovering that their staffs must be reinforced by trained men who understand the needs of agriculture if their business is to keep pace with advancing knowledge.

Our graduates have taken, and will continue to take, an important share of the teaching, investigational and extension positions open to workers in professional agriculture in Canada and in other parts of the Empire. Many of them, too, have made places for themselves in the research departments of such great industries of the pulp and paper industry, the sugar industry, etc. (See List of Graduates, Appendix B (1),); and a fair number have already entered businesses connected with the marketing of livestock, wool, fruit, etc. But we feel that an even greater field might be opened up to graduates who have the business instinct.

For the proper development of this field, several things are suggested by the Committee. First, it may be necessary to make provision for a more general course than is now available to third and fourth year students, for the man who wishes to enter the field of business. As mentioned above, French would be of real value in this, as well as in the professional field. The work in economics would have to be broadened and extended, providing courses in various phases of agricultural commerce, statistics, etc. The work in journalism, too, having special attractions to men training for business or industry, might be increased, an advanced course of laboratory character being pro-

vided in addition to the elementary course now put on. And greater freedom should be allowed in selecting courses than is now allowed the men who are specializing in the various branches of the science of agriculture.

Another important phase of this work, in the opinion of the Committee, should be the attempt to bring the student into touch with prospective employers through summer employment during his undergraduate days. This type of vocational guidance is already being carried on very successfully in two other fields at Macdonald: students desirous of securing farm experience are placed on selected farms for the summer vacation; and in the professional field, the practice of placing students in various temporary government posts has resulted in many of them later finding permanent employment in the departments in which they had done this preliminary work.

There is no reason why many of our students might not find profitable employment, during their summer holidays, with such firms as the DeLaval, Massey-Harris, Maple Leaf Milling, Canada Cement, N.V. Potash, and other companies allied with Canadian agriculture - or even with some of the brokerage houses dealing with agricultural produce.

It is believed that experience gained by contacts with industrial concerns would be of the greatest value to students in agricultural economics; they would see something of the workings of industrial organizations, they would gain some appreciation of the difference between theory and practice, and they would derive some understanding of industrial relationships,

all of which would help to develop their economic sense. Association of this kind, too, would give them a foothold in the business world by means of which they could more easily establish themselves.

In the strictly vocational work, the present two year Diploma Course seems very sound provision. It affords an opportunity to farm boys and others who contemplate farming to gain some preparation for their life's work. Many splendid fellows are being helped in this way, and, while the course in its present form has been offered for only five years, boys who have taken it and returned to the farm are already demonstrating its advantages. A third year is now being offered to a limited number who indicate special capacity for directive work in one or more branches of farm practice. The suggestion is made that this course can be still further strengthened by adding business training features. This could very well be done through the Economics Department were the staff in a position to undertake the teaching.

In the whole field of teaching, therefore, the opportunity for even greater service is apparent. Since teaching must continue as a major function of the College, the Committee would submit that teaching ability should receive equal recognition with that of research capacity in determining the value of members of the staff.

NB. EGD
Murray
says he
disagrees
entirely. See
his reply.

Special Considerations - While still on the subject of students, two thoughts suggest themselves to the Committee, one dealing with the securing of student material, the other with standards of attainment.

It is regrettable that in the schools, particularly throughout Quebec, comparatively few boys obtain the necessary preparation for college work. School consolidation and the present indication of greater interest in education give some hope for improvement, but it is believed that if a number of scholarships could be arranged, not only would they prove a stimulus but also an instrument by means of which some of the brightest boys available would be attracted to Macdonald College. There is good raw material in the country side; it needs developing, and the best of it should be selected for the kind of work Macdonald is in a position to do.

N.B.

The objective for Macdonald College must be the highest standard attainable. The standard attainable will depend upon the quality of students, their preparation for entrance, the curriculum, the teaching, and the influences of college life. Under the present University system, the standing of the great majority of students is determined very largely, if not entirely, by examinations. That examinations alone do not constitute a true measurement of either student attainment or student worth becomes increasingly clear. A high standard in marking will add to the value of the degree, but it will not necessarily indicate, much less insure, capacity for service in any chosen field. In other words, examinations may reveal a student's knowledge and his ability to express it, but they are not a complete criterion of what may be called his general fitness to enter the profession to which the University Certificate admits him. In many branches of agricultural service, graduation in agriculture is specified as a requirement, the possession

of a degree being regarded as some guarantee of the candidates qualifications for the position. It would seem, therefore, that, since examinations are only a partial measurement of qualifications, serious consideration should be given to ways and means of supplementing them in determining the eligibility of a student for promotion and ultimately for a degree, if the most satisfactory standard is to be maintained.

In Research

The field of research in agriculture is extremely wide. In practically every branch of production and marketing there are puzzling questions that must be answered. These questions in many cases involve research of the most fundamental character; in others, they must be decided by the applied type of work. Not infrequently both methods of procedure must be employed. Certain phases of the work naturally belong to a particular department of the college organization. This means that departmental programmes of investigation must be encouraged. Many of the larger problems, however, cannot be confined to a single department; a few of these have already been selected as projects for joint effort at Macdonald, and the work has been organized on this plan under the direction of committees. The Animal Parasite work and the Soil and Fertilizer work are examples of this development. It is proposed to stress this type of organization for research in the future and to set aside funds for such purpose as the money can be obtained or provided.

Plans are now complete for a five-year programme on the parasite work, involving an expenditure of some seventy thousand dollars. Fourteen thousand dollars in capital expenditure to

provide the necessary plant has been authorized by the Quebec Department of Agriculture as a charge against their grants of last year and this year to Macdonald College. The work will be supervised by members of the College staff, and certain college equipment will be available. It is expected that the operative costs will be met by grants from the National Research Council and the Empire Marketing Board. It is proposed that one representative from the National Research Council and one from the Empire Marketing Board be included on the Committee under whose direction the work is being conducted. In view of the substantial grants to be made, this would appear reasonable.

This type of organization for important research work extending over a period of time would seem to be desirable, and your Committee would recommend that, in so far as may be possible, work should be developed on this plan.

Macdonald College is in a unique position to serve as a great centre for research work in agriculture. It now has the basis of a first class plant, including land, laboratories, and other facilities; the members of the present staff are among the best trained in Canada; it is the finishing institution for students from a large section of Canada and is attracting students from many other countries; it is the leading institution in graduate work in agriculture in Canada; it has close relationship with both provincial and Dominion Departments of Agriculture; it has a good foundation in research work; and, finally, it is a private institution and a part of McGill University, and thus may add to its strength from the various faculties.

The recent appointment of a geneticist to the University staff should mean much to the work in agriculture at Macdonald College. Men trained in this particular field are at work in the Agronomy, Horticulture, Animal Husbandry and Poultry departments, and in all of them the co-operation of a geneticist will be helpful. It is very gratifying to observe that such co-operation is already satisfactorily established.

Again, in certain phases of Plant Pathology which Macdonald has featured successfully, there is opportunity and need for close relationship with those of the Botany Department of the University who are working in plant physiology. Some further facilities at Macdonald are necessary to permit the full development of this association, but a start has been made, and it is felt that as joint effort of this kind progresses, strength and value will be added to the work of all who participate in it.

An additional grant from the Department of Agriculture of the Quebec Government is being used to provide much-needed accommodation and facilities for investigation work, to develop investigation projects of special interest to Quebec and to render service to agriculture in the province.

From this grant, fourteen thousand dollars was set aside to build and equip greenhouses for biological work. These are now in use. Another similar amount has been authorized for the construction of an animal parasite plant, and plans are now being completed for it. The intention is to build the plant this spring.

A programme for vegetable improvement is being developed, and a well qualified man has been engaged to take charge of it.

An arrangement with the Provincial Department of Agriculture, through which the Agronomy Department will play a more important and more direct part in providing elite stock seed for propagation at provincial centres, is now under consideration, and it is expected that steps will be taken this summer to get the proposed plans in operation. To meet the demand for information and advice in regard to economics in animal feeding, the major factor in production costs, the programme of work which has already proved of wide interest is being extended. A much-appreciated service has been given to the province in certain phases of animal health and disease, and some valuable findings have been made in the college laboratories. It is proposed to provide further assistance in this in order that promising investigations may be more actively pursued. The joint project in soils and fertilizers is of particular interest to the province. It will be continued and developed. The whole field of economics in both production and marketing urgently calls for study. Great developments in it may be expected, and the need for right direction will be imperative to insure sound practice. In all of these fields, as in others in which work may be done, the extent of development must depend upon the resources available. Great care must be exercised to limit the projects to those which seem most important and which the College is in a favorable position to undertake. With the approval of the Quebec authorities, Quebec money is being devoted to strengthening the work in accordance with this policy.

In Extension Service

In the dissemination of knowledge and in other forms of direct service to farmers, an agricultural college is limited only by the time the staff can devote to such work. It is highly important that constant touch with farm people and farm problems be maintained, but now that departments of agriculture have developed extensive promotion machinery, and that the demands on colleges for new information and a more technical service are becoming more and more pressing, it seems logical that the college should choose the particular role in extension service that is most necessary for it to undertake. In this province, the English-speaking people will always expect Macdonald College to assist them in many types of activities, but apart from this and a certain amount of general extra-mural service, the extension work policy should be focused on two features: investigation projects that must be carried to the farms, and technical assistance for the field workers in the promotion field.

The Larger View

Macdonald College is a private institution, with a splendid plant and a strategic location. Very satisfactory relations exist between Macdonald and the departments of agriculture, Dominion and Provincial, and much co-operation obtains between all three.

Students in appreciable numbers are coming to Macdonald from the Old Country, for degree as well as diploma course work. Some of them have entered the Colonial Service following graduation and are favorably regarded.

Negotiations with the Empire Marketing Board and the National Research Council promise substantial support for a research project of empire importance and one that should lead to the development of a parasite research institute.

The Dominion Government is in urgent need of highly trained men to strengthen its service to agriculture.

Macdonald College has an established position in graduate training, and the character of its work throughout is commanding increasing recognition.

These developments suggest the possibility of Macdonald College becoming not only a national centre but also an Empire centre for higher work in agriculture, as well as a great co-ordinating force in both spheres.

Summary of Proposals

1. Undergraduate courses in agriculture, leading to the degree of B.S.A., in which training in underlying fundamental subjects is equal to that given in other faculties of the University.
2. Co-operation with other faculties in post-graduate work along the lines now being developed in genetics and proposed in plant physiology.
3. The addition of French to the curriculum and the development of the use of the French language by at least a proportion of our students who may desire to qualify for positions that require both languages.

4. Provision for additional courses of training in the business of agriculture and the development of both industrial experience and vocational guidance in this connection.
5. Continuation and further strengthening of the Diploma Course to assist the large number of boys who intend to farm.
6. Teaching ability to receive equal recognition with research capacity in determining the value of staff members.
7. A system of scholarships to attract and help the brightest boys from the countryside to pursue the study of agriculture, in order to insure first-class material for the building of a strong professional service in agriculture.
8. Broader standards of attainment for students.
9. Further encouragement of departmental research programmes.
10. The development of joint projects in carefully selected research fields in which the resources of all departments will be pooled and for which outside assistance may be expected. The Animal Parasite Project and the Soils and Fertilizer work are examples now under way.
11. The featuring of investigation work of special importance to the needs of Quebec province, made possible through the larger Provincial grants.
12. Direct assistance to English-speaking farmers in the province, the carrying of investigation projects to the farms, and technical assistance to supplement the service of the departments of agriculture.
13. The general dissemination of agricultural knowledge through publications, papers, etc.
14. The making of Macdonald College a national and Empire centre for advanced studies and research in agriculture.

THE MORE IMMEDIATE NEEDS

The present accommodation at Macdonald College is fairly well occupied, but its capacity can be materially increased by alterations, added facilities and comparatively small building extensions to permit the necessary rearrangement of department space. Amongst other things the Repair Shop and Storage now housed in the Agricultural Building should be removed, and other provision made for it. At least one additional storey should be added to the present one-storey Agricultural Engineering building. This would permit the consolidation of the Agronomy and Agricultural Engineering departments in the Agricultural Building, where they ought to be. Needed space would then be available in the Biology Building for additional laboratories, and in the Main Building for Economics and English, now located in the Physics and Bacteriology wings.

For the further development of investigation work and the building up of a strong graduate school, the employment of graduate students on a part-time basis is essential and would seem to be one of the most practicable methods at hand. The importance of this type of assistance has been stressed in the department reports (see Appendix A).

For sustained research, a strong staff on whom only a limited demand for teaching is made, is required. The strengthening of the present staff by the appointment of a few well-qualified men would afford the necessary relief in teaching, and enable a group of research workers to devote their time largely to research work.

Naturally, as research and graduate work become developed, greater resources are required for it. Apparatus, facilities and supplies must be provided.

To retain the services of the best men on the staff at present, to replace them when necessary, and to obtain others with the required qualifications to add the desired strength, the upper limits of the salary scale should be raised.

Some extra assistance is now being obtained from the Provincial Government. Part of this is being used to provide much-needed facilities for certain types of investigation work. The balance is being employed for carrying on work of special interest to the province and for extension service.

Other outside assistance is being obtained for research and graduate work, and there seems good reason to believe that this will increase.

But in order to make our greatest appeal for such support and to make the best use of it when secured, the strengthening of our organization at the points indicated herewith is imperative. Only when we are properly equipped and can adequately demonstrate our capacity to advance along these lines will the fullest co-operation of those interested and friendly outside forces come; and we feel that it is the function of the University to provide the initial impetus to this advance.

A. Departmental ReportsThe Department of Agricultural EngineeringHistory and Progress of Department

Agricultural Engineering is perhaps the youngest department in the college. When the writer took over the work of this department in October 1921 its personnel consisted of one man and its activities consisted mainly of the teaching of farm mechanics.

There existed, however, a demand for instruction in the various branches of agricultural engineering, viz:- power, tillage and harvesting machinery, farm structures, sanitation and reclamation, which called for expansion of the department. Requests for assistance in these branches soon indicated the need of a farm structures blue print service. A draftsman who is also laboratory assistant was employed in 1922.

The department has been represented on the faculty of Agriculture since 1922.

In 1923 a teaching assistant was added to the staff. Further expansion has appeared desirable to the writer since the above date and its possibilities were investigated but so far these efforts have not been successful.

Instruction

The teaching activities of this department consist of six courses for degree students, five for diploma course students and manual training half a day a week to High School students.

There is a consistent demand for assistance and information from the rural districts and during the last two years the time of one man, during the summer months, was required in drainage survey work in Pontiac county. Due to the work of this department a traction ditching machine was pur-

chased by a local farmer and during the summers of 1929 and 1930 a total of about thirty-two miles of underdrains have been installed. So far this work has been confined to two townships.

Two bulletins have been written to make available to farmers practical information on the gasolene engine and on underdrainage. Both of these were published by the department of Agriculture of the province. The former Bulletin is published in English and French.

