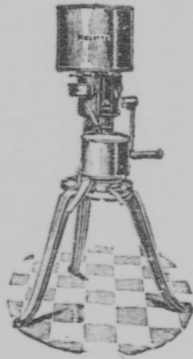


The  
D. N. G.  
Review



## Talk No. 5

*This talk on Cream Separators is summed up in one word*



## ECONOMY

*and in the broadest sense of the word*

# MELOTTE

*stands first among separators*

### ECONOMY

does not mean only the initial cost—the actual outlay in dollars and cents to obtain. The fact is there are many cheaper machines just as there are lower and cheaper grades of all kinds of manufactured goods.

### ECONOMY

means wise investment with the certainty of profitable returns. Durability of the machine—Percentage of cream obtained—Small outlay for repairs and oiling.

### ECONOMY

**IN WORK:**—Two features combined to make a machine run easy—*Simple* construction and *perfect* construction. The simplicity of the Melotte design has been discussed in *Talk No. 1* of this Magazine. Add to this the fact that every bolt and bar, every nut and screw, every part of the Melotte is made of the best material by the best workmen and there is the *only* combination that makes work easy.

### ECONOMY

**IN DURABILITY:**—The simpler the machine is and the better it is made the less chance there is that it will go out of order or wear out quickly. There is no loosening of the parts—no jarring or friction in the Melotte. As the Melotte is a *low speed* machine its natural life is much longer than that of an equally well built high speed machine.

### ECONOMY

**IN CREAM SAVING.** By actual and repeated tests on hundreds of occasions the exceptional value of the Melotte as a Separator has been demonstrated. The Manufacturers take particular pleasure in submitting the result of these tests to all interested persons.

### ECONOMY

A MELOTTE CREAM SEPARATOR has been connected with the shafting at the Works since November 5th, 1900. It has been running 10½ hours per day ever since for 300 days each year. Supposing a farmer to work his Separator one hour per day, the above mentioned test is equal to a period of 42 years. During this time the repairs and oil have cost at retail prices the small sum of \$6.38.

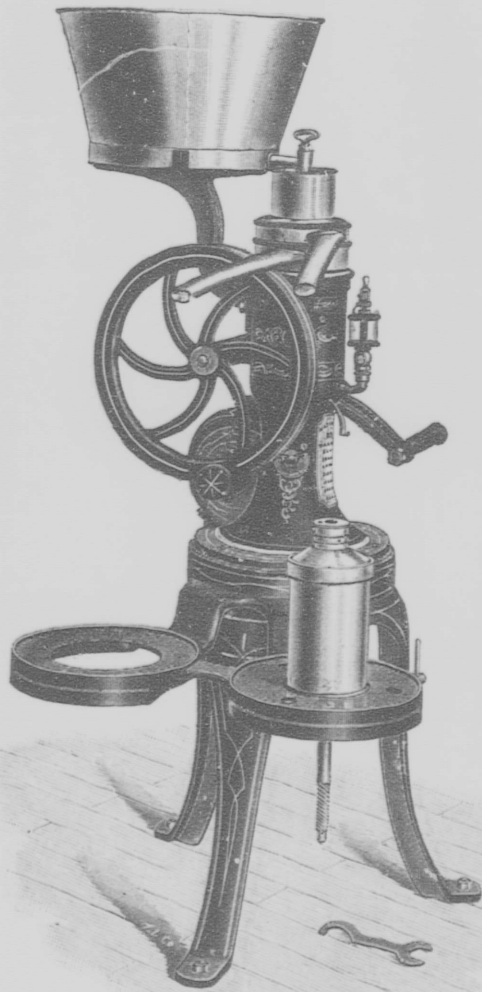
Taken altogether when results are considered  
**T H E M E L O T T E**  
is the most economic Cream Separator made



*For further information see next issue and write for booklet to*

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**NATIONAL**

**Cream  
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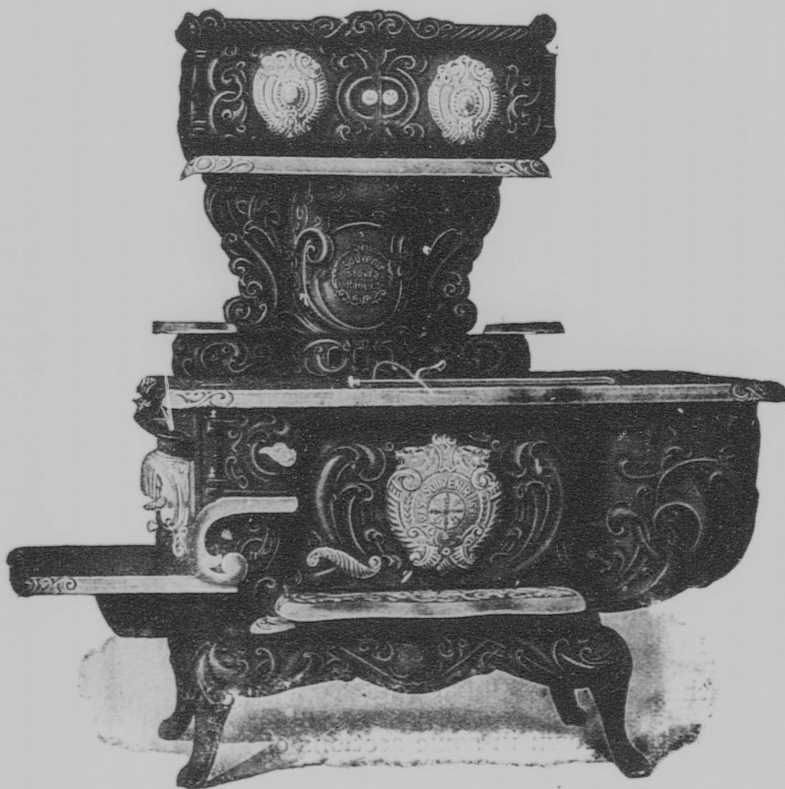
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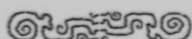
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CONTENTS

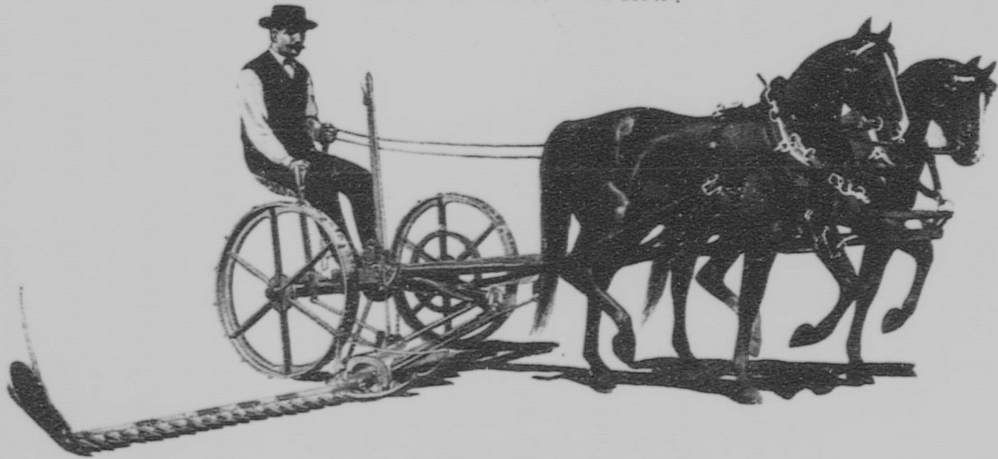
Vol. XVIII. FEBRUARY. No. 5

	Page.
The Seed Selection Special—Jas. Murray, B. S. A.....	203
The Romance of Wheat—R. J. Deachman, B. S. A. ....	208
Why Do We Do It?—Jos. E. Wing .....	211
Nodule Formation On the Roots of Leguminous Plants—Professor Edwards .....	214
The Forestry Convention .....	218
Pasture Grasses—A. P. MacNannel .....	221
Editorial .....	226
College Life .....	228
Old Boys .....	232
Macdonald .....	235
Athletics .....	239
Locals .....	244



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Agricultural Implements and Sundries—Pages iv, x, xi, xii, xiv, xix, xxxi, xxxvi.
Railways, Banks, Insurance, etc.—Pages ii, iii, xv, 246, xviii, xxi.
Newspapers and Journals—xxiv.
Business Houses in Guelph—xii, xxii, xxiii, xxiv, xxv, xxvi, xxvii, xxviii, xxix, xxx, xxxi, xxxii, xxxiii, xxxiv.
Educational—viii, xiii.
Cream Separators—Cover pages—i, xvii, xxxv.
Books and Book Publishers, Office Specialties—Pages viii, xxxiv.
Fencing Companies—Page xiv.
Seedsmen—Pages iv, xv, xvi.
Live Stock—Pages xx, xxi.