Agricultural Engineering extension presents for the future a field of enormous possibilities. Nothing is more urgently needed in the agriculture of this province than a lowering of production costs. In this connection the reduction of the percentage of total capital invested in non-productive equipment and the need for increased efficiency in the use of labor are of fundamental importance. The first calls for farm re-planning, greater efficiency in the use of buildings and machinery and often considerable reorganization of method; the second is largely concerned with the choice and more effective use of all kinds of mechanical equipment so important in the necessary increase of production per worker. The agricultural engineer is the logical consultant in practically all questions arising in the solution of these vital problems. This is a field of extension which, at the present time, must be left untouched due to a lack of help.

Investigation and Research

Any research projects to be undertaken by this department must be of such a nature as not to call for the full time of one man.

Work in the following projects has, however, been carried on and, while not carried to definite conclusions, it has been possible to make deductions of considerable value in the solution of problems with which they are connected. These projects are:-

1. Mole drainage - A mole plow was imported from England about 1925 and used in an experimental way in several localities. Observations showed these drains to have a short life in this climate. More work should be done before this project is dropped however.

2. Dairy Stable Ventilation - During the past two winters studies of the air movement through some 15 dairy stables on and near Montreal Island have been conducted. The results of this work are of great value in the designing of ventilation systems for stables. Much remains to be done, however, before many of the questions concerning temperature and humidity conditions in stables can be definitely answered.

3. Poultry House Ventilation and Insulation - A project of a co-operative nature with the Poultry department has been conducted to ascertain the temperature difference which can be maintained in a moderately well insulated poultry house as compared with one of single board construction. Ventilation is also being studied. The possible correlation between poultry house temperatures and egg production is an important phase of this project.

Reports concerning the last two projects will be submitted within this year.

Possibilities for Specialization

We are not equipped to turn out professional engineers, yet we are in a position to produce a very superior type of management expert or service engineer.

Agricultural engineering consists of the elements of mechanical, civil and electrical engineering applied to agriculture. The agricultural engineer must possess a knowledge of these elements of engineering and must have a very definite conception of the requirements of agriculture. There are problems in agricultural engineering which wait for their solution on the highly specialized engineer in one of the above mentioned types of professional engineering but it remains for the agricultural engineer first to discover and define these problems and secondly it remains for him to apply the solution when it is found.

THE REPORT OF THE DEPARTMENT OF AGRONOMY FOR
THE FACULTY OF AGRICULTURE.

A. PROGRESS IN WORK OF DEPARTMENT.

Since this department was organized, it has always been the aim to keep the standard of the work as high as possible. This has necessitated changes of one sort and another. The progress which has been made can best be illustrated by mentioning a few of the more important changes that have taken place.

Keeping well abreast with the time, our investigational and research work has been materially changed. Single plot tests, which are wholly inadequate to provide a true answer, have given way to those which are replicated at least four times, and, in many cases, still more often. All our results now undergo a statistical interpretation to determine their significance. An extensive study is being made of soil heterogeneity on one of our fields. This should provide valuable information on experimental methods and so prove of use in making our work still more efficient. Additional facilities have made it possible to do much more exact work. A large scale drying equipment has been installed, which makes it possible to convert samples of all forage material to absolute dry weight within a few hours. Formerly, much inaccuracy resulted in an attempt to bring different samples to a comparable moisture content.

New varieties or strains of wheat, barley, oats, corn, swedes, and mangels have been developed.

Kharkov 22 M.C. - a hardy fall sown variety of wheat - is now being extensively grown in eastern Ontario and southern Alberta.

The Banner 44 (M.C.) oat has been distributed and multiplied so that it now forms the bulk of the seed produced in the organized seed centers of the Province. The Alaska oat which was introduced as a result of our tests has now taken a prominent position in the northern districts of the Province where an early oat is essential.

North Western Dent corn is grown extensively for silage purposes in the Eastern Townships, while Quebec No. 28, an early flint, is grown generally as a grain corn and in many parts of the west as a fodder variety.

Two strains of swedes, Bangholm 8112 and 8312, have been fairly widely distributed. The latter has been included in the Seed Board tests for the past five years and has given good results.

The Yellow Intermediate (M.C.) mangel has been used as basic stock for seed production in Prince Edward Island and British Columbia.

In addition to these varieties which have been distributed in this and other provinces, a number of others have been accepted by the Quebec Seed Board for the Provincial Comparative Tests: in oats, Cartier, Lasalle,

Brant and Brome - all of which have resulted from hybridization; in barley; Pontiac, a six-rowed sort; Monck, a two-rowed, and Oxford, a strong-strawed, hulless variety.

A large number of varieties and strains, in the crops worked with most intensively, are in an advanced stage of testing. Furthermore, a great many cultural practices have been tested and the results disseminated through short courses, the farm press and in pamphlet form.

The agronomy staff has furnished the supervision for the Ste. Rosalie seed farm where registered stock of our own and other varieties are grown for the provincial seed centers. This arrangement is in cooperation with the Quebec Department of Agriculture, with which a close and very satisfactory working relationship has been established.

The standard of training in the staff of the department is now much higher. The advanced degrees held by the staff are from four different universities; Cornell, Wisconsin, McGill, and Toronto. Each man has aimed to specialize in a different phase of agronomic work.

B. INSTRUCTION - COURSES, CURRICULA, AND OTHER FORMS.

This department has always stressed the teaching phase of its work. In addition to its normal complement of instruction in the non-degree courses and the junior years in the degree course, it has graduated thirty-three students with the B.S.A. degree, who have specialized in agronomy. Graduate instruction was begun in the 1923-24 session. To date, twenty-four students have registered for the M.S.A. degree.

In accord with the general change in the College curricula, the courses offered by the agronomy department have undergone considerable revision. Many of the general and elementary courses, formerly given in the first two years for the bachelor's degree, have been discontinued. This prevents considerable repetition, which formerly existed, and provides a better scheme of instruction.

The new alignment of basic courses would seem to be a much better arrangement, giving, as it does, a much more thorough preliminary training. From the standpoint of this department, however, the rearrangement may possibly prove somewhat of a drawback since students have no contact with agronomy until after they are required to name their options. There is as yet no basis on which to guage this effect since the present second year is the first which has come wholly under the new scheme.

In addition to courses given in the College curriculum, members of the agronomy staff have contributed generously to the many short courses and fairs held in various parts of the Province. Meetings have also been held in connection with various extension projects from time to time.

Considerable time has been given to the work of the Canadian Seed Growers' Association - a federal organization - and to its provincial child - the Quebec Seed Board. Both of these organizations have been supported, since they are intimately associated with almost all phases of agronomic work and have a very definite bearing on the dissemination of any of the new productions resulting from our breeding program.

C. INVESTIGATION AND RESEARCH; ITS ORGANIZATION.

The present organization of the department for investigation and research divides the work into two major fields: (1) small grain crops, (2) forage crops. Two of the members of the staff are more or less directly associated with each of these phases. This arrangement provides for continuity in the program in the event of a change in personnel.

The program of investigation and research now emphasizes, as it always has done, the breeding aspect. It was felt that a greater contribution could be made

from this angle and that is still believed to be true. Whereas our work previously covered a large number of crops, the present program calls for more intensive effort on the more important crops. In small grains, oats are receiving most attention, barley considerable, and wheat and rye, hardly any at all.

The oat crop is by far the most important grain crop in the Province and there is a definite need for a higher yielding, early oat and a late oat of better quality. These two objects, along with strength of straw and resistance to disease, are the main objectives in oats.

Considerable progress has been made already in breeding a barley suitable for malting purposes. Since there has been a definite move to encourage the production of malting barley in various sections of this province, breeding work with barley would seem very well justified.

In forage crops, specific attention is devoted to timothy, red clover, and corn, and in a minor category, orchard grass and alsike. These are all open fertilized crops and as such present a much greater problem to the breeder. It is felt, however, that, particularly with timothy and red clover, a great opportunity exists to improve the status of these crops. The work already done, offers considerable hope in that direction.

In addition to the breeding program, a number of other distinct investigation or research problems are underway. Some of these have developed from the breeding work. The following list includes the more important of these:

1. Rates and proportions of oats, peas, and vetches for silage.
2. Varietal hardiness in alfalfa.
3. Varietal resistance to smut in oats.
4. Genetic studies in corn and oats.
5. Varietal hybridization in corn.
6. Selection in self fertilized lines in swedes.
7. Soil heterogeneity studies and field research technique.

This department also cooperates with other departments in several projects. Under the Soils Research Committee, the field plot and pot tests with alfalfa have been under our supervision.

As a result of a request from the Tobacco Division for some work with tobacco, we are cooperating with the Plant Pathology Department in carrying out this work.

Last year, as a cooperative project, work was undertaken on the pasture problem. This is an important project, of which, but a few phases can be attempted with our present facilities.

THE ANIMAL HUSBANDRY DEPARTMENT

From the opening of the College this department has carried a large share of teaching and filled an important place in the extension service. Herds and flocks have been maintained and the department has had charge of the College farm administration. The policy of the department has had the following objectives:-

1. To develop and operate live stock features of importance in the Province of Quebec and subject to the limitation of a college organization to follow practice that could be recommended where similar conditions obtain.
2. To make departmental experience and contact with live stock and farm management a basis for teaching and field work.
3. To effect and maintain an organization that would give the most equipment and opportunity for the least money based on economy of operation and commercial return.
4. To give diploma course students the most useful knowledge of the practical phases of Animal Husbandry.
5. To train degree students thoroughly for specialised work in Animal Husbandry and to give them an intelligent understanding of its various relationships in agriculture generally.
6. To develop information by investigation and to distribute it in both technical and popular form.

Educational work with live stock is extremely expensive, but it is very vital in the equipment of and service to farmers in this country. In maintaining a full equipment, it is always a problem to balance commercial management with educational requirements. It is believed that

this has been accomplished fairly well at Macdonald for the net expenditure made. It is obvious, however, that with more pressing need for investigation and advanced work because of the complex problems that have to be dealt with in Canada, further strengthening of the educational side is highly desirable.

The services of the members of this department have been in constant demand by live stock associations, Boys' and Girls' Clubs, Dairymen's Associations, Agricultural Fairs, Farmer meetings, ^{short courses and other} County Agronomer activities. A great deal of information is distributed by correspondence and through the press as answers to inquiries, and numerous articles are written every year. Substantial additions have been made to the College literature in the past few years. Among the publications may be mentioned, "Individual Feeding in Swine Experimentation", "Rice Meal for Fattening", "Individual Feeding for Comparative Feeding Trials with Hogs", "Feeds and Feeding", "Feeding and Better Live Stock", "Dried Brewers' Yeast versus Linseed Oilmeal as a Protein Supplement for Dairy Cows in Milk", "Balancing the Ration".

In the distribution of improved stock it may be stated that hundreds of animals, dairy cattle, sheep and swine more especially, have been sold to farmers throughout Eastern Canada. Some have been sent to the West and a few have been exported to the United States. From a number of these, marked results of far-reaching influence have been obtained. Animals bred at Macdonald College have been prominent among the prize winners in breed associations and at the large fairs.

Wool marketing on a co-operative plan was started in 1912 by Macdonald College in Pontiac County where some very intensive work was done and from which developed through other organizations, the present Canadian Co-operative Wool Growers' organization. Cheviot sheep were introduced as demonstration flocks in 1913, two importations being made

from Scotland. Cheviots have multiplied in Canada since that time, and are being tested at the present time in Western Canada for crossing purposes on Range sheep.

The Advanced Registration for Dairy Cattle which now is a national development in Canada and is being adopted in various forms in other countries, was proposed and the plan now in operation was drafted by the Head of the Animal Husbandry Department of Macdonald College.

A member of this department is the Secretary of the Provincial Feed Board and has a great deal to do with its development and operation. Another has acted as judge of farms for the Quebec Government in the "Agricole Merite" competitions, while a third devotes more than half his time to placing students on farms and in other service and acting in the capacity of Field Representative of the School of Agriculture. The Head of the department is the Dean of the Faculty so that considering the large share of teaching carried, for all students, the popularity of major work in Animal Husbandry, the demands on staff time for extension work, the administration of the farm, the management of the live stock, the many functions performed in an advisory capacity, the investigation work carried on and the literature published, it is at once apparent that the staff of this department are carrying a very heavy load.

Practically all of the services rendered by this department are of immediate practical value to the farmer, it probably has a wider farm contact than any other department and a large section of farmers and farmer's sons judge the college very largely by the kind of Animal Husbandry Department maintained and the character of the work done in it.

It is an expensive type of department to operate but considering the development it has reached in this college, the claim may be justifiably made that the net expenditure is less than for similar work in

any other comparable institution in Canada.

The time has come when graduate work is a logical further development. The department is fairly well equipped to make a satisfactory start in graduate work; the staff are competent to undertake the instruction and can do so with the necessary assistance. The work being done has attracted wide attention and favorable comment. A large group of men are at work in Animal Husbandry throughout Canada and both the need and demand for graduate work in this branch are rapidly becoming evident.

Courses have been outlined and submitted for inclusion in the report of the Faculty of Graduate Studies.

To place graduate work in Animal Husbandry in the position which the importance of the work justifies, will call for an additional expenditure of from \$10,000 to \$15,000 annually. Little or nothing is being done elsewhere in Canada. The Federal Department is stressing live stock work and recognizes the importance of advanced training for their men. It is hoped, therefore, that as the work becomes established it will command the necessary support and it would seem reasonable to expect some measure of financial aid from the Dominion Government.

In so far as department appropriations are concerned, the only important expenditures anticipated at present are for land drainage and land clearing. The farm drainage presents a special problem because of difficulty in outlet and owing to the settling of the land in the central part of the farm. The whole system will have to be lowered and while some progress is being made with this from year to year, some substantial provision will have to be made for it as soon as the necessary outlet can be effected through the adjoining municipalities. There are some sixty acres of land on the college farm not servicing any useful purpose at present which should be cleared. The

land is urgently needed and would be a source of added income.

If the proposed boulevard is built in accordance with the present plans, it will not interfere seriously with the college property and in all probability a considerable sum of money will be obtained for land appropriated and land isolated should it be sold. In such event the money should be devoted to the improvement of the college farm land. This would enhance the value of the farm and would compensate for the loss of land.

yes

School of Household Science as well as to those of the School of Agriculture. The courses vary from the elementary, given to the Honorary Class and Junior Administrators to those designed as a basis for advanced study and research by specialists in bacteriology. The courses are listed in the announcement for 1930-31 on pages 58, 111, 129 and 137. In each course emphasis is laid upon the aspect as suggested by the title; laboratory work covers practice in methods and techniques required for each branch of the subject. The aim is to arrange that laboratory work shall cover, as far as practicable, the ground of the corresponding lectures.

A student selecting bacteriology as his major subject is expected to obtain high standing in general microbiology and bacteriology in the first year, in bacteriology and bacteriological physiology in the third year, and to cover advanced bacteriology and agricultural bacteriology (the microbiology of milk, cheese, butter, soil, and food) in the fourth year. Training in methods and techniques is thus obtained by the student before entering courses of instruction in applied agricultural bacteriology. Such training is basic to any branch of the subject. The same ideal is aimed at in the courses given to students of

DEPARTMENT OF BACTERIOLOGY.