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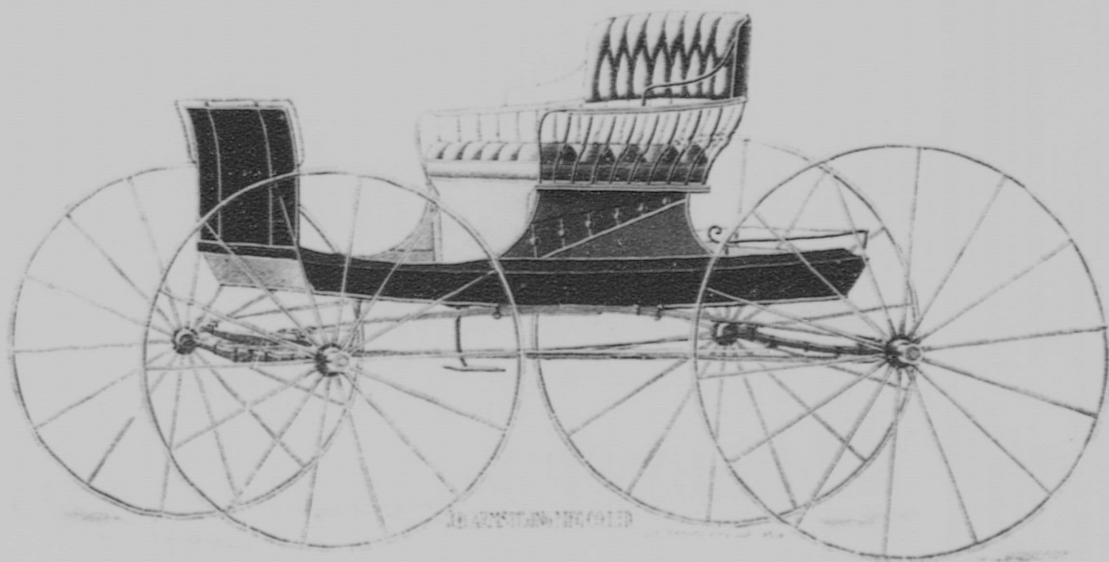
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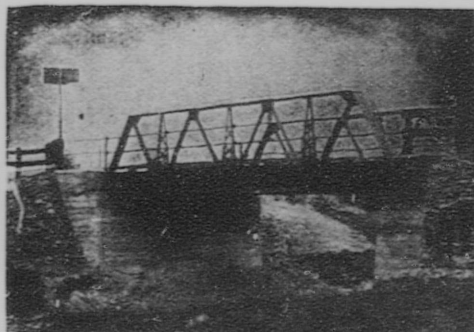
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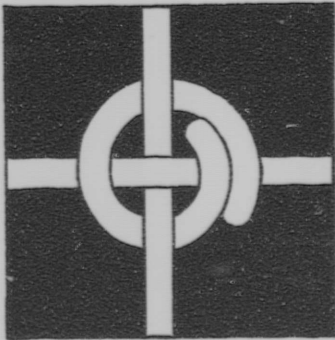
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We are prepared to prove any assertion we make above.

Illustrated printed matter furnished for the asking. 497

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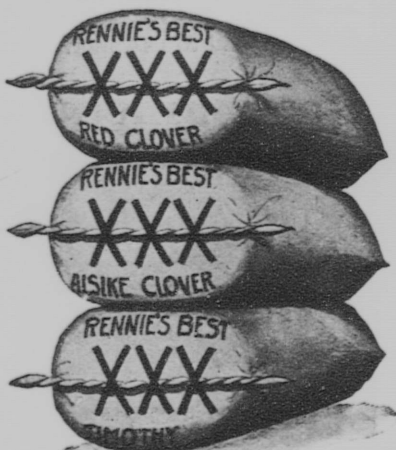
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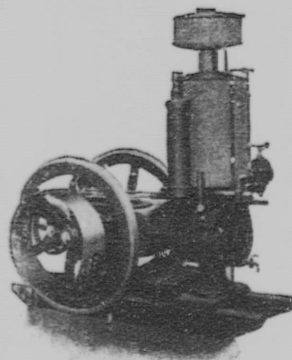
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# The O. A. C. Review

Published Monthly during the College Year  
by the Students of the Ontario Agricultural College, Guelph, Canada.

*THE DIGNITY OF A CALLING IS ITS UTILITY*

VOL. XVIII.

ONTARIO AGRICULTURAL COLLEGE  
FEBRUARY, 1906.

No. 5

## The Seed Selection Special

By JAMES MURRAY, B. S. A.  
Supt. Western Seed Division



THE means of disseminating and impressing agricultural information are now-a-days numerous and diversified, and in some instances, novel. One of the most effective and permanent is the agricultural press, which, as the

every year have, among agricultural gatherings no peer as educators in their particular lines. Here in the West, we have also the Grain Growers' Associations, powerful organizations of farmers with unlimited latent possibilities. Added to these there are still our agricultural colleges, dairy schools, and agricultural departments, provincial and federal, with their officers always



A New Feature in Agricultural Education

years go by is becoming more reliable and more universally appreciated. The Farmer's Institute meeting is still well attended, and is capable of as great accomplishments as ever. Winter Fairs, such as the one held at Guelph

ready and willing to render every possible service.

All these available sources of agricultural information might appear to render unnecessary any additional undertaking such as the Special Seed

Trains. Our conditions, however, are such that special efforts are required to overcome special difficulties. In a country where the production of one class of product is highly specialized, and where the revenue of 99 per cent. of the farmers is derived from one source, it is not unusual for certain seasons to bring universal troubles, impossible to foresee, and difficult to surmount. The fame of Manitoba and Saskatchewan is derived from their production of grain, the large average yield per acre and the unusually good quality of the grain. The farmers are proud of the reputation their country has, and are loath to see a high proportion of their grain fail to reach the desired standard. This feeling on the part of the farmers of these Provinces makes them ready and anxious to hear and learn anything that can help them to know better, and thus to do better in their farm operations. The wealth of this country lies in its soil of unsurpassed fertility and the climate that is of such wonderful assistance in producing grain of high milling quality. We have not the forest nor the mineral wealth enjoyed by some of the other Provinces, and being thus limited in sources of wealth, the interest is the greater in making the operations of farm productive and in applying labor and capital to the best advantage. Our wonderfully productive soil makes weed growth the more persistent and difficult to control. Such a soil, apparently inexhaustible in fertility, encourages the continual growing of what is regarded as the revenue yielding crop—wheat—and the entire absence on most farms of any system of crop rotation gives the best possible opportunity for many weeds to multiply and establish themselves in the soil, crowding out

the growing grain and spoiling the sample for market. The influx of settlers during the last few years has been another factor in introducing new weeds and spreading others to new districts. New settlers are usually none too conversant with the best means of holding in check and eradicating noxious weeds, so they frequently gain a strong foothold before effective action is taken against them.

Each season seems to bring its own particular problem. Sometimes they can be accounted for and overcome or avoided. Again, the conditions which arise are completely beyond immediate control. Such, for instance, as the visitation of rust in 1904. There is thus nearly every year some particular condition which militates against the best success, and we have impressed upon us the necessity of making the most of those factors in crop production which are within our control.

The results of the inspection of last year's harvest up to date show an astounding increase in the proportion of grain rejected for smut and weed seeds. The following figures from the Official Grain Inspector shows the proportion of grain which graded rejected for smut and weeds in the crops of 1903, 1904 and 1905, for the four months ending Dec. 31st. Of the crop 1903-04 of 38,473 cars inspected, 2 1-2 per cent. were rejected for smut, and one third of 1 per cent. for an excess of foreign matter.

Of the crop of 1904-05 of 37,892 cars inspected, 3 per cent. were rejected for smut and 1 1-2 per cent for an excess of foreign matter.

Of the crop of 1905 inspected till Dec. 31st, out of 36,842 cars, 10 per cent. were rejected for smut and 5 per cent. for an excess of foreign matter.

These figures show an appalling loss to the farmers of the West this year, a loss that is due, in part at least, to entirely preventable causes. The great increase in the proportion of grain rejected for weed seeds is largely through the rapid spread of wild oats, the propagation of which is so well favored by the growing of wheat. The increase in smutty grain is due to a combination of causes. In the first place the season was favorable to the development of this disease. For several years conditions have not favored this fungus, and much of the grain which was sown without treatment for smut was not affected. As a consequence the opinion became all the more common that it was unnecessary to take any precautions against this enemy of the grain grower, and many either gave up treating their seed altogether or treated it in a careless fashion. This year found many unprepared for the epidemic. Many again maintain that the quality of the chemicals sold was at fault, but there is no proof to substantiate this claim. The evidence would appear to show that the trouble rests largely with the individual farmer, and there is no doubt he has this year been a heavy loser.

On every bushel of the 6,000,000 bushels of wheat already rejected, there is a direct loss of from 8 cents to 20 cents per bushel, and besides the farmer pays for having his grain cleaned at Port Arthur, and pays freight on his weed seeds to that point. Besides his loss here, there is the enormous loss due to the weeds crowding out the grain in the field, robbing it of moisture and nourishment. They cause a loss of time, labor and money in harvesting; make more bulk in sheaves for stooking, stacking and threshing, and re-

quire more twine for binding. A conservative estimate places the loss this year to the farmers of Manitoba, Saskatchewan and Alberta, through smut, weeds and poor cultivation at \$20,000,000.