Murray's
Opinion? Yes
get

REPORT TO THE PRINCIPAL'S COMMITTEE OF THE FACULTY OF AGRICULTURE.

Instruction

Courses

Instruction is given by all members of the Departmental Staff by means of lectures and laboratory work, with personal supervision and attention to difficulties, to students of the School of Household Science as well as to those of the School of Agriculture. The courses vary from the elementary, given to the Homemaker Class and Junior Administrators to those designed as a basis for advanced study and research by specialists in bacteriology. The courses are listed in the Announcement for 1930-31 on pages 68, 111, 119 and 125. In each course emphasis is laid upon the aspect as suggested by the title; laboratory work covers practice in methods and techniques required for each branch of the subject. The aim is to arrange that laboratory work shall cover, as far as practicable, the ground of the concurrent lectures.

A student selecting bacteriology as his major subject is expected to obtain high standing in general microbiology and microbial physiology in the third year, and to cover advanced technique and agricultural bacteriology (the microbiology of milk and dairy products, soil, and food) in the fourth year. Training in methods and technique is thus obtained by the student before entering courses of instruction in applied agricultural bacteriology. Such training is basic to any branch of the subject. The same ideal is aimed at in the courses given to students of Household Science.

Suggestions for Improvement

1. Curricula

(a) General Microbiology. By the present arrangement of courses certain students are required to take a course in general microbiology in either the 3rd or 4th year. In some cases it would appear to be more practicable to require that the student shall take the course in the 3rd year; this course is a pre-requisite for students of Animal Husbandry or Poultry who may elect to take a course in advanced technique, given in the 4th year; it is a pre-requisite similarly for students of Agronomy or Horticulture who may elect to take soil microbiology. It is suggested therefore that students of Agronomy, Animal Husbandry, Horticulture or Poultry be required to take the course of general microbiology in the 3rd year. In this connection it should be noted that students of Animal Husbandry are required by that Department in their 4th year to take leave of absence for judging livestock; this besides disorganizing the work of this department, is detrimental to the student's work in general microbiology.

(b) Soil Microbiology. A course in Soil Technology, dealing with the physics and chemistry of soils, given by the Chemistry Department, is required of the students of Agronomy and Horticulture. It is submitted that soil microbiology be also required from such students; they will then be better equipped for their subject. Pari passu, it may reasonably be inferred that soil technology should also be required from students of Plant Pathology; these students will then be better equipped for the course in soil microbiology, as well as in their own subject.

(c) It is further submitted that students will be better able to decide on the work to be taken in the definitive years if an introductory course of 3 or 5 lectures be given in the second year.

2. Routine and Equipment.

A considerable amount of thought and time has to be given to the preparation of materials such as sterile glassware and media for all of the courses requiring laboratory work. Most of this, except the actual cleaning up of the glassware used, has to be done by the instructor concerned. Routine operations of this kind and amount are special to work in bacteriology. In research work the worker himself expects to have the finer detail to consider. The provision of a trained technician in addition to the present attendant would enable the staff to give their more efficient attention to essentials. This suggestion is also submitted in regard to graduate work. Other facilities that could be improved in this way include the provision of a refrigerator rearrangement of cupboards, the improvement of sinks and drains, a better system of lighting whereby lamps would be situated for efficient illumination, a larger annual appropriation for books and materials, and adequate greenhouse space for soil work.

Further secretarial assistance is also required, to assist in the organization of library facilities, card-indexing, and office-work.

3. Organization for Research.

With the present assistance the direction and scope of research work is limited. A high standard of research can only be reached and maintained by workers who are able to give adequate attention to such work. It is hoped that work in the various branches of agricultural bacteriology may be further developed following the granting of the facilities suggested. At present the Department has in hand, under a grant from the National Research Council, an investigation on typical soils of the Province of Quebec. Lack of an assistant trained in agricultural bacteriology has held up this work during the winter. Mr. N.B. McMaster under a Bursary from the National Research Council, has been investigating the effects of external conditions on a series of soils having different manurial treatments.

McGill University. Faculty of Agriculture.

Report to the Principal's Committee

Macdonald College Department of Chemistry

Since the change in the curricula for the degrees of B.S.A. and B.H.S. the instruction in Chemistry has been materially extended. In both these curricula, three lectures and two laboratory periods of two hours each are now given throughout the first and second years. This enables us to lay a better foundation in General Chemistry and Organic Chemistry than was formerly possible.

In the Third Year, all B.S.A. students receive a course in Biochemistry, 2 lectures and 2 laboratory periods, following a related course in Biophysics. The B.H.S. students take the same course in Biochemistry, following one in Physical Chemistry. In addition to the Biochemistry, B.S.A. students taking Chemistry as their major subject have an extensive course in Analytical Chemistry, which is from now on to be made still more comprehensive by the inclusion of additional quantitative analysis and some lectures on Physical Chemistry with special reference to its application in analysis.

In the Fourth Year the Chemistry specialists and the B.H.S. students take a course of two lectures and two laboratory periods throughout the year in Dairy and Food Chemistry. The Chemistry specialists also take courses in Soil Technology, Physical Chemistry and the Chemistry of Insecticides and Fungicides, all including laboratory practice, take active part in the Seminar and carry out assigned projects requiring independent effort.

In the third and fourth years of their B.S.A. cur-

ricula, students who are specializing in other departments take courses of special interest in relation to their own specialties - for example, Soil Technology, Dairy & Food Chemistry, Insecticides and Fungicides.

Instruction, including laboratory practice, is given also for one term to second year students in the Diploma course and to Household Science students of the Homemakers and Institution Administration courses. At present, also, an Assistant teaches Chemistry to students of Grades X and XI of the Macdonald High School.

Research is carried on in the field of soils by Dr. McKibbin, in animal chemistry by Dr. McCarthy and in foods by Dr. Snell. An examination of selected soils from various parts of the Province has led to the recognition that there are various types demanding different treatments and suggesting that a general survey of the soils of the Province should be made under governmental auspices. Some indications of correlation between the composition of the soils and nutritional deficiencies of feeding stuffs grown upon them have been found. A considerable number of analyses of the amniotic fluid of cattle, normal and pathological, were made under Dr. McCarthy's direction in connection with an investigation made in collaboration with the Veterinary Science Department. Work upon maple products with special reference to methods of analysis for detection of adulteration has been in progress for some years and a new method of moulding maple sugar so as to prevent hardening and mottling has been invented. Research on soils and on maple products has received support from the National Research Council and previously from the 1911 appropria-

tion of the Dominion Government for the encouragement of agriculture. Were such external sources of support to fail the research work of the Department would of necessity be greatly curtailed. *on business here and in the city they are found here*

Library facilities for research work in Chemistry are inadequate. The number of chemical journals subscribed for is very small and were it not for the private subscriptions of members of the staff and the availability of the McGill libraries and those of the National Research Council and the Dominion Department of Agriculture - which can obviously only be taken advantage of to a limited extent - research would be extremely difficult to conduct. A grant of \$3000 for books and journal sets and \$250 a year for maintenance would put us in a much better position as regards literature. *out*

The establishment of research fellowships is desirable. To attract suitable students these should be on a part time basis and if they are to involve eleven months work a year the stipend should be about \$1000. If the Research Council grants were continued at the same time, it would be necessary to provide additional work benches in a basement room not at present fully equipped. As water, gas, electricity, steam and distilled water are already laid on in that room and there is a bench belonging to the Physics Department stored there, the equipment of this room would not involve much expense. *out*

The load of teaching upon the members of our staff is still too heavy for the efficient performance of our work of instruction and research. In the present term, the three Professors are engaged for sixty-six hours a week (an aver- *out*

age of 22 hours each) in the class room or laboratory. The half time of the assistants is fully occupied with Departmental work (including that of the High School) and with their attendance on classes here and in the city they are finding scarcely any time to devote to research except in college vacations. It is evident, therefore, that expansion of the teaching force is necessary if progress is to be made in research. This might well take the form of the establishment of a Lecturership at about \$2500 a year. A less desirable alternative would be the appointment of two additional part time assistants at, say, \$1000. Such expansion would no doubt necessitate increased appropriations for equipment and supplies and probably an increased appropriation for supply room service and for a technician trained to carry out routine analytical work.

out

DEPARTMENT REPORT OF ENTOMOLOGY AT MACDONALD COLLEGE
FACULTY OF AGRICULTURE, MCGILL UNIVERSITY.

I. Historical Review.

At the inception of Macdonald College in 1907 the work in Entomology was included in the Biology Department, the first instructor being Dr. J.M. Swaine, Three courses in entomology were given at that time, (1) a general elementary course to all students (2) one in anatomy and classification for all students and (3) a more advanced course in economic entomology to horticultural and agronomy specialists and selective students. There was at that time no biology or entomology "option", but students were allowed to take a so-called "selective" option. Under this scheme entomology was selected by W.H. Brittain of the first graduating class of Macdonald and now head of the Department, who upon graduation was appointed assistant in the department, to be followed next year by Dr. E.M. DuPorte, who is still connected with the Department as Assistant Professor. Swaine and Brittain both left the Department early in 1912 and Prof. Lochhead, head of the Department took over the teaching of entomology. The general course and the course in economic entomology continued to be given for several years without change. As time went on the courses in morphology and taxonomy were separated and extended and courses in insect ecology, technique, etc., were added under the direction of Dr. DuPorte, these courses being taken at first only by selective students. With the division of the Biology Department into the Entomological and Botanical Departments in 1920, an entomological "option" was instituted.

In 1923 Mr. A. D. Baker joined the Department. In 1925 Prof. Lochhead retired and was succeeded by the present incumbent the following year. Mr. W. E. Whitehead joined the Department somewhat later.

Present changes have consisted in putting on commencing in 1928 of a special course in advanced economic entomology for students taking major work in this subject, and a further half course supplemental to this is open to qualified students. Formerly students majoring in entomology had only the course designed for the horticultural or agronomy specialists. Courses in parasitology including medical entomology were introduced in 1929.

With the complete course revision which has taken place in 1929-1930 in the Faculty of Agriculture, the courses given in the first two years are restricted to work in the fundamental sciences of mathematics, physics, chemistry, botany, zoology, etc., and the general cultural subjects. In accordance with this plan the course in general and economic entomology was removed from the second year.

Organized graduate work has been carried out substantially as outlined in the present announcement. (The development of this work is contained in a separate memorandum.)

II Instruction - Courses, etc.

Diploma Course. A half course in general and economic entomology is given to the first year Diploma Course.

Degree Course. A. Zoology (Including Parasitology). One full course for all students, including B.H.S. and the equivalent of five other full courses for students electing them.

B. Entomology. The equivalent of eight full courses.

Graduate Course. The equivalent of six full courses.

During the past four years considerable progress has been made by the department in the way of general facilities. An additional assistant has been taken on, the equipment has been greatly increased, a large number of new books and bulletins have been added to the library. A greenhouse has been built which will not only improve our teaching facilities, but allow for further progress in research.

The department has a number of collections which are growing rapidly, all of which are catalogued to date with complete data. There is (1) the permanent reference collection (a) of pinned material and (b) one of the small orders on slides, (2) a systematic collection for advanced students in taxonomy, (3) an economic collection including representatives of the different stages of crop pests and (4) a parasite collection, together with regular slide collections required by our course in general morphology, histology, etc.

It will be noted that the courses scheduled by the Entomology Department in the Faculty of Agriculture and the Graduate Faculty combined exceed those of any other department, and make considerable demands on the staff. Some of the courses especially the one in general zoology, comparative anatomy, etc., are expensive in both time and money.

Departmental Needs From Standpoint of Teaching. There is need for much attention to the collections, which for many years remained static, but are now going ahead slowly. They are not

out

in such a condition as to reflect credit on the institution as far as their size is concerned, and until someone can devote the major part of their attention to this work only limited progress can be made. The fact that insects outnumber all other forms of animal life and that the mere technique of preparation for the collection is often slow and laborious, makes this problem a formidable one. Since training in taxonomy is a basic part of the students equipment we must have large collections in different groups available for study. Larval forms, so important in economic entomology, must be secured, treated, etc., since at present we have no larval collection worth the name.

We are now embarking on instruction work in the field of parasitology and must start from the beginning. The situation demands that we secure or develop a worker in the field of taxonomy. Since this field it is much too large to engage only the part of one man's time, the allocation of one man entirely to taxonomic investigations and the development of our various collections would round off our departmental organization and place our instruction work on a firmer basis.

The present departmental budget makes reasonable provision for maintenance and will enable us to gradually make good present deficiencies with respect to ordinary classroom material and equipment. The fitting up of a laboratory for physiological and taxonomy work is a basic need. Special provision to complete this would have to be made to the extent of approximately \$500 per annum for over a period of 5 years.

III. Investigations & Research.

Until recently no provision, financially or otherwise, has been made for carrying on research in entomology. For this reason the members of the department have devoted most of their attention to morphological and taxonomic problems, that required no outlay for equipment or assistance. Numerous papers in these fields have been published by members of the staff and others are in course of preparation.

With a certain amount of assistance from the Research Council several years of work were devoted to the investigation of the onion maggot (Hylemyia antiqua Meig.). A careful study of the bionomics of this pest has been made and the results published.

Much preliminary work has been done on the parasites of domestic animals, particularly poultry. Our field survey has given us valuable data on the distribution and relative abundance of the species concerned. Preliminary experiments have given indispensable information as to the nature of the problem and the difficulties involved. More detailed work is now going forward and, with the provision of expected increased facilities, the work can be rapidly expanded. This problem is placed first for the following reasons:

1. It offers the best method for cooperative work ~~and pooling~~ and pooling of resources of the departments concerned, viz., Poultry, Animal Husbandry, Veterinary, Chemistry and Entomology.

2. The problem is one of great intrinsic importance and is nowhere in Canada being investigated in a comprehensive manner.

In Entomology there are many fundamental problems which we are anxious to attack. Economic entomology at the present time

is in much the same condition as would be a science of medicine built up without the foundations of physiology and pharmacology. Entomologists are practically at the limit of their empirical methods and are now turning to more fundamental studies. There are many problems in insect metabolism which we are anxious to investigate if some additional equipment for physiological study were available. The bearing of such work as insecticide studies is obvious, but, at present, nothing of the kind is being undertaken in Canada and very little elsewhere. Another entomological problem which we have had in mind for some time but have not had the funds to investigate is a qualitative and quantitative study of soil insects, the factors influencing their abundance and movements, and their relation to other soil organisms.

The district about Montreal is probably the most important vegetable growing section in Canada and is also the centre of an important and rapidly expanding orchard industry. Macdonald College occupies a strategic position for conducting basic studies into the insects and diseases affecting such crops, carried out with proper regard for modern methods of research. The investigations that we have in mind are of that fundamental character that can best be conducted at a university where closely coordinated work between different departments can be carried out over a period of years.