Even a loss of this proportion is small compared with the revenue that the land now under cultivation is capable of yielding. Our soil is so incomparably fertile that it is capable of enormous yields considerably larger than those usually reaped. It was to overcome these preventable losses that occur through carelessness and lack of knowledge and to stimulate an effort to derive the maximum production for the necessary expenditure of time and labor in cultivating wheat that the special seed trains were started this Winter. The usual medium for disseminating such information, the Farmers' Institutes, have been and are still doing excellent work. The number of meetings that can be held in this way is however small at best—only one place a day, and the number of men available for such work being limited, the season for effective work soon passes. In many of the newer districts again no agricultural societies have been formed, and in the ordinary courses of meetings these places would be entirely missed.

The campaign being carried out this Winter aims to reach practically all the grain growers in these three great Western Provinces, with the gospel of good seed and clean farms. The willing co-operation of the two great railway companies, the Canadian Pacific and the Canadian Northern, has made possible this educational revival of such unexampled scope and possibilities. With the railways it is simply a business proposition. Their traffic,

both freight and passenger, is dependent primarily upon the prosperity of the farmers, and any influence which makes for larger and better crops is to their direct advantage. One bushel increased yield per acre of wheat in Manitoba and Saskatchewan brings to the railway companies in freight to the lake front over \$300,000. The spending capacity of each settler is increased and the railways get their proportion of this in freight on goods, or in a larger passenger traffic.

Most of the success of this scheme of education depends upon the lecturers, the practicability of their subject matter and its use in overcoming the difficulties that are faced. The lecturers must be men whose information will be relied upon, men in whom the farmers have confidence. This necessitates experience and knowledge of conditions. Further, they must be able to speak forcibly and to state facts clearly and briefly—with time limited at both ends there is none to waste. Much is dependent upon the ability of the speaker to impress his hearers with the importance of the subject under discussion, so that what he says with regard to it is only the beginning of animated talk when the train pulls out and the lecturer is no more. He must impress the fact that knowledge in itself is useless unless it enables a man to do better, so very few farmers now farm nearly so well as they know how.

No two men in these Provinces are more highly thought of by the farmers than Mr. S. A. Bedford and Mr. Angus Mackay, the superintendents of our Branch Experimental Farms. Both have had a long intimate association with agriculture in all parts of the country, and their opinions everywhere carry weight, and their arguments bring

conviction. The personnel of the lecturing staff has been arranged by the Seed Branch of the Dominion Department of Agriculture, and both these men are accompanying the train throughout most of the tour.

Messrs. Bedford and Mackay have both been engaged in agriculture in the West for over twenty years, farming first privately, and since the establishment of the Experimental Farms, sixteen years ago, have been superintending the work there. Men better qualified to lecture or more acceptably listened to, could not be found.

Another popular and able speaker is Dr. Fletcher, who as Dominion Botanist and Entomologist, is so well known throughout Canada.

Among others who will lecture on the train during the tour are a large number of ex-students of the O. A. C., who are now helping along the course of improved agriculture in the West. These include George H. Clark, seed commissioner; the Hon. W. R. Motherwell, George Harcourt, A. P. Ketchen, W. C. McKillican, R. J. Deachman, W. J. Black, A. G. Hopkins, John A. Mooney and the writer.

The Seed Train, as equipped and furnished and ready to start on its tour on Jan. 8th, consisted of a baggage car, two cars for accommodating those who come to hear the lectures, a commissary car for the accommodation of the staff of lecturers and the private car "Minnedosa" of W. B. Lanigan, C. P. R. general freight agent, who accompanies the train as representative of that company. Each lecture car was fitted up with sheaves of grain of different varieties, specimens of weeds, growing grain from different kinds of seed, samples of grain graded "rejected," showing the proportion of weed

seeds and dirt as well as charts for the lectures. All the material was arranged to illustrate the points to be made by the lectures and thus to save time, and by use of the ocular demonstrations make conviction doubly sure.

Brandon, the "Wheat City," was chosen as the point at which to hold the first meeting and from whence the special should go out on its tour of 5,700 miles through the country that grows the world's best wheat and grow it more abundantly. The farmers in the neighborhood did themselves proud and turned out 300 strong to the first meeting. The cars have a seating capacity of sixty each, but by crowding in and enduring a little temporary discomfort fully 200 heard the lectures. The large attendance at the starting point and which has greeted the train generally throughout the trip is due largely to the enthusiastic co-operation that the project has received since it was first mooted from the Grain Growers' Associations of Manitoba and Saskatchewan. These organizations have a combined membership of 6,000 of the best farmers and the officers of the central and branch organizations have been unflagging in their interest throughout. The Boards of Trade and the Provincial Department of Agriculture have lent their co-operation to make the undertaking an unqualified success. The local press and some of the city papers keep local interest stirred up by publishing notices regarding the work and progress of the train every week.

It was my good fortune to be one of

the lecturers on the train during the first week and without exception I have never seen meetings better attended and a greater interest manifested. Two cars were filled with farmers at nearly every point of the four or five visited daily. Many had driven ten and fifteen miles and in many instances as far as 25 to 30 miles. Well directed, pointed questions were everywhere in evidence and the interest stirred up was evinced by the little groups that stood talking on the platforms after the train pulled away. One hour at a place may seem short, but no time was lost at the start, and as the bell started to ring, three minutes before leaving, every moment was occupied. The profuse illustrations were an invaluable aid in condensing remarks and in making points clear.

Two or three lectures were delivered in each car on Seed Selection, Weed Eradication, Prevention of Smut, and relative subjects. Bulletins were distributed at the close of each meeting as the crowd filed out.

The attendance up to the date of writing, Jan. 29th, has averaged about 120 at each meeting, and has aggregated over 9,000. The entire tour will be completed by March 2nd, and by that time over 1,000 lectures will be delivered.

The benefits accruing from such a campaign as this cannot be estimated; there are so many conditions involved. But if the enthusiasm and interest manifested are any criterion to judge of its possibilities, we may be assured of most gratifying success.

## The Romance of Wheat

By R. J. DEACHMAN

**D**URING the months of September, October and November, 30,525 carloads of wheat have been inspected at Winnipeg and Calgary as compared with 20,120 cars for the corresponding period last year, and 18,494 for the same period of the year before. The bulk of this is Red Fife, a small, hard variety of wheat that first

what obscure; it does not trace its history back to the Garden of Eden. It first found its way to Canada in the early 50's and took its name from one, Robert Fife, who first imported it. It is said to have come from the Baltic provinces of Europe and although those districts were not exactly the cradle of freedom in the old land, yet Red Fife cares not for flag or country but only asks that it may be planted where long



A Home in the Western Wheatfields

saw Manitoba soil in the year 1870. Today it has found its way into every market of the world; it is its own standard of excellence, and railroads are being built and gigantic elevators constructed to handle the vast product that flows from the western grain fields at the rate of almost one carload every two minutes. This is the romance of wheat in Western Canada.

The origin of the Red Fife is some-

sunshine and cool nights enable it to reach the very highest pinnacle of perfection, and these conditions it has found in Western Canada. But nothing great was ever achieved without a struggle, and wheat has always been in the forefront of the fight of the pioneer. Every time a new district is opened for settlement we are told that it is too far north or too dry for successful wheat production, but as years roll



round the record of facts disproves the story, and we are left to wonder where the limit of successful production will eventually be found. Years ago in the United States, a commission was

extended his operations until Pincher Creek became famous as a centre for fall wheat production. Now the Pincher Creek district is a small mountain-sheltered valley in the south-west-



The Oat Crop is also a Strong Factor in the Western Farmer's Work

appointed to inquire into the wheat-growing possibilities of Illinois, and this commission with owl-like wisdom, declared that Illinois was too far north and west for the successful growth of wheat. It is not so many years since we were taught to believe that Indian Head was situated on the border of the arid belt, and that wheat-growing there was very uncertain business, and yet Indian Head is today the largest primary wheat shipping point in the world. So much for man and his ability to forecast the future!

Less than two decades ago a new factor began to loom up on the wheat-grower's horizon. A rancher near Pincher Creek took from his pocket a few grains of wheat that he had brought from Ontario and tried the experiment of growing fall wheat in Alberta. It grew: it prospered: and he

ern corner of Alberta and there were those who would have us believe that "Alberta Red" could only be grown within that limited area, but I have myself seen excellent fields of fall wheat that would yield over 30 bushels to the acre fully 300 miles north of Pincher. This year Alberta has had, practically, its first elevators: by the end of next summer there will be between 50 and 60 at country points and large terminal ones at Calgary and the coast. This is the second chapter in the romance of wheat.

In the eastern portion of Alberta and in the adjoining territory in Saskatchewan are to be found areas where the rainfall is certainly insufficient to produce large crops under the ordinary methods of cultivation. But the dry land farmer, the man from across the line, who has been a pioneer of dry

places, comes to the rescue, and by methods of cultivation which conserve the moisture of the soil, he manages to produce in an average year when the total precipitation is only fourteen inches, a crop of at least 25 bushels of fall wheat to the acre. Truly wonderful is the power of man to overcome the obstacles that lie between him and the goal of success. It was no uncommon sight during the past summer to see wheat fields in the dry districts too poor to cut, and side by side on land equally dry crops that were yielding profitable returns to the husbandman.