As a further development in the work of the department, which would fill a field now completely neglected in Canada and would link up with the parasite project already referred to, is the initiation of work on insect parasitism. The biological control of insects is at the fore front of entomological research problems today and is of such a fundamental character that it should be

carried out at a university. My proposition is that this field be recognized as a part of the work of the Parasitological Institute that we propose to establish. To undertake this a careful study of the parasite Hymenoptera is required. There is now no Hymenopterist in Canada, which seriously cripples the work that the Entomological Branch is trying to accomplish. It is therefore proposed that the taxonomist whom we hope to appoint should have this group as his main field, and thus link up the work of the department with that of the parasitological institute.

Further problems in the field of parasitology which should be considered are soil nematodes and protozoa. Each of these fields are considered of sufficient importance to engage the entire attention of several workers at the Imperial Bureau of Soil Science and the Imperial Bureau of Animal Health respectively.

Departmental Needs in Connection with Research.

The organization for a fully developed animal parasite investigation has already been referred to. Very definite plans for this project have been made which, if fully carried out, will involve an expenditure of approximately \$45,000 for capital expenditure and maintenance spread over a five year period. Negotiations for financial support have been carried out with the National Research ^{successfully}

Council, the Empire Marketing Board and the Quebec Government.

If these plans do not mature it is essential that other avenues be explored at once, as this offers one of the best means of furnishing vital fundamental assistance to the live-stock industry and in a field that is not at present preoccupied.

In undertaking work of this sort two types of assistance are involved, viz., (1) labour, and (2) scientific assistance. For entomological research plants are required, the same as for horticultural or agronomic investigations - a fact which seems usually to be overlooked, and this involves the arrangement for growing, harvesting and tending these crops. Even a small piece of land situated at the College, would involve seasonal labour to the extent of one man, occasional horse labour and probably some casual labour later on. This must be definitely provided for if worth while work is to be undertaken, since leaving such things to the good will of so-called "outside" departments never works out in practice.

In addition, provision must be made for scientific assistance and a graduate-assistant would be the best type of an assistant for this work, since it would provide someone with the interest required, would help to build up our graduate work and give to the man himself an opportunity to work on a suitable problem. In securing assistants of the right type we would have to be prepared to compete with similar institutions.

It may be pointed out that, at best, we could do nothing in a large way in such investigations at Macdonald College - and for obvious reasons. Furthermore, insects and disease have

to be studied where they exist. They can rarely be "planted". In order to study them the workers must have mobility and be ready to carry out work with the infected crop anywhere within a reasonable radius of his centre. m

It may be of interest to point out that one regional entomological laboratory of the Department of Agriculture has six permanent workers, two seasonal workers and one permanent stenographer and is equipped with laboratories, insecticide mixing plant, insectaries, sprays, two cars, etc., and other equipment much in excess of our provision and they probably spend more than the whole institution devotes to pure research. This is for experimental and research work alone, no instruction being involved. Perhaps we cannot compete with that and undoubtedly we must confine ourselves to the more fundamental phases of the subject, but we too must be enabled to study outbreaks in the place of their occurrence. m yes

Nevertheless, it is clear that we are not getting what we should get out of our organization for the lack of opportunity to carry our work to its logical conclusion. In other words, ordinary maintenance absorbs the funds available, but most of the plant, equipment and personnel for a much wider field of work are there. Supplemented with a little more material and equipment and personnel and a relatively modest appropriation we could increase our usefulness many times over and begin to make those contacts, which are so vital to an Agricultural College. I have estimated that, provided certain of these hypothetical added facilities are pooled with the Plant Pathology Department, we could carry out the programme, indicated in a general way in the foregoing, by the expenditure of \$2500-\$3000 per annum for each of the two departments.

SUMMARY

1. The history and development of the department has been summarized.
2. It has been pointed out that the number of teaching hours undertaken by members of the staff of the department in the Faculties of Agriculture and Graduate Studies respectively exceed that of any other department.
3. The greatest need of the department from the point of view of teaching is a full time man for insect taxonomy. It is pointed out that the work of this man would link up the activities of the department with those of the parasitological institute, and it is proposed that he would devote his attention mainly to parasitic Hymenoptera.
4. The fitting up of a laboratory for insect physiology and toxicology is referred to as a basic need.
5. The advisability of developing research work in the field of crop insects is stressed, and the requirements for the work and the necessary method of approach is indicated.

DEPARTMENT OF FARM ECONOMICS

The work in economics at Macdonald College, formerly otherwise carried on, reached the status of a department in 1926-27. At the time of establishing this department there was no hope or intention revealed of rapid expansion in staff. This intention has been rigidly adhered to and this is still a one-man department. The somewhat leisurely development has the advantages of allowing time for estimating the necessity for this comparatively new department by the administrative officers and staff and also the demand (if any) for the expansion in this field of work in research, teaching and extension work. Perhaps the most accurate estimate of the demand for expansion of this work may be revealed by a brief survey of what has been done.

Past Accomplishments

The comparatively short period during which this department has existed under its present form, coupled with the fact of its limited personnel, contribute to the brevity of this description. However, some progress may be reported.

Instruction work

During the period all courses in this field have been made elective with the exception of one course, namely, The Principles Of Economics, which is compulsory. This change, as far as we may judge from the very short period which has elapsed

since its adoption, has resulted in making the work more popular with the students and consequently has increased instructional work. The courses now offered degree students include the following.

1. Principles of economics (compulsory)
2. Advanced course in economic theory (elective)
3. Farm organization and management "
4. Principles of marketing and cooperation "
5. The economics of agriculture "

The amount of lecturing entailed is and can only be accomplished by giving part of the work in alternate years. These classes are, by this method, comparatively large, in some cases too large. In addition to this work there are increasing demands for students for project work in this field which will be considered under the discussion of the possibility for graduate work. Lecture work for diploma course students comprises the principles of economics, farm organization and management and principles of marketing. A pronounced increase in the demand for instructional work in this field is in evidence.

Research

Investigational work is particularly fundamental to teaching in a field as youthful as that under discussion. This is particularly the case in studying the problems of agriculture where textbooks evolved in other sections of the world are of limited assistance. A considerable foundational work remains to be done in this field, we may be permitted to anumerate the following publications:

1. Canadian Farming since Confederation
Journal of Farm Economics, July 1927.
2. The development of agricultural economics
Address, C.S.T.A. Convention, Quebec, 1928.
Scientific Agriculture, Oct. 1928.
3. Recent Changes in Farm Organization in Western Canada
Journal of Land & Public Utility Economics,
Aug. 1928.
4. Immigration and Land Settlement,
Journal of Commerce, Oct. 1928.
5. Quo Vadis
Journal of Commerce, June 1929.
6. Production per Man
University of Toronto Studies
History and Economics, Vol. 2, 1930.
7. Some Results of the Post War Depression on Farm Organ-
ization in Canada
Address, International Conference of Agricultural
Economics, Ithaca, New York, Aug. 23, 1930.
Scientific Agriculture, Nov. 1930.

Investigational work of the nature of surveys have been of necessity limited. Considerable work has been done by this department on the cost of milk production investigation now being carried on by the provincial government. A certain amount of data is now accumulating on this survey from the English speaking areas contributing to the Montreal fluid milk supply. This material might furnish some valuable information if time were available for tabulating and analysing results.

Some data has been secured from the township of North Hatley in Stanstead County which might yield some information

did time permit to continue the work and analyse results. In the field of investigational work where so much appears necessary the department has reached the stage where activities undertaken cannot be even continued let alone expanded or new and apparently necessary work undertaken.

Service to Agriculture

Extension work has expanded until some limit has been necessary to this activity in order to prevent the interference with lectures in the class room to assume too great proportions. This extension work is chiefly local but by no means limited to the province. In this connection, attention might be called to the active part taken in the organization of the economics group within the C.S.T.A., designed partly to secure greater unanimity of effort in this comparatively new field of work.

Potentialities

Obviously the stage has been reached where two alternatives present themselves. One of these alternatives is the expansion of the department, involving some addition to the staff. The other alternative is the elimination of the work which may be considered the least necessary. The latter alternative is the one necessarily being followed at the present time. This involves the practical elimination of any consecutive research work, the limitation of extension service and the impossibility of expanding instructional work including project work.

The expansion of the work in economics and particularly the establishment and expansion of the branch in the Department

of Agriculture at Ottawa may account for the increased interest in this field. Preparation involves graduate training. // There is some enquiry for the opportunity for graduate training of students in economics who intend to specialize in the problems of agriculture. It is obvious that this work cannot be provided by a small department unless by some arrangement whereby the major portion of the work could be secured at McGill. The department at Macdonald College might get in touch with the students and provide the problems for investigation. In regard to possible investigational work on the problems of agriculture the lack of, need for and advantages from statistical investigation and analysis warrants special emphasis. The potentialities of McGill University and Macdonald College as a graduate school for workers in agriculture would indicate that this development might be given some consideration. //

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Department of Horticulture.

A statement concerning the progress in work of the Department of Horticulture may be conveniently considered under the following headings, administration, instruction, extension and investigations and research:-

(a) Administration - The Department operates intensively about 60 acres in orchards, small fruit plantations and vegetable crops, which has returned an average revenue for the five years 1926-30 of \$12,328, and 10,000 sq. ft. of greenhouses with an average revenue during the same period of \$4,901. A campus of 60 acres embracing large collections of trees, shrubs and flowers, as well as lawns, is maintained. In connection with the collections of varieties of fruits, vegetables and ornamental plants, records as to yields, periods of bloom, hardiness of plant, and other records are kept. In addition the Department shares in the expense and maintenance of the Biological Greenhouses.

(b) Instruction - Teaching and educational work has required a large share of the time of the staff, in the

Degree courses, in the Diploma courses, in Short course work and in lectures, demonstrations and other contacts with many organizations and people. Several pamphlets and many mimeograph sheets, as well as timely magazine articles, both technical and practical, have been issued.

(c). Extension.- The Department was instrumental in the early work of the School Fairs and Gardens, and has continued an interest in this field, although the activities have been greatly curtailed. In the field of County Agricultural Representatives the Department had an active part and has continued its contact although in a reduced degree. The Department has produced and distributed large quantities of new and leading varieties of plants to many parts of the province and elsewhere. Among these are, - strawberry and raspberry varieties, grapes, scions of the McIntosh, Melba and many other varieties of apples, asparagus and rhubarb plants and other vegetable seeds, and many thousands of plants of peonies, irises, flowering shrubs and other ornamental plants. Plans for Rural School and Church grounds improvement have been prepared and the work furthered with plants.

(d). Investigations and Research.- Many problems have confronted the Department and much work has been done in connection with seed production, varietal trials, pollination studies, thinning fruit, fertilizer tests, top-grafting, seed production, plant improvement and other lines of investigations. The Macdonald Rhubarb was originated and developed and now has become of considerable importance in the commercial trade. Unfortunately research work and investigations have not played as large a part in the history of the Department as the situation should

have justified, owing to insufficient finances and assistants.

The needs in Horticulture are great and all opportunities should be availed. The following recommendations are made:-

1. Graduate courses in Pomology and Vegetable Crops have been offered, and it is hoped that with them some provision for scholarships will be provided. This would permit of certain lines of investigations, under projects or theses, being carried on in the Department.
2. The appointment in the Department of a specialist in Landscape Architecture and Ornamental Horticulture, who could devote all his time to these subjects in teaching and research.
3. The appointment of a technical assistant who could devote all his time to research in Pomology and Vegetable Crops.
4. The provision for assistance, clerical and gardeners, to assist in research and other investigations, including plant breeding in fruits, vegetables and ornamental plants, root-stocks, hardiness of plants, storage problems, cultural practices, etc.
5. Provision for the extension of a Library and Herbarium. There is a great shortage in both of these, as well as equipment for handling them.
6. Establishment of a By-Products Laboratory. At present there is no by-products laboratory devoted to the study and research in the methods of processing and canning fruits and vegetables in Canada. In California and in other States there are large and important Departments of the

Universities devoted to these purposes and they have contributed largely to the success and development of important agricultural crops. The Canadian producer and consumer of fruit and vegetable products is faced with an increasing import of foreign products of these kinds amounting to \$45,298,221 (import value) in 1930. At the same time the production of fruits and vegetables in Canada has been seriously affected. It is suggested that the National Research Council should co-operate in a national effort of this nature.

7. Establishment of an Arboretum and Botanical Garden. There is no Arboretum or Botanical Garden in the Province of Quebec and no national one in Canada. Within fifteen miles of Macdonald College is Montreal, a centre containing over 12.5% of the population of Canada. Macdonald College possesses many acres, some idle, and others producing much less than \$50.00 per acre per year, and within a radius of several miles of Macdonald College is other idle property of as fine natural beauty as any land on the Island of Montreal and all suitable for an Arboretum and Botanical Garden. The arguments in favor of such a garden are the facts that Canada has a wide and natural flora, yet no national Arboretum and Botanical Garden. Macdonald College and McGill University have a responsibility in this respect that could be met through the support of the citizens of Canada.

N.
B.

Physics Department

During the last two or three years all the undergraduate courses in Physics have been considerably extended and improved. Laboratory courses have received special attention and complete new student manuals have been prepared. New courses for fourth year and graduate students are being given in the Kinetic Theory of Gases and in Molecular Physics; while the course in Biophysics has been made more comprehensive and includes a completely new laboratory course (first given in 1930-31).

The Mathematics courses, also given by this department, have been extended so that the status of a student at the end of the second year should now compare very favorably with that achieved at other Colleges.

In addition to the work of the department in the Faculty of Agriculture, courses are being given in both Physics and Mathematics to students in the School of Household Science; while four lectures and two laboratory classes in Physics are given each week to the High School students.

In considering the contribution that the Physics Department of Macdonald College may make towards the post graduate work of McGill, the situation appears to be as follows. Post graduate work in physics must be based on solid undergraduate training in physics and mathematics. The training given here at present in the first two years is sound and would serve as an excellent starting point; but to attain B.Sc. standard in Honour Physics several more advanced courses in both Physics

and Mathematics would have to be given. With the present teaching load it is evident that such additions to the work cannot be undertaken without additions to the staff. This does not seem desirable at the present time. McGill is within easy reach and is well fitted to give such advanced courses, so that a student desiring to specialize in Physics might better do so there.

Having specialized in Physics it is natural that some students may wish to proceed to higher work. Of the newer branches of Physics receiving particular attention at present that portion of the subject which deals with the physics of biological processes is of considerable importance. A study of this kind presents difficulties, but offers the opportunities of any new field. It is thought that a student having aptitude and a liking for such work might well pursue his studies in this Department. The close association of the departments of Physics and Biology at Macdonald College should enable really practical problems to be attacked, and at the same time, should ensure that any pure research attempted might contribute to a general understanding of biological activities.

It must be pointed out that before any extended programme can be carried out along this line considerable additions to the research equipment would have to be made.

At the present time physical problems are continually arising in connection with investigations which are being carried on by the biological departments here. In such cases it is the object of this Department to cooperate as much as possible with the other departments, and whenever feasible to supply guidance and equipment to the student particularly concerned with the problem in question.

As to the sources of student material, we would depend at present upon McGill. In order to have a wide appeal to students a large body of high-grade published work is necessary. This, for various reasons, we have not got. Available time is the most important consideration, and while we are striving to get something done, it is evident that many years are generally necessary for a department to build up a high reputation.