Irrigation is the next step that is making a change in the far west. Larger and larger areas are yearly coming under the sway of the man who control the annual "precipitation" and talks of water rights and acre-inches and kicks against the irrigation company as strongly as his brother in the rain belt objects to the way in which nature dispenses her supply of the necessary. The irrigation farmer will not be entirely a wheat grower; he will

grow Alfalfa and practice dairying, yet after all wheat will still be the old reliable standby and the opening of irrigation lands will only tend to increase its sway. There may be more dairying and mixed farming but there will be more, much more wheat.

The greatest present enemy to the supremacy of the west as the world's great wheat producer lies in the indifference of the people to improved methods. Wheat may win a foothold from east to west, and from north to south; it may conquer the dry places and for it the arid lands may be made fertile but the greatest enemy to the wheat fields of the west today is the prevalence of weeds, the sowing of the inferior seed, and the general carelessness of the average farmer. When these crying evils are overcome, the west will rejoice in its new found possibilities, Canada will occupy the first rank as a food-producing nation, and then, and only then can the third chapter of the romance of wheat in Western Canada be written in our country's history.



An Alberta Watering Place

## Why Do We Do It?

By JOS. E. WING



THE question of why men do the things that they do, the question of the human will, the question of motive, the question why men do things

that they know will make them unhappy, all these questions are among the most puzzling ones that afflict mankind. Indeed the question of the advancement of mankind is not so much a material question, it is a question of so bringing influences to bear on men that you will change their impulses, that you will cause them to do things that they now leave undone, and to cease to do things that they now do.

I confess that I undertook to present this paper because it had in the subject a fascination for me, not because I was fitted to shed light on it. It is a subject that I can hardly fathom. There come to me now and then glimpses of light, but the ultimate solution is not in sight. I do things, and know not why. I do things that cause me sorrow afterward and remorse even while I am doing them. I do things that my reason and conscience tell me are wrong. I do things that are good, that are even better than I knew that I could do, and so it goes on, I am a puzzle to myself, a mixture of good and evil, of strength and weakness. And what I am my reason and observation tells me all men are, with perhaps some few exceptions. We are all puzzles to ourselves. Our wives may understand us, but we can hardly lay claim to un-

derstanding ourselves. We certainly cannot understand them.

The simplest motives for action are self-preservative. All animate things have these motives, these actions. We draw away from the fire when it scorches us, so does the worm. We scramble out of the water when we fall therein, so does the pig. We feel the drawing together of stomach walls and make search for food, so does the cow. There are these primal causes for action that inhere in all animate beings, and they are about as strong in one form as in another. Man, in addition to what belongs to the brute, has memory and inherited tradition. He has memories of long cold winters, of hungry times, thus he feels an impulse from fear, causing him to gather together firewood to gather together food.

Now, we have a hint as to why we do things in a measure differently from the brutes. There has been developed within us a stronger trait of thrift, of what we call acquisitiveness. We love to gather things together. So do the squirrels, and there are in the West some squirrels that are singularly human, they gather and hoard with unceasing energy, laying away all manner of foods, sometimes in enormously superfluous quantities, and they gather things useless to themselves, that they may fancy, bright bits of stone, shell, silver. They seem almost human enough to vote! This habit of acquisition is all but universal among men. It is most developed in the white races that have lived long in lands where

winter comes and where stores must be laid away. It is least developed in the Negro and other Southern races whose ancestors have long lived in tropical countries where fruits ripen the year round.

This instinct that leads men to gather things together is self-preservative, and it is good. It is possessed by almost every man. Even the poor and thriftless desire things, the trouble is through weakness somewhere in their natures, they cannot accumulate them, or having accumulated them, they cannot resist a desire to prematurely use them, dissipate or destroy them. I have not found the dissolute men who came to me penniless and dressed in the only clothes they possessed less exacting when they named their expected wage, but more. They have this primal impulse to accumulate, but it is made of no use to them through the abnormal development of appetites that destroy the fruits of their toil. The millionaire who toils daily to amass yet greater riches is an example of that instinct, developed abnormally. He amasses wealth though it only gives him care and pain, he amasses it though he can hardly tell why, but no doubt pride comes in to form a strong contributing factor in his case. He thinks much of what his friends will say of his success. Success, could no one know of it, would not count for much. We are quite alike in this respect. We involuntarily do things to affect others. This side of our nature is stronger than we realize.

There are, in truth, two distinct personalities in each man. There is the man himself as he is when alone. And there is the man as he is when he thinks other men, or women, are seeing him. The man alone most interests me. When I see him alone I know nearly

what he inherently is. When he acts alone you know that these acts spring from wills inside of himself. You know then how much of his doing is of himself and how much of it is the result of his desire for the respect and admiration of other men. In this land we have not much opportunity to live alone, and it is a fact to be deplored. All strong natures live much alone, even when surrounded by crowds of men and women, they are as though alone for they are thinking largely their own thoughts and living largely their own lives. I have often envied the opportunities of olden days when men lived the lives of hermits, dwelling off in some forest or on a mountain side, when they cultivated a little garden and lived their lives, sometimes at least, in useful labor. Some of them were scientists, engaged in the absorbing work of interpreting the laws of nature, then little understood, and some engaged in earnest thought of the spiritual, and beautiful side of the world, they learned to know well the trees and flowers and the skies and water and to see in them and in the universe very much more than those who dwelt in cities could see. From them came great and imperishable things in literature. I do not know that art ever came from the hermit's cell, art is the expression of the human soul that mingles with his fellow man and sees in him possibilities beyond what others dream. But great things in literature come from within, from the men communing with the quiet world, learning to love it and understand it, and at last to express it.

From such a life came our most wonderful sacred poems and songs. Do you think that any man, or any company of men, could in this age of steam

and daily newspapers, write a *Te Deum*?

What the man did when he was alone might have been good, but naturally it was often selfish. There are exceptions to that, of course; there are records of men, hermits, who voluntarily maintained roads and bridges and hung lanterns to mark fords for those who crossed rivers. These men had either strong inherited sense of their brotherhood to man or else had once lived with men and learned how hard the pathway is for many and longed, with love in their longing, to make it easier for them.

Why does he do it? If it is a worthy thing that he has done, you may be sure that there has been love behind it. He has had in his heart love, for one woman, maybe, for wife and children, maybe, either motive is good and natural and necessary, but if he has done a thing that we call really and truly great, he has had in him more of love than that which goes out to wife and children: he has felt a flooding love through him that took in a large part of the human race. If he has loved wife and children and his near neighbors, he has made a useful citizen, and done all that we could reasonably ask of him. If he has reached out and loved more of mankind than that, and has been recognized, and given opportunities, he has developed into a true statesman. And if he has had a very great love, with also a compelling strength that never tired, and a hatred to go with it of all that hurts his fellow men, then you have such a man as our President. And it is easy to see why he does things!

Doubtless our motives are often much mixed when we do things. There

is in all of us some of the love of self, the desire of ease and freedom from pain or care. There is often some love of wife and child and desire to benefit them. There is some thought of what effect we are making upon our neighbors, and there is some little desire to help. While I was preparing this paper I was busy making a pair of rough stone gateposts to go at the gateway into the lawn at our home. It occurred to me all at once "why do I do it? What are my motives?" Then I began to analyze them. First, it was clearly unnecessary to have stone gateposts. I was replacing one post that would have endured ten years yet with no repair. The other was probably good for nearly the same length of time. It took a lot of toil to gather the stones for these posts, gravel had to be hauled, and cement bought and thought given to the design, and much labor to accomplish them. Why, then, did I do it?

A hermit would not have done it, or if he had it would have been because he wished to impress others, or to leave behind him some monument to show that he had lived there. So it was clear that I was doing it in part to impress others, and there came the puzzle, for I knew full well that few of my neighbors would approve of these rough stone things. But then, I remembered a few of my friends who loved natural things and felt that they would approve. Then it became clear to me that I desired to influence the taste of others who would pass that way and cause them to like simple, natural things, and to see beauty in natural things. That was why I piled up these stones as they naturally would lie, with no hammering nor mortar visible in them at all.

## Nodule Formation on the Roots of Leguminous Plants

By PROFESSOR EDWARDS



AMONG the new ideas in agricultural science is the adaptation to practical use of one of the beneficial provisions of nature for the maintenance of soil fertility, namely, the phenomenon of nodule formation upon the roots of leguminous plants.

The phenomenon itself is, however, by no means new nor of recent discovery, for the earliest tillers of the soil were cognizant of the value of the legumes in practical agriculture. Pliny wrote: "The bean ranks first among the legumes. It fertilizes the ground on which it has been grown as well as any manure." There are also in ancient writings many other references to the importance of including some leguminous crop in the rotation.

Although the presence of the root nodules, and the influence of the legumes in the enrichment of the soil have been recognized for so many centuries, it is only within the last few years that the micro-organisms concerned in the formation of the nodules and the attendant fixation of the free nitrogen of the atmosphere have been cultivated artificially, and utilised to increase the leguminous crop with the consequent increase in the nitrogen content of the soil.



Fig. 1.