There is no doubt that there are plenty of opportunities at present for graduates in physics who have a good knowledge of Biology.

With the above in mind it is suggested,

(1) that little or no further course work in Physics of post graduate nature should be attempted here at present,

(2) that a limited number of students might well be encouraged to prepare their theses in the borderland realm of the Physics of biological processes. To be fitted for the work a student should have taken two or more courses in both Biology and Chemistry in addition to his work in Physics.

While teaching is the chief undertaking of the department a good deal of extension and investigational work is carried on. These last two endeavours have increased steadily so that at present they are more extensive than at any previous time and such these activities should be increased as funds will allow.

The department teaches the ordinary undergraduate botanical courses including: General Botany, Morphology of Plants, Anatomy and Physiology, and Taxonomy. However, it gives in the undergraduate work to the course in Plant Physiology and Ecology

DEPARTMENT OF PLANT PATHOLOGY

This department was first organized in 1920 when the then existing department of Biology was divided into the departments of Entomology and Botany. From the first the chief endeavour was the teaching of Plant Pathology and so in 1926 the name was changed from the department of Botany to the department of Plant Pathology. Since the organization of this work forty-three students have taken undergraduate and thirty-five, post graduate studies (either as major or minor work) in the department. This includes a present registration of seven undergraduate and four post graduate students. While the numbers are not large they are quite in keeping with the demands for men in this field which is limited. A very fair proportion of the workers in plant pathology in Canada today are graduates of Macdonald and seven are engaged in this work in other parts of the Empire including four who are in the employ of the British Colonial Service. Thus the teaching work and graduates of the department have been given recognition.

While teaching is the chief undertaking of the department a good deal of extension and investigational work is carried on. These last two endeavours have increased steadily so that at present they are more extensive than at any previous time and both these activities should be increased as funds will allow.

The department teaches the ordinary undergraduate botanical courses including: General Botany, Morphology of Plants. Anatomy and Cytology, and Taxonomy. Emphasis, however, is given in the undergraduate work to the courses in Plant Pathology and Mycology

as an essential supporting subject to the study of Plant Pathology. Post graduate courses are also offered in the last two subjects. That the work given in the above subjects is adequate seems to be proven by the fact that a number of our graduates have been granted full credit for both undergraduate and post graduate courses taken in the department in registering for post graduate studies in several other universities. These include, Toronto, Cornell and Wisconsin where Plant Pathology is featured. However, a course in advanced Plant Physiology should be available for students at Macdonald taking Plant Pathology and other studies such as Agronomy. Tentative plans have been made to meet this situation through co-operation with the department of Botany, McGill University. Otherwise, the courses offered at Macdonald constitute a sound basis for a thorough training in Plant Pathology.

The members of the department keep in close contact with the practical aspects of the subject through field studies carried on in the summer and by giving whatever assistance is possible to plant growers in solving their disease problems. This proves invaluable in teaching and in selecting and directing thesis problems in post graduate studies.

In our investigational work a few more or less restricted lines have been and are being emphasized and consistently followed. Chief of these are the investigations of the department into the virus diseases of plants. This was started in 1920 and has been carried on ever since. Studies are in progress this year on the properties of the virus causing tobacco mosaic a common and troublesome disease. Investigations on the method of action and value of various chemicals as seed disinfectants against seed borne parasites causing disease,

has been for some years a particular effort. The effects of one pathogenic organism on another (both of which are common disease organisms to one plant) have been made a special study. Cereal smuts have been studied considerably. A start has been made in investigating the factors determining winter hardiness in plants and it is the intention to develop, as intensively as funds will provide for the necessary equipment, this study which is of great importance in Quebec and Canada generally.

The department is quite well equipped with the apparatus necessary for plant pathological work such as sterilizers, glass-ware, microtomes, research microscopes, photomicrographic apparatus, hydrogen-ion outfit and chemicals. A fine collection of prepared microscope slides and preserved material of pathological specimens are available for the study of the important plant diseases. The department is endeavouring to build up special lines of equipment such as temperature control apparatus for the study of winter hardiness and effects of temperature on disease development. A start has been made along this line and one experimental plant chamber artificially lighted and thermostatically heated is available. This equipment has proven to be very useful and other units should be added. A laboratory hydraulic press was added last year to be used in the extraction of plant juices in comparative studies on the juices of diseased and healthy plants. There is considerable greenhouse space available for graduate students who might require such facilities. An important feature is that this space is divided into convenient sections with separate heating which allows for much better control over the environmental factors which are important in all plant disease studies. The College library is

well provided with the botanical and phytopathological journals and publications, but there is some need for additions particularly relative to publications in foreign languages.

In considering the opportunities for graduates in Plant Pathology, it is to be recognized that the field in Canada is limited. Plant pathological work in Canada has had considerable development and expansion within the last few years, but it is to be expected that the new positions available are likely to become fewer. It is gratifying to know that a fair number of our graduates have been appointed to positions in other parts of the Empire, and while one could expect that there would be an increase in demand for men in this field there is, of course, no guarantee as to this. During the period of rapid expansion, the man with a general training in Phytopathology has been in demand but now the stage has been reached when the demands are for men with specialized training in certain branches of the science. Thus it would not seem to be wise to make an effort to increase the present numbers taking work in the department, but rather to encourage a few promising students to follow graduate work in ~~a~~ certain well chosen lines such as those mentioned above. This can best be done by the members of the department devoting considerable time to such research work.

This brings us to a consideration of the demands made upon the personnel of the department. At present the staff is composed of two professors, one lecturer and a graduate assistant. With such few members it is obvious that the undergraduate and post graduate teaching makes excessive demands upon each member. Then there is the demands of extension work which is carried on chiefly in the summer.

Thus it is evident that each member has far too little time for research work. This situation can only be met by the appointment of another man. The department would greatly profit by the addition of a man who had a reputation in a certain branch of phytopathological study and each member would be freed of excessive teaching and be given time to pursue research work more intensively. This seems a logical way of enhancing the reputation of the department and so deserves consideration.

The department is very handicapped by lack of laboratory space and this should be provided as soon as possible.

There would be much benefit from increased funds for extension work, but this is considered to be secondary to the two items mentioned above.

Extension.

1. Lectures to farm groups and at short courses
2. Correspondence re management problems
3. Assistance to poultry and other farms
4. General articles for the agricultural press
5. Assistance in organization and direction of the

Department of Poultry Husbandry

Departmental Report to Faculty

Principal's Report

Courses.

The courses at present offered are sufficient for specialized training in the field of poultry husbandry when supplemented by required courses given in other departments as well as courses which may be elected for certain phases of specialization. The possibilities of election may be broadened according to certain requirements.

The alternating plan of putting on certain courses has opened up much better possibilities for the student to select a grouping of subjects for his own specific needs. It also allows the instructor more time for personal research, investigation and study.

Extension.

Considerable time is given to extension phases of work. Present extension activities may be listed as follows:-

1. Lectures to farm groups and at short courses.
2. Correspondence re management problems.
3. Assistance to poultrymen at farms.
4. General articles for the agricultural press.
5. Assistance in organization and direction of the

Montreal Poultry Show.

6. Judging poultry at county and district Agricultural fairs.
7. Cooperative assistance to the Poultry Service of the Department of Agriculture at Quebec and the Provincial Poultry Association.
8. Secretarial work of the Quebec R.O.P. Breeders Association.
9. Assistance in the direction of the Canadian National Poultry Record Association.
10. Work of Secretary-Treasurer of the Poultry Science Association.
11. Assistance in the organization and direction of the Canadian section of the World's Poultry Congresses.

During the past year the annual convention of the Poultry Science Association was held at the College, July 9-11. The proceedings of that meeting were arranged and published by the poultry department although financed through the courtesy of The Lake of the Woods Milling Company of Montreal.

The department is in close contact with all phases of developmental work in Poultry Husbandry throughout Canada, having a member of the staff actually on the board of direction of most of the important activities underway.

Investigation and Research.

The Poultry Department policy of activities centres largely around the experimental and research work underway and projected for the future. Three major lines of activity are

being developed, all of which should serve as bases for specialization for poultry students. These phases of work are first, genetic and breeding problems, second, growth and nutritional problems, and third, disease and parasitic problems. The third phase, that of disease and parasites, will be carried on in co-operation with Dr. Conklin and the Committee on Poultry Parasites, respectively.

The possibility for attracting students to specialize in Poultry Husbandry depends largely upon work of immediate fundamental nature being carried on by the department. The above mentioned phases of research are of the utmost importance to the development of the industry.

Production records of eggs, breeding activity and growth will be available for students in Economics or others wishing to obtain material for statistical analyses. Such data should be available for projects of various types.

The list of work already published serves as a basis to designate the type of some work projected (See Appendix D).

Genetic and Breeding Work

1. Study of the Inheritance of Body Size and Egg Size.

(The object of this study is to determine the number of genetic factors involved in the inheritance of body size and egg size and to discover their relation to other factors, the inheritance of which has already been determined).

2. Artificial Impregnation Problems.

3. Sex Ratio in the Fowl.

4. Cross-breeding and Meat Production.

5. Statistical Studies of Egg Size.

Growth and Nutritional Problems.

1. The Relationship of Body Type and Meat Production.

(This problem involves the study of the growth and feed consumption of various pure bred and cross bred stock to varying ages as designating classes of market stock).

2. Market Duck Growth and Feed Consumption.
3. Molasses in the Chick Growing Ration.
4. Barley as a supplement for Corn in the Chick growing ration.
5. Slipped Tendons in Growing Chicks.

Disease and Parasites.

1. Possible carriers of Disease.

(A study of body lice as possible transmitters or carriers of Chicken Pox).

Special attention is being given to the development in the departmental organization to allow for major attention to research and experimentation. Facilities for handling such work are at hand, although some additions regarding special handling, cooping and equipment are still needed.

Projects under way at present and others under consideration are of a nature to allow for special studies which could be handled by undergraduate as well as graduate students as projects and theses.

Sources of student material.

The nature of the investigational work under way is of the type which is of greatest interest and importance at the present time in the poultry industry. Such problems should be of special interest to prospective undergraduate and graduate students.

Opportunities for graduates and ex-students.

The ever increasing development in the poultry industry with a keen demand for further research and investigation

The veterinary department at an agricultural college is one of the fundamental problems of breeding nutrition and disease, offers better opportunities at present for the trained specialist than heretofore. Special attention is given to the development of definite fields of specialization within the work since the greatest need is for men fitted to take junior investigational positions. Of course, only the desirable type of student should be encouraged to go in for investigational work. Others may be offered opportunities to develop along lines of specialization to fit them for commercial or production activities.

Veterinary Department.

The veterinary department at an agricultural college is established primarily as a service department. The veterinarian fills the position of an adviser to the animal husbandman in matters of animal health. From the educational viewpoint, the courses given in this department are of supporting nature. Physiology of farm animals is essential to those majoring in any branch of animal husbandry in that they must have an understanding of the normal.^{Animals} Applied physiology and microbiology are also taught in this department.

Graduate students have utilized the materials and equipment of this department during the past years. Among those who have obtained their advanced degrees from this institution, Mr. J. Townsend studied "Mastitis of Dairy Cattle". This work consisted of a bacteriological study of the milk from animals with infected udders. Mr. Townsend demonstrated the presence and the distribution of the micro-flora of the infected udders. In the thesis, attention was called to the isolation of A. abortus, the causative agent of undulant fever of man, in a high per cent of the cases. This work was completed before the grave importance of A. abortus in milk was known.

In connection with the bacteriological study of the microbiological studies in mastitis, the veterinarian conducted tests with various agents for the prevention and treatment of the disease. Autogenous vaccines, injections of colloidal carbon and of milk were employed in a large number of animals.

During the period from 1921-1923 a study was made of an unknown disease of cattle that had existed in the eastern part of this Province for some years. One large farm reported a loss of over \$25,000.00 in purebred animals, between 1918 and the fall of 1923. The ante and post-mortem symptoms were very confusing as illustrated by the many previous erroneous diagnoses.

Studies conducted on the farm and in the laboratory were followed by the isolation of the causative agent. The organism was a new species and was named B. suberis since it was found to be prevalent in cork bricks and corn from many sources.

Immunological and serological studies resulted in the preparation of an immune serum for the protection of susceptible animals. This biological product was entirely satisfactory and succeeded in checking the losses upon the farm mentioned.

The incidence of latent reactions to the tuberculin test and of non-reaction by infected individuals, received much attention in 1922. With these factors in view, a test was devised and applied which gave very satisfactory results. A report of this method was given in the Journal of the American Veterinary Medical Association. It may be stated that a modification of the tests announced at that time have been used in the eradication of tuberculosis by the Dominion and U.S. Federal Governments for the past six years.

Studies were made of the Dreyer's antigen for the immunization of animals against tuberculosis. Chemical methods and serological methods for the detection of tuberculosis have also received attention.

Genital disease among dairy cattle have been considered for many years as the major problem confronting both the animal husbandman and the veterinarian. There are many handicaps to such an investigation following the success with which Prof. B. Bang focused attention upon one form of bacterial life which he and his co-worker Stribolt discovered in 1898. Since Bang discovered "the abortion organism", all workers have continued to search for it and to neglect other potential disease producing factors. In our work, we have considered the physiology, bacteriology, chemistry, pathology and clinical observations.

Mr. A.S. MacFarlane and later Mr. R.R. Thompson have studied the bacterial flora of the pregnant uterus. One hundred and thirty uteri

have been considered in systematic studies of the utere-chorionic space and the amniotic fluids in order that a better understanding might be had of the bacterial flora. Clinical examinations preceded bacteriological studies. Case histories were recorded whenever possible and chemical studies of the amniotic fluids of eighty of the above samples were carried out by Mr. L. Pugsley as reported in his thesis for the M.Sc. degree.

The combined studies of the bovine uterus have lead to the following conclusions:- 1. Uteri found to be clinically diseased have contained a microbial flora and have been found to contain an amniotic fluid that was not normal. 2. Many uteri contain signs of pathological conditions and A.abortus is not present yet organisms commonly spoken of as 'secondary invaders' frequently appear. Over 85% of all pregnant uteri studied had a bacterial flora. 4. When bacteria capable of reducing nitrates to nitrites were present, the amniotic fluid was found to be high in total nitrogen content and the amino acid nitrogen was greatly increased. 5. Tissues that contained bacteria capable of fermenting carbohydrates were also altered chemically. 6. The Ca/P and the K/P ratios were found to be altered in the diseased specimens. The significance of these alterations has not been determined but will be reported upon from further studies. 7. The density of the amniotic fluids and the pH of the fluids are altered in the diseased specimens and have a practical value. By observations of the fluid or by simple methods of determining the pH of the fetal fluid, it is possible to determine the condition of the tract from which a fetus is expelled. 8. It has been pointed out that the organisms present in the uterus may alter the condition of the media and thus make it a more suitable place for the development of A.abortus. Further study will be required in order to determine whether A.abortus is a separate entity or a plasmorphic form of some other organism.