The earliest description of the legume nodules was given by Malpighi in his book published at the close of the seventeenth century, in which he referred to them as diseased excrescences. From time to time various investigators examined and described the nodules, and various opinions were launched as to their nature, some holding that they were normal outgrowths, so-called lateral roots, others that the outgrowths were abnormal, and due to fungi parasitic upon the plants. Although the bacteria were demonstrated in the nodules as early as 1866 they were not

considered to be of any importance; and even twenty years later one investigator examined them closely and came to the conclusion that the "supposed bacteria were organized albuminoids," and termed them bacteroids from their external resemblance to bacteria. It is only eighteen years since it was first decisively demonstrated that any direct and intimate relationship existed between the nodules and the plants upon which they developed. At this time it was discovered that if legumes were grown in sterilized nutrient solutions,

the nodules did not appear. If, on the other hand, chopped nodules grown in ordinary soil were inserted among the root hairs, the nodules developed on the roots in large numbers. This discovery threw a little more light upon the manner in which the nodules are produced, and increased the probability of the previous assumption that they result from the activity of bacteria which gain access to the root, and there exert a certain stimulance inducing a luxuriant cell-growth. It had previously been noted that the leguminous plants were capable of growing and thriving in soil destitute of nitrogen. Hence the obvious idea sprang up that possibly these nodules should be regarded as facilitating the absorption of uncombined nitrogen from the air. During the same year, Beyerinck proved conclusively that the tubercles were caused by an organism in the soil, and that by some joint action, chemical in nature and even now not fully understood, between the plant and the bacteria, the free and uncombined nitrogen of the air could be assimilated directly.

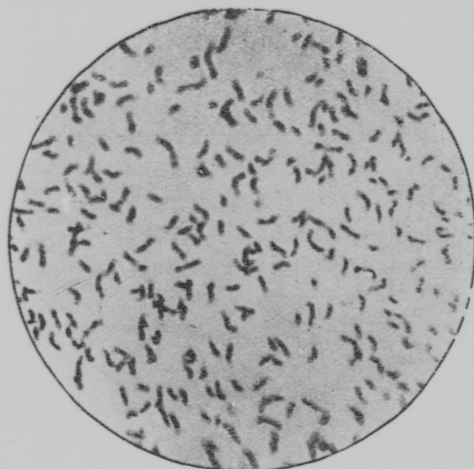


Fig. II.

To the latter investigator belongs the honor of first isolating and cultivating the microbe on artificial media. To it he gave the name *Bacillus radicola*. Later, another worker figured and described it as *Rhizobium leguminosarum*. Of recent years, however, the earlier nomenclature is being adhered to except with a change of the genus name, and the organism is now known and designated as *Pseudomonas radicola*.

Much discussion has been provoked and many diverse opinions have arisen as to the morphology of the organism, from the fact that it assumes many different forms under different conditions in the nodule itself, and when cultivated artificially. This fact undoubtedly has been largely responsible for the different theories in earlier years regarding the true cause of the nodule formation.

An examination of a mature nodule of almost any legume will show large numbers of rod shaped bacteria as well as the characteristic branched forms; but it is probable that the organism which produces the infection is different from either of these, being an extremely minute, motile rod usually measuring less than one twenty five thousandth of an inch in length. This short rod-shaped cell forces its way into a root hair or epidermal cell, multiplies there, and forms thread-like colonies extending to the inner cells of the root, giving somewhat the appearance of a mycelial thread of some fungus, a fact which led early investigators to believe the nodule to be of a fungous nature. The entrance of the bacteria sets up an irritation of the cells of the root hair causing a rapid proliferation of the cells until a tubercle is formed. The bacteria multiply simultaneously with the division of the plant cells, and are transferred into these new cells where a great change comes over most of them. They enlarge to the size of one ten-thousandth to one-five-thousandth of an inch in length, and one twenty-five-thousandth of an inch in diameter, and show peculiar club-shaped and variously branching forms as in figures 1

and 3, which do not possess the power of cell division. Just how these branched forms originate has been the cause of some investigation and much speculation, and it is still an unsettled question whether they are degenerate types or only variations due to environment.

A small number of microbe bodies remain capable of cell division, and these, after disassociation and decay of the nodules, reach the soil ready to bring about new infection.

It has frequently been observed that one kind of legume will not produce nodules in soil on which another legume has produced nodules in abundance. From this fact it has been supposed that each legume required a special and peculiar nodule organism. It is true that the long adaptation of the bacteria to the special condition obtaining in a particular species of legume enables such organisms to produce more nodules in a shorter length of time than bacteria isolated from some other legume. However, when the latter are grown upon nitrogen-free artificial media, practically any legume may be inoculated from any other legume, thus indicating that the bacteria from all are of one species and that they become so altered in their symbiosis with certain legumes that they are rendered almost useless for infecting others.

As a rule, bacteria from one species will inoculate another species closely related to it. For example, sweet white clover will inoculate alfalfa, and even more abundantly than the bacteria from alfalfa itself. Peas and vetches seem to be mutually available. On the other hand, the bacteria as modified by peas are unavailable for clovers.

From a practical standpoint, therefore, in inoculating soil about to be sowed to leguminous crops, it becomes of importance to use the specific organism for the specific crop, or at least one closely allied to it. The difference, however, is probably only a slight physiological difference arising from long association with a plant of specific characteristics, and enabling the bacteria to penetrate the host upon which they have become accustomed to grow more readily than any other.

The question naturally arises, where and how is the nitrogen fixed? This, like many other points in the study and investigation of the phenomenon, has been a subject of much

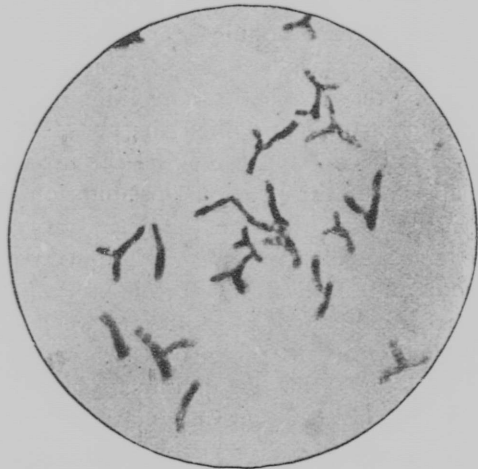


Fig. III.



Fig. IV.



discussion and some disagreement. One of the earliest investigators formulated the theory that the plant absorbs the nitrogen in the same manner as it does the carbon dioxide, transformation taking place in the leaves in the same way as the carbon does. This view gave way to the idea that the nitrogen was fixed in the soil by the bacterial action, and then used by the roots in the same way that any combined nitrogen would be come available. Among other theories, one which appears plausible is proposed by Dr. Moore of Washington. He contends that the bacteria, especially the branched forms, store up the nitrogen in themselves. Upon the disassociation of the nodule, which occurs as the legume approaches maturity through the action of an enzyme secreted by the cells of the plant roots, the bacterial cell walls are dissolved, the stored-up nitrogen is liberated and becomes disseminated throughout the plant. That the bacteria have been proven to be capable of assimilating the nitrogen of the atmosphere when grown upon artificial media independent of any host plant, and that the nodules have been frequently shown by actual analysis to contain 7 or 8 per cent. of nitrogen, whereas the remainder of the plant may contain only 2 per cent., are facts which lend evidence in support of this theory. If we grant this hypothesis, we are forced to the conclusion that mere nodules on the roots are not indicative of benefit to the plant; that unless the nodules contain bacteria of the large form, the plant cannot secure the nitrogen from them, as it is supposedly unable to accomplish the dissolution of the rod-like forms. However, until this supposition has been definitely proven, and also until it is proven that the legume secretes an enzyme having the power to destroy the bacterial cell walls, thereby setting free the contained nitrogen, we cannot accept this theory as a fact.

Not all the nitrogen fixing bacteria are found in the nodules of the leguminosae. It has been demonstrated from time to time by both European and American investigators that a soil left "fallow," and cultivated thoroughly will undergo an increase in the amount of nitrogen present; and various species of bacteria have been shown to possess the property of fixing the free nitrogen of the atmosphere without the intervention of a host plant. The amount, however, is small as compared with the amount fixed by the tubercle forming organisms of the leguminosae.

To what extent the use of inoculation methods in the increase of legume bacteria will be carried is somewhat of a matter of conjecture. The organisms can be readily cultivated under artificial conditions without loss of their nitrogen fixing capability, and their application to the soil is a simple matter. Further, it has been amply demonstrated that under certain conditions the inoculation of soils with *Ps. radicola* proves beneficial in placing at the disposal of the growing crop a more abundant portion of the vast stores of nitrogen of the atmosphere, thus obviating the necessity for relying for this all-important element of plant growth upon commercial fertilizers.

The soil is the great store-house of plant food, locked up in unavailable form. Unlimited supplies of nitrogen are present in the air. Soil micro-organisms, if we furnish them favorable conditions for growth through thorough tillage, will transform the food from both sources into a form in which it may be readily assimilated by growing crops, and, the doctrine of Malthus notwithstanding, Mother Earth will continue to yield us a livelihood so long as we employ intelligent methods in securing it.

## The Forestry Convention

THE Forestry Convention, held at Ottawa, on Jan. 10th, 11th and 12th, was one of interest, not only to one industry or even a community of industries, but to every citizen of the country. Canada is supposed to be rich in a multiplicity of natural resources; our fresh and salt-water fish, our gold and coal fields, both east and west, our millions of wheat of the prairies and an abundant supply of water power hold possibilities of which we as yet know little. But the forests constitute a problem peculiar to themselves. They form a natural resource, which, from its very magnitude is, when first encountered, considered an enemy, and thus one that induces prodigality and waste in its use, but one that for many economical reasons, is a necessity to a country, and moreover, one that, by judicious handling may become a perennial and increasing source of profit. A knowledge of the extent of our forests, and the influence of this natural asset upon our climate and our water power, in the industries and in manufactures as well as the direct bearing it has on the prosperity of every individual, is unfortunately not widespread.

To help spread the knowledge, to awaken public interest and to afford a means of discussing the many intricacies connected with the question of Forestry, Sir Wilfrid Laurier summoned this convention to meet at the capital. Already the various governments in the United States are experiencing prodigious difficulties and spending immense sums on account of

unwise or insufficient legislation for control of the forests. The Canadian Government proposes dealing with the question before the evil results of injudicious methods become too apparent. The making of the plans for the convention was left in the hands of the Canadian Forestry Association, and the success far exceeded the expectations of even the promoters. On the programme were representatives of the lumber and pulp interest, the mines, the railroads, the irrigation and power companies, the farmers, the newspapers, the boards of trade, as well as experts on forestry problems and education from abroad. Delegates came from every province of the Dominion, from Nova Scotia to British Columbia. The Premier presided at every meeting. His Excellency, the Governor-General, opened the convention, and was present at and took an active interest in the proceedings. The President of the United States sent a personal message to the Governor-General and Sir Wilfrid Laurier and greetings to the convention. The papers read by men of high standing in their vocations, were of a most practical nature and altogether the plan of the convention was on a scale befitting the magnitude of the interests involved. To say that this meeting was perhaps the most important ever held in the Dominion is not stating too much.

In a short article, very little of what happened can be imparted. A few of the facts learned and a few of the impressions received is all that can be attempted.

Our first session was occupied by the Governor-General's opening speech, the Premier's remarks, and the address of the President of the Forestry Association, Mr. E. G. Joly de Lotbiniere. The latter gave us some idea of the extent of forest reserves under Provincial and Dominion Governments. West of Ontario the Dominion hold nearly ten million acres. Ontario has over nine million and is looking forward to twenty-five million in the near future.

Mr. Gifford Pinchot, chief of the United States Forestry Service, also addressed the convention. "This," he said, "is an age of steel, but not less an age of wood, and the pinch of scarcity when it comes will be keenly felt, and signs are not lacking that a timber famine is imminent. He spoke of the policy of the United States Government in setting aside as forest reserve, every acre of public land which would contribute more in forests than otherwise—a policy, which, by the way, is applicable to many parts of the Dominion, especially in New Ontario and British Columbia, containing as they do tracts of the best timber in the world, which if denuded would be barren wastes. In his address on "Dominion Forestry," Mr. Stewart, Dominion Superintendent of Forestry, pointed out the difficulty in guiding immigration, on account of our lack of knowledge of what we have. "Exploration in advance of settlement," is a necessity. Other speakers had much to say on this question of Forest Reserves, their effect on the water and power supply, and the duty of the Government in creating and maintaining these reserves. On account of the length of time required for returns, it was difficult to get private enterprise to take measures for future profit. But the duty of the Government is not only to the present generation, but to the future also. The resolutions on the subject were important. In effect they

were "that exploration of the public domain should precede settlement, looking toward permanent and prosperous homes for settlers and the reserving, for the production of timber, of lands unsuited for agriculture.

The question of forest fires was one which received very serious consideration. The statement was made by Hon. Senator Edwards that not ten per cent of the timber taken out of the Ottawa Valley has been cut by lumbermen. Fires took the remainder. R. T. Borden spoke of the case where a \$3,000,000 fire was the result of clearing land for a five bushel patch of potatoes. Miners, prospectors, settlers, railroads, campers and lightning were some of the causes of fire. The system of ranges has worked much good, especially in the railway belt in British Columbia. In this district five years ago there was an annual destruction of large quantities of timber, navigation along the coast sometimes being obstructed by the smoke caused by these fires. Since then practically none has been lost. Fire ranges, prevention of illegitimate settling, railway patrols, and the education of the people in the proper care of all fires started were methods suggested in dealing with the problem.

A session was given over to the discussion of the forest in relation to water supply and water power. Hon. Sydney Fisher, and Mr. Cecil B. Smith, chairman of the Temiskaming Railway Commission, opened the subject with very practical addresses. The influence of the forest in preventing that condition of floods in rainy seasons and dearth in the dry, was emphasized by Mr. Fisher. Mr. Smith pointed out regions in Ontario where the denudation of the forests had already led to the destruction of what was once valuable water power. If these water powers were preserved by preserving the forests on the "height of land," many of the railroads would be oper-

ated by electric power, and thus also remove a source of danger to our forests. There is at present 350,000 horse power developed in Canada representing a saving of 1,750,000 tons of coal a year.

Papers such as "The Practibility of the Growing on the Farm," by Dr. Sanders; "Farm Forestry," by Rev. A. E. Burke, P. E. I.; "Tree-Planting in the West," by Mr. Norman Ross; "The Agricultural Forest Product," by Mr. E. J. Zavitz, Guelph; show that the farmers' side of the question was not neglected.

The lumbermen also had their say. Their chief trouble came in the shape of the illegitimate settler. As Senator Edwards put it, "We buy the timber from the Government; the bogus settler secures a section of land and sells to us the timber which we have already purchased; then he leaves the country."

The Relation of our Forests to Our Other Industries, was ably dealt with. The timber requirements of the railways were presented by Mr. Hobson, chief engineer of the Grand Trunk and Mr. Armstrong, colonization agent of the Canadian Pacific. The G. T. R. for the last seven years used an average of over 2,100,000 ties annually. Other timber for buildings, fence posts, cars and other constructions brought the total annual consumption of timber up to 95,000,000 feet. The C. P. R. requirements are about 5,000,000 ties, besides telegraph poles, fence posts and about 75,000,000 feet for buildings. "The Pulp Industry of Canada"; "The Demand of the Newspapers on the Forest"; "The Forest and the Mine"; "The Wood Supply of the Manufacturer"; were papers which showed how ultimately the welfare of these industries was bound up in that of our forests. All the speakers advocated the greater protection of that parent of resources—the forest.

As yet we have no system of forestry education in the Dominion. But if our forest policies are to be on a sound basis, trained men will be needed. It is gratifying to learn that Ontario will

soon have a School of Forestry so that a thorough education on this subject can be obtained within the Dominion. This was the last topic taken up at the convention, and excited a deep interest.

After three days of weighty discussion, the convention "took to the tall timbers." Mr. J. R. Booth invited the members to visit his Madawaska limits, situated about 130 miles west of Ottawa. Earl Grey and his party, together with a few other ladies, and about 70 members were able to accept the invitation, and reached the shanties about 11 a.m., Saturday. A couple of hours were spent on the log roads, watching the felling of a forest monarch by the axe and the loading operations. At noon came the sound of the dinner horn, and a genuine shanty dinner of pork and beans, stewed prunes, pie, and coffee minus the milk, was indulged in. Unbreakable shanty china was used. After the repast the Governor-General proposed the health of "General" Booth, who in rising to reply was most enthusiastically received. He thanked the representative of the Sovereign for honoring him with his presence on the limit. On the rousing cheers which followed the "Good Time," the cook was not forgotten.

The people of the Dominion are beginning to realize the importance of this asset to our material progress. The railroads, the miners, the newspapers, the manufacturers, acknowledge their dependence upon it. The lumberman is learning that the forester is for him, not against him. Educators are taking a deep interest in this branch of study, the Governments are awakening to their duty in regard to forest management. The convention is a thing of the past, but as Sir Wilfrid Laurier said, the real worth lies ahead. And as the deliberations in the Railway Committee room at Ottawa were of a substantial nature, and undertaken by substantial business citizens, we feel assured that most substantial results must follow, and a thorough forest policy be adopted.

F. C. HART, '06.

## Pasture Grasses

By A. P. MACVANNEL.



Fig. 1—Timothy.

THERE is no line of work more intimately connected with the Agricultural interests of any country than that pertaining to the improvement and maintenance of pasture crops. Pastoral pursuits were among the first industries to engage the attention of man, and today the pastoral industries of the greatest nations surpass all others in importance, and are second to none in actual money value. The greatest pasturing regions of the world are the Steppes of Russia, the pampas of South America, the extensive sheep pastures of Australia (which produce more than one-fourth of all the world's supply of wool), and the vast plains and mountain slopes of the United States and Canada. These furnish the bulk of the world's beef, wool

and other animal products entering into commerce.