Clinical, histo-pathological and seminal examinations of sires

has been made during the last eight years. During this time there has been an increasing demand for this type of work as the importance of it has become known through results obtained in the field. It has been demonstrated that the sire is frequently a cause for much of the breeding disease in individual herds. This does not agree with the opinion and statements of these workers who are considering that all genital diseases are due to A.abortus. Our records contain conclusive evidence that the sire may cause serious trouble in herds that are entirely negative to the agglutination test for Bang's disease and that the type of disease introduced by the sire may be even more serious than Bang's disease.

It is possible to detect alterations in the spermatazoa of many diseased sires before they have appeared of importance from the clinical aspects. Alterations occur in the shape of the cells, variations in the head length measurements and in the staining which allow the laboratory examination to evaluate the male as a potential breeding animal.

Many cases have been followed through breeding years after they have been diagnosed as diseased. The clinical records of the spermatically diseased animals have borne out the laboratory diagnosis. The fact that the sire is diseased may not only cause genital disease in the females bred to him, but may be observed in the offspring that are reared.

The work with genital diseases is being continued. It might be benefitted by an increase in technical assistance. The use of graduate students is not sufficient for the continuity of the work. This field offers an opportunity for aid to live stock breeders that is not at present available in this country.

Other lines of work have been undertaken as they appeared. The ones of greatest importance being - parasitic investigation in domestic animals; a new disease of brooder-housed chickens (completed); nutrition and diseases of fur-bearing animals. A parasite of sheep and mink, said to be new to this continent, was discovered in an animal autopsied in December 1929.

Reports upon work and scientific papers have been published from this laboratory at various times.

B. (1) List of Graduates.

CLASS '11

- Brittain, William Harold,
Professor of Entomology and Zoology, Macdonald College, Que.
- Buck, Frank Ebenezer,
Asst. Professor of Horticulture, University of British
Columbia, Vancouver, B.C.
- Gorham, Raymond Paddock,
Asst. Entomologist, Dominion Entomological Laboratory,
Fredericton, N.B.
- Grisdale, Frank S.
Olds, Alta.
- Innes, Robert
Deputy Minister, Dept. of Natural Resources, Halifax, N.S.
- Reid, William John
Farming, Middleton, P.E.I.
- Savage, Alfred
Professor of Animal Pathology, Manitoba Agricultural
College, Winnipeg, Man.
- Spencer, Charles Martyn
Farming, Great North Road, Henderson, New Zealand.
- Straight, Ernest Manzer
Supt. Experimental Farm, Sydney, B.C.
- Summerby, Robert
Professor of Agronomy, Macdonald College, Que.
- Sweet, Carl
Chief, Seed Division, Dominion Seed Branch, Ottawa, Ont.
- Williams, Charles McAlister,
Business, Charlottetown, P.E.I.
- Wood, Gordon William
Professor of Animal Husbandry, Manitoba Agricultural
College, Winnipeg, Man.

CLASS '12

- Baird, Wylie W.
Supt, Experimental Farm, Nappan, N.S.
- Brown, Frederick Steadman
Asst. Supt. Dominion Experimental Station, Lennoxville, Que.

- Campbell, Archibald Alexander
Dept. of Natural Resources, C.P.R., Brooks, Alta.
- Davis, Malcolm Bancroft
Chief Assistant, Horticulture Division, Central
Experimental Farm, Ottawa, Ont.
- Durost, Henry Beecher
Extension Work, Woodstock, N.B.
- Fiske, Stewart McLeod
Farming, Martintown, Ont.
- Fiske, Kenneth McLeod
Fleming's Limited, Juniper, N.B.
- Flewelling, David Bruce
District Agriculturist, Bridgewater, N.S.
- Kennedy, Roderick Stuart
Advertising Promotion Manager, Montreal Daily Star,
Montreal, Que.
- Lods, Emile Albert
Asst. Professor of Agronomy, Macdonald College, Que.
- Newton, Robert
Professor of Field Husbandry and Plant Biochemistry,
University of Alberta, Edmonton, Alta.
- Ness, Alexander Renfrew
Asst. Professor of Animal Husbandry, Macdonald College, Que.
- Parent, Leandre Vadnais
Mgr. Canadian Co-operative Wool Growers' Ltd. Lennoxville, Que.
- Raymond, Lee Carleton
Asst. Professor of Agronomy, Macdonald College, Que.
- Rhoades, Ernest
Sec. World's Grain Exhibition and Conference, Regina, Sask.
- Robertson, John Gordon
Live Stock Commissioner, Dept. of Agriculture, Regina, Sask.
- Robinson, James Milton
Field Supervisor, Soldier's Settlement Board, Salmon Arm, B.C.
- Simard, Jules Arthur
District Inspector, Dominion Seed Branch, Montreal, Que.

CLASS '13

- Dash, John Sydney
Director of Agriculture, Georgetown, British Guiana.
- DuPorte, Ernest Melville
Asst. Professor of Entomology & Zoology, Macdonald College.

Emberly, Arthur Franklin
Farming, Ayer's Cliff, Que.

Gibson, William H.
Supt. Dominion Experimental Farm, Indian Head, Sask.

Gorham, Alexander Campbell
Director of Agricultural Education, Sussex, N.B.

Halliday, George Courtland
Farming, Sawyerville, Que.

Jenkins, Murray Hazelton
Poultryman, Dom. Exp. Farm, Nappan, N.S.

King, John Kenneth
Canadian Co-operative Live Stock Producers, Ltd.
327 Bridge Street, Montreal, Que.

LeLacheur, Garnet
Dom. Seed Branch, Sackville, N.B.

Lothian, David Ernest
Canadian Immigration Agent, 116 Union St., Aberdeen, Scotland.

MacBeth, Kenneth
Asst. Supt., Dom. Exp. Farm, Agassiz, B.C.

McClintock, Laurence Delmar
County Agriculturist, Knowlton, Que.

Middleton, William Alexander
Provincial Horticulturist, Agricultural College, Truro, N.S.

O'Brien, George Earl
Gen. Mgr. Canadian Co-operative Wool Growers' Ltd.
217 Bay St., Toronto, Ont.

Raymond, Arthur Edwin
Farming, Woodstock, N.B.

Richardson, Benjamin Billings
Farming, Oxford Mills, Ont.

Savoie, François Narcisse
Sec. and Director of County Agriculturists,
Dept. of Agriculture, Quebec, Que.

CLASS '14

Blondin, Edward Napoleon
Ralston Purina Co., Huntingdon, Que.

Coffin, Caryl Fenn
Box 236, Valdosta, Georgia, U.S.A.

- Cooke, Osborne Alvin
Provincial Dept. of Agriculture, Prince Albert, Sask.
- Cowan, Philip Russell
Cerealist, Central Exp. Farm, Ottawa, Ont.
- Dougall, Robert
40 Jeppe St., Pretoria, South Africa.
- Drayton, Frank Lisle
Plant Pathologist, Central Exp. Farm, Ottawa, Ont.
- Fiske, Hollis J. MacLeod
Business, W.J. McCart & Co. , 74 Colborne St., Toronto, Ont.
- Hamilton, David Wiley
Professor of Agricultural Education, Pullman, Washington.
- Hamilton, Richard Iredale
Asst. Agrostologist, Central Exp. Farm, Ottawa, Ont.
- Hodge, Clarence Herbert
Ontario Farmer, Consolidated Press, Toronto, Ont.
- Huestis, Ralph Ruskin
University of Oregon, Eugene, Oregon.
- Husk, Ray Elson
Farm Manager, Holmes Farm & Orchard, Charlotte, Vt.
- MacFarlane, Wimburne Laurie
Farming, Fox Harbour Point, N.S.
- Moe, George Gordon
Associate Professor of Agronomy, University of British
Columbia, Vancouver, B.C.
- Muir, George William
Chief Asst. to Dom. Animal Husbandman, Central Exp. Farm,
Ottawa, Ont.
- Newton, William
Plant Pathologist, Exp. Farm, Agassiz, B.C.
- Ritchie, Thomas Frederick
Asst. in Vegetable Gardening, Central Experimental Farm,
Ottawa, Ont.
- Schafheitlin, Adolf Otto
Farming, Canning, N.S.

CLASS '15

Boyce, George Coonley
Farming, Athelstan, Que.

Durling, Vernon Beckwith
Address Unknown.

Evans, Harry Ilsley
Soldiers' Settlement Board, Sussex, N.B.

Hodgins, Ellard Lee
c/o Beatty Bros. Ltd., Smiths Falls, Ont.

King, James Hayes
Dominion Live Stock Branch, Moncton, N.B.

MacDougall, Winfred Gregor
County Agriculturist, Lennoxville, Que.

McOuat, John Egbert
Principal, High School, Pointe Claire, Que.

McOuat, Leonard Christie
General Agricultural Agent, C.P.R., Windsor Station,
Montreal, Que.

Mitchell, Homer Dean
Address Unknown.

Presley, Fred. Young
120 East 39th Street, New York City.

Roy, Harold Bower,
Address Unknown.

Ricker, Earl Malcolm
Director of Norfolk County Agricultural School,
East Weymouth, Mass.

Russell, Charles
Principal, State Normal School, Westfield, Mass.

Sadler, Wilfrid
Professor of Dairying, University of British Columbia,
Vancouver, B.C.

Taylor, Andrew Gilmore
Poultry Husbandman, Central Exp. Farm, Ottawa, Ont.

Westbrooke, Lawrence Jay
Farming, South Bryon, N.Y.

Williamson, Harold Freeman
276 Indian Road, Toronto, Ont.

CLASS '16

Biggar, Thomas Howard
Farming, Huntingdon, Que.

Boving, George Bror
Extension Asst. In Agronomy, University of British Columbia,
Vancouver, B.C.

Cochrane, Edward Stanley,
Farming, Bedford, Que.

Crothers, Rev. Loring W.F.
Hull, Que.

Fraser, John Gordon Earl
Chief. Asst. to the Cerealist, Central Exp. Farm,
Ottawa, Ont.

Gooderham, Charles Benjamin
Dominion Apiarist, Central Exp. Farm, Ottawa, Ont.

Hay, George Clunie
1645, 17th Avenue West, Vancouver, B.C.

Hicks, Ora Campbell
Soils and Crops Division, University of New Brunswick,
Fredericton, N.B.

Hutchings, Clarence Basden
Asst. Entomologist, Dominion Entomological Branch,
Ottawa, Ont.

Hyndman, Austin Elliot
Business, 847 Grosvenor Avenue, Montreal, Que.

Lyster, Chester
Stockyards Agent, Dominion Live Stock Branch, Stock
Yards, Toronto, Ont.

McOuat, James Harold
Acme Farmers' Dairy Ltd., Walmer Road, Toronto, Ont.

Moyman, John Chambers,
Chief, Division of Illustration Stations, Central
Exp. Farm, Ottawa, Ont.

Schafheitlin, Rudolf
Manager, Cannard Fruit Co., Canning, N.S.

Ste. Marie, Joseph Antonio
Supt. Experimental Station, Ste. Anne de la Pocatiere, Que.

Sutton, Walter Elbert
Farm Manager, Lyndonville, Vt.

CLASS '17

Bothwell, Alexander Frederick
County Agriculturist, Lachute, Que.

Cunningham, Howe Symonds
Plant Pathologist, Agricultural Station, Paget East,
Bermuda.

Dickson, George Herbert
Asst. in Charge of Hardy Fruit Work, Vineland Experimental
Station, Vineland, Ont.

Elliott, Rowland Montagne
Maritime Live Stock Marketing Board, Moncton, N.B.

Fiske, Roland C. McLeod
Business, 343 Harvard Ave., Claremont, Calif.

Hetherington, Thomas Golbert
Supervisor of Illustration Stations for N.B., Fredericton,
N.B.

Jones, Lewellyn Riendeau
Florist, Swanton, Vt.

Morris, Dr. Campbell
Dentist, Birks Bldg. Montreal, Que.

Newton, John Dawson
Associate Professor of Soils, University of Alberta,
Edmonton, Alta.

Roy, Louis Charles
Dept. of Agriculture & Natural Resources, Can. National
Rlys., Montreal, Que.

Spicer, Edmund Carlyle
Farming, Spencer's Island, N.S.

Wood, Edgar George
District Agriculturist, Hannah, Alta.

CLASS '18

Arnold, Gilbert E.
Farming, Breeder and Importer of Purebred Livestock,
Grenville, Que.

Boulden, Charles Eric
District Agriculturist, Windsor, N.S.

Kelsall, Arthur
Entomologist, Dom. Entomological Laboratory, Annapolis
Royal, N.S.

Kinsman, Frederick Borden
Supervisor of Illustration Stations for N.S., Lakeville, N.S.

McMahon, Enoch Arthur
Mgr. of Insecticides and Fungicides Division, John Cowan
Chemical Co., 9 Dalhousie Street, Montreal, Que.

Mace, Herbert Sward
38 Nichols Street, Rutland, Vt.

Newton, Miss Margaret
Rust Research Laboratory, Winnipeg, Man.

Reid, Robert Jack Murray
Farming, Hemmingford, Que.

Stanford, Miss Pearl (Mrs. Paul St. Pierre)
28 Kedsie Ave., Chicago, Ill.

Taylor, Eldon Main
N.B. Dept. of Agriculture, Fredericton, N.B.

CLASS '19

Grove-White, Eric
Colonial Dept. of Agriculture, Zomba, Nyasaland, British
Central Africa.

Wilcox, Charles John
Farm Supt. Keystone Chocolate Co., Harrisburg, Pa.

CLASS '20

Ashton, William E.
c/o Bull & Sons, Brantford, Ont.

Birch, Anthony Home Wyrley
Apiarist, Central Experimental Farm, Ottawa, Ont.

Derick, Russell Arthur
Cerealist, Central Experimental Farm, Ottawa, Ont.

Dunsmore, Wilford Grant
Asst. Animal Husbandman, Central Exp. Farm, Ottawa, Ont.

Hay, William Drew
Asst. Supt. Dom. Exp. Station, Lethbridge, Alta.

Hodgins, Samuel Raymond Norris
Asst. Professor of English, and Editor, Quebec Journal of
Agriculture, Macdonald College, Que.

Jones, Walter Norman
Chief, Animal Nutritionist, Albert Dickinson Co.
Chicago, Ill.

Maw, William Alfred
Asst. Professor of Poultry Husbandry, Macdonald College, Que.

Ness, John Earle
Farming, Howick, Que.

Peterson, Clyde Farrington
Business, 10325 - 12th Street, Edmonton, Alta.

Reid, William John
Farm Manager, Rougemont, Que.

Saunders, Leslie Gale
Zoology Dept. University of Saskatchewan, Saskatoon, Sask.

Skinner, Samuel Greenway
Landscape Gardener, Canadian National Rlys., Toronto, Ont.

CLASS '21

Barnett, William H.
Live Stock Branch, Ottawa, Ont.

Bradford, William Cecil Rogers
Farming, Lachute, Que.

Bragg, P.D.
Address Unknown.

Buckland, Allan John
Business, Atlas Plywood Corp., Richford, Vt.

Butler, Henry Albert
International Pulp and Paper Co., Cornerbrook, Nfld.

Chauvin, Frank Bernard
Lawyer, 720 Maplewood Ave., Montreal, Que.