The cattle, horses and sheep of Canada number over 4,000,000 and are valued at \$128,000,000. The vast capital which these represent is absolutely dependent upon the greatest of all our natural resources, our pasture and forage plants. These annually sustain industries upon which the very existence of the people of Canada is dependent. Even the value of all our beef consumed at home and abroad, our mutton, our milk and its products, our hides and wool, and the numerous other animal products which minister to our wants and pleasures, show a surprising multiplication of industries dependent upon our forage supplies. The amount of hay produced in Canada has been estimated to be nearly 7,000,000 tons—scarcely more than enough to feed our cattle, horses and sheep during five months of the year. This hay crop, valuable as it may be, must be supplemented by about 17,000,000 tons from other sources. This amount, or sixty per cent of the forage necessary to maintain our stock, is furnished by our pastures and grazing lands. The question of what does this pasturage consist is then an exceedingly interesting one almost equally interesting, and even more important, is that of how shall this forage supply be maintained and its productiveness increased?

There are a great many grasses native and otherwise growing in Canada, which stock pasture upon; but the number of really important cultivated grasses is very small; not exceeding a dozen varieties. Practically all the

meadow grasses are used more or less for pasture purposes. The most important varieties included under meadow grasses and which are consequently sown for pastures are: Timothy, Orchard Grass, Kentucky Blue or June Grass, Canadian Blue, Meadow and Fall Fescues, Meadow Foxtail, Redtop and Blue Joint Grass. As a hay grass, Timothy is the most common, but it is not so popular as some of the other varieties for grazing purposes. These are the best of the grasses we have, and are the ones upon which the farmers of Ontario depend entirely for their pastures and hay crops, and by comparing their respective merits or demerits, it ought not to be difficult for anyone interested in the renewal or maintenance of pastures to select such as will fully meet the necessities of each



Fig. 11 Orchard Grass.



Fig. 111--Kentucky Blue Grass

particular case. Precisely how best to utilize them is not very certain, but intelligent investigators who have been experimenting have offered many suggestions in this direction worthy of consideration.

In selecting grasses for pasturage, the purpose should be to so mix the different varieties as to secure those that mature consecutively throughout the season. An early spring grass such as Orchard Grass or some smaller variety like June Grass, to be followed by those that green out later, proves a good combination, as it secures a succession of grasses maturing at different times. But where the purpose is to cut the grass for hay, the plan should be to sow together varieties that mature at the same time. These questions are not difficult to determine if those interested study local conditions, and the adaptability and habits of the different grasses, their time of flowering and the ripening of the seed.

The commonest and most widely distributed grass in Ontario is Timothy (*Phleum pratense*) Fig 1. It is also known as Herds' Grass and Meadow Cat's Tail. It is not classed as one of the native grasses, but was introduced into this country about 60 years ago. Its value as a hay grass is too well known to require any mention here. However, it cannot be compared in its pasture or drought resistant qualities with other grasses which resemble it in habit. It thrives best on loamy soils, but gives fair yields of forage on a wide range of soils. It is not a first-class pasture grass, but in some parts of

Ontario it is grown to the practical exclusion of all other varieties. The cause of this has been attributed to the fact that other grasses are not known by the farmers of these sections, and, as a consequence some of the grasses which are better adapted for pastures have not been recognized. Timothy is also an unsatisfactory pasture for the reason that it tends to grow in tufts and does not produce a uniform sod. The bulbs at the bases of the stems expose it to the injury of frost, insects and close grazing, and even under most favorable circumstances, it affords only a slight aftermath. It does not start to grow early in the spring, which, coupled with the last-mentioned feature, and the fact that if not cropped closely it becomes coarse and woody, makes it an undesirable grass for pasture purposes.

Orchard Grass (*Dactylis glomerata*), Fig. 2, also known as Rough Cock's Foot, is a very important pasture grass but has not been cultivated to any great extent in this country for the reason that it is very difficult and expensive to seed down. It is valuable because it commences to grow very early in the spring and continues green all seasons. It is well suited to most sections of Canada, being a vigorous growing, hardy perennial grass, thriving on almost any kind of soil and in shaded locations better than any other of our cultivated grasses. It is characteristic of this to grow in tufts and crowd out other tender varieties of grasses. In spite of this fact, it is one of our most valuable pasture grasses. It resists droughts exceedingly well, furnishes an excellent, quick-growing aftermath, which is relished by all kinds of farm animals, and withstands very close grazing. As this grass becomes better known, we look forward to the time when it will occupy a more prominent place in the pasture lands of this country.

The best known and most popular of our strictly native grasses is June Grass (*Poa pratensis*) Fig. 3. This is the most common pasture grass of the United States ranges, where it is known as Kentucky Blue Grass. It is one of exceptionally nutritious character during the early part of the season. The desirable features of this important grass have been pointed out in a previous article by Mr. Buchanman, and, therefore, a description of this valuable grass at the present time is quite unnecessary.

Another very nutritious grass is seen in Fig. 4. Canadian Blue Grass, (*Poa compressa*). It too is a native of Canada and is adapted to or may be grown on very poor soil, such as sand, gravel or hard clay. The greatest objection to this grass is its hard, wiry stems, which is flattened and compressed. When grown alone it does not make a desirable pasture, but is an excellent grass to sow in mixtures, as its low habit of growth enables it to hold its own against other species and to fill up vacant spaces left by the dying out of other varieties.

Meadow Fescue (*Festuca pratensis*) Fig. 5, and Fall Fescue (*Festuca elatior*) are two of the most promising grasses for pasture purposes. They are similar to one another in most respects; the latter being somewhat taller and coarser in its nature. The manner of growth is between Orchard Grass and Kentucky Blue Grass. They do not grow in such pronounced tufts as Orchard Grass nor yet do they form the compact bottom so characteristic of the Kentucky Blue. They commence growth early in the spring and will continue green until late in the fall. These two grasses are very hardy perennials



Fig. IV.--Canadian Bl



Fig. v.—Meadow Fescue.



Fig. VI Meadow Foxtail.



Fig. VII Red Top.

and grow on almost any kind of soil, and are consequently specially adapted for pastures. They withstand drought equally well with the last mentioned grasses, and are perhaps better adapted to resist the intense heat of summer. The Fescues are not so highly prized for temporary pastures for the reason that they do not become established until about the third year. For permanent pastures they are very popular and deserving of more general use, since they yield such an excellent pasturage when once established.

Madow Foxtail (*Alopecurus pratensis*), Fig. 6, is a very hardy perennial much resembling Timothy in appearance but with shorter leaves and stalk, shorter, thicker and softer spike and starts into growth from two to three weeks earlier than Timothy. It is particularly suited for permanent pastures and favors a moist situation where it lasts well. Like the Fescues it requires about three years to become established, but, nevertheless, it should form a part of every permanent pasture.

Red Top (*Agrostis vulgaris*), Fig. 7, is a fairly hardy perennial grass, which is best adapted to low lands. It has creeping root stalks which interlace and form a dense, compact sod. It is most suitable for permanent pastures when sown in mixtures, but when sown alone it has very little value.

In Canadian Blue Joint (*Deuxia Canadensis*), Fig. 8, we have a valuable grass for lands that cannot be drained. It even grows on land that is too wet for Red Top. It is commonly found growing wild in "beaver meadows"



and marshes, but may be grown on cultivated lands. It remains green for a long time after the seed is ripe, and is relished by stock in all stages of its growth, affording a large amount of nutritious pasturage and improving in quality from year to year.

There are many other valuable grasses found growing in this country and it is probably correct to say that, notwithstanding the great value of this crop, it receives less attention, relatively, than any other important crop that we grow. The farmers of the old country recognized long ago the great value of the grass crop, and have sought by every means in their power to improve its value. The farmers of Canada, on the other hand, have done very little for its improvement, owing, it may be, to the abundance of our lands. The farmers of Ontario are well situated in the matter of grasses, although it is sometimes thought that they grow rather sparingly. Yet, if we consider how few grasses there are growing in the dry regions of our Western possessions just east of the Rocky Mountains, or in the arid regions of the United States, we are more likely to appreciate what we have, and to aim to improve and increase the productiveness of the most common varieties.

Grasses improve the condition of soil to no inappreciable degree. They save the soil from washing away and fill it with easily accessible plant food. They assist the soil in retaining moisture and in improving the texture by adding much humus or vegetable matter directly. They also furnish an easy medium of turning plant life into money, as when animals graze they gather their own food, thus turning the grasses into money with the expenditure of but little labor.

As to the management and improvement of our pasture lands, it is well to remember that it is poor policy to pasture them off too closely. And this holds good whether they are in meadow or kept simply for pasture. There is no mistake greater and more common than this in the management of grass lands and the drier the climate the greater are the evils that arise from this practice. Then how can pasture lands be improved without plowing them under and reseeding? In many instances they can; in others they cannot. Various modes of renovating pastures have been proposed and also practiced. There is no method, however, that is so universally applicable, or so potent, as that of top-dressing with farmyard manure, in conjunction with the sowing of additional seed when necessary. When an old pasture becomes sod-bound, and, in consequence, does not throw up a vigorous growth, a good top dressing of suitable fertilizer will so quicken and renew it that a vigorous growth will be secured the following season, and probably for two or three seasons. Fertilizer thus applied is very profitably applied and it is somewhat surprising that this practice is not becoming more general.