Daly, Paul Macintyre
263 Charlotte St., St. John, N.B.

Denison, Simeon Minor
Dumart Co., Kitchener, Ont.

Hay, Angus Lockhart
Consolidated Mining and Smelting Co., Marysville, B.C.

Hockey, John Frederick
Plant Pathologist, Dominion Laboratory of Plant Pathology,
Kentville, N.S.

Jones, Arthur Reginald
Mgr. Egg and Poultry Exchange, 680 Main Street, St. John, N.B.

Laurie, Douglas Melrose
Farming, Hemmingford, Que.

MacAloney, Mary (Mrs. C.J. Owen)
134 North Brook Street, Geneva, N.Y.

Mackenzie, John Murdock Fraser
Experimental Station, Fredericton, N.B.

- Major, Thomas Grant
Tobacco Division, Central Exp. Farm, Ottawa, Ont.
- Matthews, George Douglas
Experimental Station, Scott, Sask.
- Milne, Arthur Robb
Immigration Dept, Can. National Rlys., Cockspur St.,
London, S.W. 1, England.
- Newton, Dorothy Elizabeth
Dept. of Plant Pathology, Macdonald College, Que.
- Norcross, Ashley Christopher
Norcross-McNabb, Inc., 1942-E 75th Street, Cleveland, Ohio.
- Paige, Morton Baldwin
Farming, Glenmore Ranch, Kelowna, B.C.
- Perry, William Thomas
Dunwalk Farm, Far Hill, N.J.
- Peterson, Archibald William
Live Stock Branch, Ottawa, Ont.
- Richardson, James Keith
Asst. Plant Pathologist, Dom. Laboratory of Plant
Pathology, St. Catharines, Ont.
- Scannell, James Wesley
District Plant Disease Insepector, Dom. Laboratory of
Plant Pathology, Indian Head, Sask.
- Simmonds, Pyre Morton
Plant Pathologist, Dom. Laboratory of Plant Pathology,
Saskatoon, Sask.
- Watson, Cyril James
Chemistry Division, Central Exp. Farm, Ottawa, Ont.

CLASS '22

- Bate, Harold K.
Farming, Black Lands, Restigouche Co., N.B.
- Beaudin, Joseph L.A.
Business, Ormstown, Que.
- Boily, Francois E.L.S.E.
District Live Stock Promoter, Dept, of Agr. Sherbrooke, Que.
- Buchanan, James Stewart
Sun Life Assurance Co., 75 Federal St., Boston, Mass.

- Clay, Harold Waldorfe
Hog Grading Inspector, Dom. Live Stock Branch,
Charlottetown, P.E.I.
- Collins, Charles McKittrick
Agr. Representative, Dept. of Agr. N.S., Lawrencetown, N.S.
- Dogherty, Franklin William
American Jersey Cattle Club, 1210-62nd Street, Brooklyn, N.Y.
- Gerhardt, William Begg
United Fruit Co., Guaro, Orienta, Cuba.
- Gordon, William Lawrence
Asst. Plant Pathologist, Dom. Rust Research Laboratory,
Manitoba Agr. College, Winnipeg, Man.
- Graham, J. Wesley
District Sheep & Swine Promoter, Dom. Live Stock Branch,
Moncton, N.B.
- Hammond, George Henry
Junior Entomologist, Dom. Entomological Laboratory,
Hemmingford, Que.
- Lachaine, Osias Wenceslas
Dom. Division of Botany, c/o Ontario Agr. College, Guelph, Ont.
- McGreer, Eric Daniel
Farm and Ranch Review, Calgary, Alta.
- Ness, Robert Bruce
Farming, Howick, Que.
- Shepherd, Edward Fred. Sisnett
Asst. Botanist and Mycologist, Dept. of Agriculture,
Reduit, Mauritius.
- Skinner, Clarence Tipson
Dominion Fruit Inspector, 1 Common Street, Montreal, Que.
- Sutherland, John Douglas
c/o F.G. Todd, 920 Castle Bldg., Montreal, Que.
- Templeton, Robert William
Farming, Riverfield, Que.
- Welsh, John Nicholas
Cerealist, Dominion Rust Research Laboratory, Manitoba
Agr. College, Winnipeg, Man.
- Winter, James McGill
Farming, Ormstown, Que.

CLASS '23

Armitage, Wendell H. University of Saskatchewan, Saskatoon, Sask.
Business, 83 Frontenac Street, Sherbrooke, Que.

Armstrong, Thomas
Experimental Station, Vineland, Ont.

Atwell, Ernest A.
Forest Products Laboratories, Dept. of Interior, Ottawa.

Baker, Alexander D.
Asst. in Entomology and Zoology Dept., Macdonald College.

Bowen, George Harry
Box 306, International House, 500 Riverside Drive,
New York City.

Brighton, Harris Weir
Asst. Can. Trade Commissioner, B. Mitre 430, Buenos Aires,
Argentina.

Dimmock, Frederick
Asst. Agrostologist, Dom. Experimental Station, Harrow, Ont.

Graham, Archibald Robert
Dom. Parasite Laboratory, Belleville, Ont.

Grisdale, John Hume
Farming, Iroquois, Ont.

Holden, Edgar Wendell
Student, Veterinary College, Cornell, Ithaca, N.Y.

McKibbin, Reginald Robert
Asst. Professor of Chemistry, Macdonald College, Que.

McOuat, Thomas Edward
Lachute, Que.

Maw, Arthur John Goodall
Poultry Department, Macdonald College.

Perron, Wilfred Henry
W.H. Perron & Co. Ltd., 929 St. Lawrence Blvd., Montreal.

Rolleston, Lancelot Omond
Tuinucu Sugar Co., Tuinucu, Santa Clapa, Cuba.

Smith, James Black
Address Unknown

Stevens, John Valentine
Abitibi Power & Paper Co., Iroquois Falls, Ont.

Vanterpool, Thomas Clifford
Dept. of Botany, University of Saskatchewan, Saskatoon, Sask.

Williams, Edward Kimpton
460 Bloomfield Ave., Outremont, Que.

Wurtzburger, Ralph Lawrence
Business, 1305 West Lawn Ave., Racine, Wis.

CLASS '24

McGarigle, Joseph Alexander
Busfield MacLeod Co., 394 Bay Street, Toronto, Ont.

Mitchell, Claude Ritson
Forest Products Laboratories, 3420 University St., Montreal,
Que.

Smith, Robert Henry
2050 Marlowe St., Montreal, Que.

Walsh, George Stanley
Farming, Hemmingford, Que.

Stewart, Kenneth Edward
Dominion Entomological Laboratory, Indian Head, Sask.

CLASS '25

Angell, Herbert R.
Dept. of Agr., Australia (Exact address unknown).

Brigham, John Holyoke
87 Lincoln Ave., St. Albans, Vt.

Cooke, Homer Edgar
R.O.P. Poultry Inspector, Arundel, Que.

Fleury, Joseph Paul
Live Stock Branch, Sherbrooke, Que.

Fogerty, Charles Douglas
Farming, Galt, Ont.

Goldie, James Alexander
Vineland Exp. Station, Vineland, Ont.

Haslam, Robert Jarvis
Tobacco Inspector, Harrow, Ont.

Hempson, John Ames
Address Unknown.

- Hill, Hinson,
Research Worker in Horticulture, Central Exp. Farm,
Ottawa, Ont.
- Hunt, George Edward
Dept. of Agriculture, Moscow, Russia.
- Lanthier, Joseph Donald
Consolidated Press, Toronto, Ont.
- Owen, Gasper William
Address Unknown.
- Tully, Wilbur Campbell
Prof. Poultry Husbandry, State Agr. College, Brookings, S.D.
- Ward, Frederick Stephen
Dept. of Agr, Kuala, Lumpur, Federated Malay States.

CLASS '26

- Bell, Roy Stewart
Mount Bruno Golf Club, St. Bruno, Que.
- Cooke, Leslie James
Farming, Arundel, Que.
- Cooper, Richard Francis V.
c/o Seccion Fomento Rural du F.C.S., Plaza Constitution,
Buenos Aires, Argentina.
- Cossman, Paul Albert
United Fruit Co., Guaro, Orienti de Cuba.
- Hamilton, William Brooks
Bureau of Public Health, University of Kentucky,
Lexington, Ky.
- Hetherington, Stanley Wilmot
Dept. of Chemistry, Rhode Island State College, Kingston, R.I.
- Levine, William
Ste. Agathe des Monts, Que.
- Perrault, Champlain
Laboratory of Plant Pathology, Ste. Anne de la Pocatiere, Que.
- Russell, Mary Gertrude
2026 Jeanne Mance St., Montreal, Que.
- Walford, Stephen McOuat
Poultry Dept., Purdue University, LaFayette, Ind.
- Walker, David Randolphe
Macdonald College, Que.

Walker, William Wallace
Business, 113 Stanley St., St. Lambert, Que. (Home address)

McMurray, Miss M.
45 Welpark Road, Ayrshire, Scotland.

CLASS '27

Bennett, Ralph Kerr
Live Stock Branch, Ottawa, Ont.

Heslop, Thomas Arthur
A.C. White Landscape Co., 2049 McGill College Ave.,
Montreal, Que.

Hicks, Arthur John
Botany Division, Central Exp. Farm, Ottawa, Ont.

Macdougall, Colin Clyde
District Agriculturist, Sussex, N.B.

Montserin, Blazire Gregory
Santa Margarita, St. Joseph, Trinidad, B.W.I.

Patterson, Donald Flacith
Entomologist, Vineland Exp. Station, Vineland, Ont.

Patterson, Nelson Amos
Entomological Laboratory, Annapolis Royal, N.S.

CLASS '28

Bynoe, Evan Theodore
Graduate Student, Bacteriology Dept., Macdonald College, Que.

Dawson, Vernon Courtenay
Federated Malay States (exact address unknown).

Deakin, Alan
Graduate Student, Dept. of Genetics, University of Wisconsin,
Madison, Wis.

Drummond, Neilson Alexander
District Agriculturist, Campbell's Bay, Que.

Johnson, John Hector
School of Education, University of Toronto, Toronto, Ont.

MacFarlane, Alexander Sterling
Fisheries Experiment Station, Halifax, N.S.

Marshall, William Beckman Hamilton,
Fruit Inspection Service, 1 Common St., Montreal, Que.

- Nadir, Tasian Nubar
Boulevard Said 1, Alexandria, Egypt.
- Rowell, Paige Howard
Farming, Abbotsford, Que.
- Ste. Marie, Charles Edouard
Division of Illustration Stations, Central Exp. Farm,
Ottawa, Ont.
- Stuckey, Ronald Wilson
Dept. of Agriculture, Kampala, Uganda, British East Africa.
- Tait, George McLeod
Horticulture Dept., Cornell University, Ithaca, N.Y.
- West, John
Address Unknown

CLASS '29

- Finlayson, Roy Leonard
Dom. Entomological Laboratories, Chatham, Ont.
- Fitzpatrick, Randal Evelyn
Plant Pathology Dept., Toronto University, Toronto, Ont.
- Harvest, Cecil Hamilton de Vere,
c/o Col. Harvest, United Service Club, London, England.
- Hawkes, Madeleine Elizabeth
c/o Family Herald & Weekly Star, Montreal, Que.
- Holcomb, Robert Kirkwood
Ste. Anne de Bellevue, Que.
- Howatt, Lorne John
Dept. of Plant Pathology, Macdonald College, Que.
- Johnson, Avalon Earl
50 Duncan St., Halifax, N.S.
- Lindsay, William Edward
Dominion Entomological Laboratory, Dept. of Agr. Chatham, Ont.
- McCormack, Robert Bruce
Plant Pathology Dept., Cornell University, Ithaca, N.Y.
- McMaster, Norman Berry
Macdonald College, Que.
- Olmsted, Frederick Stoughton
1844 Main Street, East Hartford, Conn.

Paige, Emmerson George
Dom. Fruit Branch, Jackson Bldg., Ottawa, Ont.

Pickett, Allison DeForest
Box 82, Fort Williams, N.S.

Taylor, Carlton Fulton,
Plant Pathology Dept., Cornell University, Ithaca, N.Y.

Whitehead, Walter Edward
Macdonald College, Que.

CLASS '30

Bain, Frances McGregor
Chemist, Dept. of Agriculture, Port of Spain, Trinidad, B.W.I.

Cameron, James McBain
Stellarton, N.S.

Eardley, Eric Allworth
Botany Division, Central Exp. Farm., Ottawa, Ont.

Haslam, George Lloyd
Tobacco Division, Central Exp. Farm, Ottawa, Ont.

Hudson, Samuel Claude
Economics Branch, Dept. of Agriculture, Ottawa, Ont.

Johnson, Robert Edward
Division of Horticulture, Central Experimental Farm, Ottawa.

Jack, Robert
Chateauguay Basin, Que.

Lawrence, Edgar Athalstan
27 West 15th Street, New York, N.Y.

Logan, Vaughn Stewart
R.R. No. 1, Amherst, N.S.

Longley, Robert Prescott
21 Chicora Ave., Toronto, Ont.

McLeod, Frederick George
District Agriculturist, Box 279, Moncton, N.B.

MacVicar, Roderick McIssaac
Forage Crops Division, Central Exp. Farm, Ottawa, Ont.

Millinchamp, Robert
Macdonald College, Que.

Munro, Sanford Sterling
Poultry Division, Central Exp. Farm, Ottawa, Ont.

Parris, George Keith
Plant Pathology Dept., Cornell University, Ithaca, N.Y.

Richards, Ralph Edward
Farming, R.R. No. 4, Stouffville, Ont.

Sharpe, Lawrence Allan
c/o Harvey School, Hawthorne, N.Y.

Sharvelle, Eric George
Dept. of Plant Pathology, University of Alberta,
Edmonton, Alta.

Smith, Robert Allan
New Brunswick Dept. of Agriculture, Fredericton, N.B.

Woodward, James Crawford
R.R. No. 4, Lennoxville, Que.

Palmer, Harold Edward
Farming, R.R. No. 1, Hemmingford, Que.

Binkock, F. (M.S.A.)
Agronomist, Forage Crops Division, Central Experimental
Farm, Ottawa, Ont.

Foster, E.H. (M.S.A.)
Farm Experimentation, New York Agricultural College,
Geneva, N.Y.

Hanson, L.H. (M.S.A.)
Superintendent, Experimental Farm, Regina, Sask.

Leak, D.A. (M.S.A.)
Cornell University, Ithaca, N.Y. (Graduate work for Ph.D.)

Lofe, E.A. (M.S.A.)
Assistant Professor of Agronomy, Macdonald College, Que.

Parent, H.O. (M.S.A.)
Supervisor of Administration, Statistics in Prince Edward Island.

Reynolds, R. (M.S.A.)
General Manager of the Federal Department of Agriculture,
Ottawa, Ont.

Rogers, J.E. (M.S.A.)
Farming (address unknown)

Russell, E. Gertrude (M.S.A.)
(address unknown)

Schurman, H.A. (M.S.A.)
Asst. Experiment Station, Experimental Station, Charlottetown, P.E.I.

B. (2) Post Graduates.

LIST OF GRADUATES WITH ADVANCED DEGREES

AGRONOMY

- Bayfield, E.G. (M.S.A.)
Cereal Chemist, Department of Agronomy, Ohio Agricultural
Experiment Station, Wooster, Ohio.
- Bird, J.N. (M.S.A.)
Lecturer in Agronomy, Macdonald College, Que.
- Clarke, J.A. (M.S.A.)
Superintendent, Experimental Station, Charlottetown, P.E.I.
- Cox, K. (.M.S.A.)
Asst. to Superintendent, Experimental Farm, Nappan, N.S.
- Cunningham, H.S. (.M.S.A.)
Plant Pathologist, Experimental Station, Paget East, Bermuda.
- Davidson, J.G. (M.S.A.)
Asst. Superintendent, Experimental Farm, Indian Head, Sask.
- Dimmock, F. (.M.S.A.)
Agrostologist, Forage Crops Division, Central Experimental
Farm, Ottawa, Ont.
- Eaton, E.L. (M.S.A.)
Farm Superintendent, Nova Scotia Agricultural College,
Truro, N.S.
- Hanlan, L.H. (M.S.A.)
Superintendent, Demonstration Farm, Hearst, Ont.
- Lamb, C.A. (M.S.A.)
Cornell University, Ithaca, N.Y. (Graduate work for Ph.D.)
- Lods, E.A. (M.S.A.)
Assistant Professor of Agronomy, Macdonald College, Que.
- Parent, R.C. (M.S.A.)
Supervisor of Illustration Stations in Prince Edward Island.
- Raynauld, R. (M.S.A.)
General Manager of the Société d'Expertise Agricole,
Montreal, Que.
- Rogers, J.T. (M.S.A.)
Farming (Address unknown)
- Russell, M. Gertrude (M.S.A.)
(Address unknown)
- Schurman, D.C. (M.S.A.)
Asst. Superintendent, Experimental Station, Charlottetown, P.E.I.
- Tinney, B.F. (M.S.A.)
Asst. Supt. Experimental Station, Charlottetown, P.E.I.

BACTERIOLOGY.

- Bynoe, E.T. (M.Sc.)
Student Assistant in Dept. of Bacteriology,
Macdonald College, Que.
- Gough, W.F. (M.Sc.)
McGill University, Montreal, Que.
- Hamilton, W.B. (M.Sc.)
Public Health Laboratories, Lexington, Ky.
- Johns, C.K. (M.Sc.)
Assistant Agricultural Bacteriologist, Ottawa, Ont.
- Thompson, R.R. (M.Sc.)
Assistant in Dept. of Bacteriology, Macdonald College, Que.
- Townsend, C.T. (M.Sc.)
Research worker in Food Microbiology under Dr. K.F. Meyer,
San Francisco, Calif.
- Zoond, A. (M.Sc.)
Board of Health, Cape Town, South Africa.

CHEMISTRY (AGRICULTURAL)

- Atkinson, H.J. (M.Sc.)
Research Assistant under National Research Council,
Macdonald College (Candidate for Ph.D.)
- Beaudet, L. (M.Sc.)
Asst. Chemist, Provincial Laboratories, Ste. Hyacinthe, Que.
- Brooks, R.O. (M.Sc.)
Fellow in Physiological Chemistry, Yale University,
New Haven, Conn. (Candidate for Ph.D.)
- Carleton, E.A. (M.Sc.)
Chemist, The Kentucky Rock Asphalt Company,
Bowling Green, Ky.
- DeLong, W.A. (M.Sc.)
Asst. Professor of Chemistry, Acadia University, Wolfville, N.S.
- Fowler, D.E. (M.Sc.)
Chemist, Naugatuck Chemical Co., Naugatuck, Conn.
- Leduc, J.A. (M.Sc.)
Professor of Chemistry, Oka Agricultural Institute, Oka, Que.
- Lochhead, A.G. (M.Sc.)
Dominion Bacteriologist, Central Experimental Farm, Ottawa, Ont.
- Mitchell, C.R. (M.Sc.)
Assistant Chemist, Forest Product Laboratories, Montreal, Que.

CHEMISTRY (AGRICULTURAL) Continued.

- Robison, S.C. (M.Sc.)
Chemist, The Continental Can Company, Syracuse, N.Y.
- Scott, J.M. (M.Sc.)
(Address unknown)
- Skazin, L. (M.Sc.)
Assistant Chemist, National Research Council, Ottawa, Ont.
- Van Zoeren, G.J. (M.Sc.)
Chemist, The DePree Laboratories, Holland, Mich.
- Warren, T.E. (M.Sc.)
Department of Mines, Ottawa, Ont.

ENTOMOLOGY

- Armstrong, T.A. (M.Sc.)
Entomological Branch, Ottawa, Ont.
- Baker, A.D. (M.Sc.)
Assistant in Entomology, Macdonald College, Que.
- Daviault, L. (M.Sc.)
Entomological Branch, Berthierville, Que.
- DuPorte, E.M. (M.Sc.)
Assistant Professor of Entomology and Zoology,
Macdonald College, Que.
- Dyce, E.J. (M.Sc.)
Lecturer in Apiculture, O.A.C., Guelph, Ont.
- Graham, A.R. (M.Sc.)
Entomological Branch, Ottawa, Ont.
- Hammond, G.H. (M.Sc.)
Entomological Field Laboratory, Hemmingford, Que.
- Maltais, J. (M.Sc.)
Entomological Field Laboratory, Hemmingford, Que.
- Painter, R. (M.Sc.)
Entomological Branch, Ottawa, Ont.
- Patterson, N.A. (M.Sc.)
Entomological Branch, Annapolis Royal, N.S.
- Saunders, L.C. (M.Sc.)
Associate Professor, Zoology Department, University of
Saskatchewan, Saskatoon, Sask.

ENTOMOLOGY (Continued)

Stewart, K.E. (M.Sc.)
Dominion Entomological Laboratory, Indian Head, Sask.

White, R.M. (M.Sc.)
Entomological Branch, Treesbank, Man.

PLANT PATHOLOGY

Atwell, E.A. (M.Sc.)
Forest Products Assistant, Ottawa, Ont.

Dustan, A.G. (M.Sc.)
Entomologist, Dominion Entomological Branch, Ottawa, Ont.

Godbout, F.L. (M.Sc.)
Plant Pathologist, Quebec Dept. of Agriculture, Quebec, Que.

Gordon, W.L. (M.Sc.)
Plant Pathologist, Dominion Rust Research Laboratory,
Winnipeg, Man.

Harrison, K.A. (M.Sc.)
Assistant Plant Pathologist, Dominion Field Lab, of Plant
Pathology, Kentville, N.S.

Hill, H. (M.Sc.)
Research Worker in Horticulture, Division of Horticulture,
Dominion Experimental Farm, Ottawa, Ont.

Lachaine, O.W. (M.Sc.)
District Plant Disease Inspector, Dominion Dept. of
Agriculture, Ottawa, Ont.

MacRae, N.A. (M.Sc.)
Tobacco Specialist, Tobacco Division, Central Experimental
Farm, Ottawa, Ont.

Machacek, J.E. (M.Sc.), (Ph.D.)
Plant Pathologist, Dominion Rust Research Laboratory,
Winnipeg, Man.

Major, T.G. (M.Sc.)
Tobacco Specialist, Tobacco Division, Central Experimental
Farm, Ottawa, Ont.

Montserin, B.G. (M.Sc.)
Plant Pathologist, Trinidad, B.W.I.

Newton, Dorothy E. (M.Sc.)
Assistant in Plant Pathology, Macdonald College, Que.

Perrault, C. (M.Sc.)
Head of Dominion Laboratory of Plant Pathology,
Ste. Anne de la Pocatière, Que.

PLANT PATHOLOGY (Continued)

Pomerleau, Rene (M.Sc.)

Provincial Forest Pathologist, Berthierville, Que.

Popp, Wm. (M.Sc.)

Plant Pathologist, Dominion Rust Research Laboratory,
Winnipeg, Man.

Richardson, J.K. (M.Sc.)

Assistant Plant Pathologist, Dominion Laboratory of
Plant Pathology, Fredericton, N.B.

Scott, G.A. (M.Sc.)

Assistant Plant Pathologist, Dominion Laboratory of
Plant Pathology, Saskatoon, Sask.

Vanterpool, T.C. (M.Sc.)

Assistant Professor of Biology, University of Saskatchewan,
Saskatoon, Sask.

4. Publications published by the College.
5. Circulars and leaflets, published by the College.
6. Farm Bulletins, published by the Quebec Department of Agriculture.
7. Circulars and leaflets, published by the Quebec Department of Agriculture.
8. Contributions to the Journal of Agriculture and Horticulture of the Province of Quebec.
(edited by a member of the staff.)
9. Contributions to other Farm Papers.
10. (a) Annual Reports to the Principal of the University and to the Provincial Minister of Agriculture.
(b) Informational leaflets and booklets about the College.
11. Miscellaneous, including non-technical books, contributions to literary publications, letters to the popular press, etc.

C. LITERATURE.

McGill University

Faculty of Agriculture

1909 - Brittain, John.

Publications of Members of the Staff of Macdonald College,
School of Agriculture.

Toronto, The Education Book Co., Limited,

with introduction by

These publications may be classified as follows:

1. Text-books.
2. Technical Bulletins, published by the College.
3. Contributions to Scientific Societies and Periodicals.
4. Farm Bulletins, published by the College.
5. Circulars and Leaflets, published by the College.
6. Farm Bulletins, published by the Quebec Department of Agriculture.
7. Circulars and Leaflets, published by the Quebec Department of Agriculture.
8. Contributions to the Journal of Agriculture and Horticulture of the Province of Quebec.
(edited by a member of the staff.)
9. Contributions to other Farm Papers.
10. (a) Annual Reports to the Principal of the University and to the Provincial Minister of Agriculture.
(b) Informational leaflets and booklets about the College.
11. Miscellaneous, including non-technical books, contributions to literary publications, letters to the popular press, etc.

1. Text-Books

1909 - Brittain, John.

Elementary Agriculture and Nature Study -

Toronto, The Education Book Co., Limited,

with introduction by

Robertson, Jas. W.

and sections by Lynde, Carleton, J., Burrell, Martin,

and Caravan, H.W.E.. pp. VIII + 298, of which 184

by Brittain. illus. 12 mo.

Lynde, Carleton J.

Lynde, Carleton J.

The Physics of Some Common Tools

being pp. 185-243 of the preceding.

Jas. W.

New York, Sturgis & Walton Company, pp. 290 + XIII

Snell, J. P.

Household Chemistry

Montreal, Rensuf Publishing Company - Pamphlet

1. Text-books
1. Text-books

1911.- Lochhead, William

A Synopsis of Economic Entomology the use of students
at High Schools and Normal Schools and for beginners.
Macdonald College (W.Lochhead) pp. 113. 8 vo.
Toronto, The Educational Book Co., pp. 70. 12 no.

Lochhead, William

Modern Biological Laws and Theories, relating to
Animal and Plant Breeding
contributed pp. 1-8, 192-211, 599-604, 605-6, 615-6,
Montreal, Witness Press, pp. 44. 8 vo.

Marshall, Charles E. - Microbiology: A Text-book
of Micro-organisms, General and
Applied.

Lynde, Carleton J.

Home Water-works. A Manual of Water Supply in Country
Homes.

with introductions by Ernest Ingersoll and Robertson,
Jas. W.

New York, Sturgis & Walton Company, pp. 270 + XIII

Snell, J. F.

Household Chemistry

Montreal, Renouf Publishing Company - Pamphlet

1. Text-books

1912 - Brittain, John.

1913 - Harrison, F.C.
A First Course in Chemistry, for the use of students at High Schools and Normal Schools and for beginners' classes in general.

Toronto, The Educational Book Co., pp. 70. 12 mo.

Harrison, F.C.

contributed pp. 1-8, 192-211, 599-604, 605-6, 615-6, 632-4 to

Marshall, Charles E. - Microbiology: A Text-book of Micro-organisms, General and Applied.

Philadelphia, Blakiston. pp. 724. ill. 12 mo.

1. Text-books

1. Text-books

1913 - Harrison, F.C.

1914 - Snell, John Ferguson

Contributed to Marshall, Microbiology, 2nd Edn.,

Elementary Household Chemistry

Philadelphia, Blakiston.

New York, The Macmillan Company, pp. IX + 307,

illus. 12 mo.

1. Text-books

1915 - Lockhead, W.

1914 - Snell, John Ferguson

Elementary Household Chemistry

New York, The Macmillan Company, pp. IX + 307,
illus. 12 mo.

1. Text-books

1915 - Lochhead, W.

1917 - **Economic Grasses: their Habits, Structure and Identification.**

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18. 1916 - Barton, H. - Breeding and Preparing Hogs for Market
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54. 1922 - Summerby, R. - Grain Crops and their Culture (French & English)
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57. 1922 - Raymond, L.C. - Planting and Caring for the Corn Crop in Quebec (French & English)
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59. 1922 - McTaggart, A. - Farm Manures (English)
61. 1922 - Dickson, B.F. - Plant diseases "
62. 1922 - Summerby, R. - Sources of seed "
63. 1922 - McTaggart, A. - Hay & Pasture Crops (English)
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8. The Journal of Agriculture and Horticulture of
the Province of Quebec.

65. 1922 - Dickson, B.T. - Common weeds and their control
(English)

This organ of the Quebec Department of Agriculture,
66. 1922 - McTaggart, A. - Alfalfa Growing in Quebec
designed to promote better agriculture (English)
diffusion of
knowledge amongst farmers and horticulturists, is published
in two editions - English and French - each issued monthly.
A certain portion of the material is common to the two editions
but in the main the two are different. The English edition
has been edited at Macdonald College from 1908 to the present
and a large proportion of the matter contained in it has been
contributed by the members of the staff of the Schools of Agri-
culture and Household Science.

9. Contributions to the Agricultural Press

Members of the staff have made frequent contributions to
other farm papers, such as the Family Herald and Weekly Star,
the Ottawa Valley Journal, the Farmers' Advocate, Farm and Dairy,
Grain Growers' Guide, etc..

8. The Journal of Agriculture and Horticulture of
the Province of Quebec.

11. Miscellaneous Publications

(Probably far from complete)

1921 - This organ of the Quebec Department of Agriculture, designed to promote better agriculture by the diffusion of knowledge amongst farmers and horticulturists, is published in two editions - English and French - each issued monthly. A certain portion of the material is common to the two editions but in the main the two are different. The English edition has been edited at Macdonald College from 1908 to the present and a large proportion of the matter contained in it has been contributed by the members of the staff of the Schools of Agriculture and Household Science.

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1930 - Brunt, H.D. - Why we Teach - Poultry Science, Proc. 22nd Annual Meeting (1930)

9. Contributions to the Agricultural Press

Members of the staff have made frequent contributions to other farm papers, such as the Family Herald and Weekly Star, the Ottawa Valley Journal, the Farmers' Advocate, Farm and Dairy, Grain Growers' Guide, etc..

11. Miscellaneous Publications

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