This article has been limited to a brief consideration of the more important of the many pasture plants belonging to the grass family. Doubtless other species quite as valuable as some which have been mentioned have been omitted, and it is certainly true that there are a great many pasture plants which do not belong to the same family. These belong chiefly to the legume family and are represented in Canada, almost entirely, by the many varieties of Clovers. Many pages might be filled with an account of the Clovers alone, but they have not been considered for the reason that they belong to an entirely different order of plants and, as yet, are not grown to such an extent for pasture purposes.



Fig. VIII—Blue Joint.

# The O. A. C. Review

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## Editorial

A modification of the Nature Study Course has been proposed by our instructor, Professor Sherman, which receives the hearty indorsement of the majority of the students. Hitherto, the six weeks' course at the end of the Third Year has been compulsory for everyone, but the heads of the Biology Department now suggest that it be made to a certain degree optional.

The training in observation and the knowledge of nature which may be gained in this course is undoubtedly of great value but like too many other educational features, it is by many students appreciated more in theory than in practice. To students graduating in biology, horticulture or forestry it is not only interesting but well-nigh indispensable since to them it is but an

expansion of their laboratory work and in addition forms an excellent basis for research work.

The majority of our students, however, do not specialize in these subjects, and while there are many taking the agriculture and other options who have an inborn love for nature, there are a great many more who have not and who find, moreover, great difficulty in acquiring it. In fact, by the time they have completed their third year work, which is especially strong in biology, they are beginning to long for something which pertains to the practical side of their own option and consequently the prospect of spending six weeks on work somewhat foreign to their taste is viewed with anything but pleasure. They must put in the time, however, albeit many resolve that they

will make it just as easy for themselves as possible, and accordingly they spend most of their winter months in planning and contemplating an easy, comfortable and bohemian existence during that season of the year when everything is conducive to this spirit of indolence, when the spring exams are over, and when their more enthusiastic biological friends are leaving no stone unturned in their search for insect mysteries and are leaving no branch unsampled in the tree of biological knowledge. Instead of leaving themselves open to gentle persuasion that perhaps there are many things which they would learn by entering into the spirit of nature study, they take up a position antagonistic to it from the start, an admission which though regrettable is no reflection upon the value and the thoroughness of the instruction given.

Fortunately this feeling has been recognized by the Biology Department and if the proposed innovations are carried out, those specializing in Agriculture, Dairying, Chemistry and Physics, will not be required to keep up a semblance of interest in all of the Nature Study Course, though part of it may still remain compulsory. There seems to be an excellent opportunity here to solve the much discussed thesis question. In six weeks a great deal of research work may be accomplished, and the time that is now spent upon thesis work in the midst of the Fourth Year, could in future be spent upon the course and upon collateral reading. We might also add that the advantages in research work at present accruing to the Biological, Horticultural and Forestry students would then be less manifest.

It is with pleasure that we notice the interest evinced by the members of the Canadian Press Association upon their recent visit to the College. Probably none of the many thousands of persons who visit the College annually were more impressed by the work which is being accomplished than was the Press Association, and it is certain that the opinions of no body of men will in the end weigh so much with public opinion. The voice of the press to a large extent controls the trend of public opinion; it is through the press that public opinion is made.

It is some time since the O. A. C. emerged from the struggle of its early years. Now it is on the smooth highway of a well-established institution, which is looked upon with favor by all. Though this is so, there is yet much to be done to enable the College to successfully maintain its present position and to go forward ever benefitting the cause of Agriculture in Ontario and in the whole world. Sooner or later every department in the College will need additions to its equipment and its staff. Such enlargements require the expenditure of public funds, and in order that this expenditure may be made at an early date there must be a strong public sentiment in favor of it.

The visit of the Canadian Press Association has led to many favorable notices of the College in the daily and weekly papers, and we hope that when applications for increased expenditure here are brought before Parliament, that the press will strongly espouse the cause with which they are at present in such hearty accord.

## College Life

### PROFESSOR ZAVITZ ABROAD. PROFESSOR LOCKHEAD HONORED.

ON Jan. 1, C. A. Zavitz, Experimentalist and Professor of Field Husbandry of this College, having been granted a year's leave of absence, left on an extended tour through various parts of the United States, the British Isles, and the European continent.

Mrs. Zavitz accompanied him as far as California, where the professor remains for the winter, familiarizing himself with the work of Luther Burbank, of Santa Rosa, who has achieved such wonders along the line of tree breeding, and has earned for himself the name of "The Plant Wizard."

At a convention held at Lincoln, Nebraska, on Jan. 16, 17 and 18, Professor Zavitz gave an address on "The Improvement of Plants by Selection," and at a later date an address on "Improved Varieties of Grain," before the Colorado Farmers' Congress, held at Denver, Colorado.

In April or May, Mr. Zavitz crosses the Atlantic, to visit agricultural colleges and experimental stations on the other side. Returning in the autumn, he spends three months at the Department of Agriculture at Washington, reaching Guelph again in December.

Professor Zavitz has already, by his ability and enthusiasm, done splendid work as experimentalist here, work which has had a marked influence on Canadian agriculture, and which has earned for him a wide reputation.

Professor William Lockhead has recently been informed of his appointment to a Fellowship in the American Association for the Advancement of Science, of which Dr. L. O. Howard, of Washington is permanent secretary. This is a distinct and high honor, since the association is one of the strongest of its kind in America. The action of the Council is in appreciation of the splendid work Professor Lockhead has been doing along the lines of scientific research.

### POULTRY INSTITUTE.

This year arrangements were made to have the Poultry Institute meet at the college. Its day meetings were held in the lecture room of the Poultry Department on the 6th, 7th, 8th and 9th of February. On the evenings of the 6th, 7th and 8th, meetings were held in Massey Hall, at which exceedingly interesting and instructive addresses were delivered by President Creelman, Professor James Rice, Cornell University, Mr. Donald Dunn, of Toronto, F. C. Elford, Chief of the Poultry Division, Ottawa, C. C. James, Deputy Minister of Agriculture and Mr. L. H. Baldwin, Toronto. At the day meetings in addition to the above speakers, addresses of great value were given by A. F. Hunter, West Roxbury, Mass.; A. G. Brown, Lakewood, New York; William McNeil, London; and Richard Oke, London, Ontario.

Needless to say these meetings were of great interest and benefit to poultrymen because of the ability, experience and reputation of the gentlemen secured as speakers, the vigor and enthusiasm manifested in the discussions and the growing importance of the egg and poultry trade.

**UNION LITERARY SOCIETY.**

The first meeting of the Union Literary Society for this term was held in Massey Hall on Saturday evening, Jan.

ful president and that under his superintendence the society will flourish.

**THE PROGRAMME.**

- Piano Solo—"Polka de la Reine" .....Raff  
Mrs. F. C. Harrison.
- Address .....The President
- Quartette—"The Old Brigade"  
..... Bani
- The College Quartette.
- Reading—Selected  
Professor W. H. Day.



The Great International Band.

27. Mr. H. B. Smith, president of the Society, occupied the chair. Mr. Smith has always taken a keen interest and an active part in Literary Society matters. He is one of the best speakers and debaters. He was one of our representatives in the debate between London University and the O. A. C., held at London last term, in which the O. A. C. won. Judging from the past record and from the first meeting for the term at which Mr. Smith presided, we doubt not but that he will prove an energetic, resourceful and success-

ful president and that under his superintendence the society will flourish.

Debate—Resolved, "That Chinese Immigration into the United States and Canada, is not detrimental to the best interests of those countries. Affirmative, Messrs. D. M. Rose and C. A. Row. Negative, Messrs. J. P. Atkin and L. Caesar

Solo..... Miss Lennox  
Judges' Decision.

Solo ..... Mr. J. A. McDonald  
Critic's Remarks.  
God Save the King!

The judges' decision was given in favor of the negative.

### COLLEGE CONVERSAZIONE.

The third Annual Conversazione of the O. A. C. was held in Macdonald Hall, Wednesday evening, Jan. 31.

This function is held under the auspices of the Junior Year and needless to say it was a grand success.

Over 1,200 invitations were sent out by the committee. At least 900 persons were present. The hall with its long, broad, handsomely finished corridors, its spacious gymnasium and dining hall and its wide stairways, proved commodious enough to accommodate with tolerable convenience, even this large number. The Juniors' committee, with the assistance of a committee of ladies of the Macdonald Institute, by their ability, taste and foresight, and by the completeness and perfection of their arrangements, had done all in their power to minister to the convenience and enjoyment of guests.

One of the striking features in connection with the event, was the happy and tasteful disposition of furniture and decorations throughout the building. The soft colored light from the electric globes in the corridors, revealed numerous comfortable chairs, sofas, and settees, made doubly attractive by the fact that many of them were located in more or less dimly lighted passages, recesses and corners, where "soft eyes looked love to eyes that spake again," and where more or less lasting acquaintances were made. Here and there, at advantage points were disposed various palms, and greenhouse plants, and last, but not least, there was to be seen everywhere a wealth of grace and chivalry," from which proceeded incessantly the hum of conversation and the ripple of laughter and merriment.

The gymnasium in the matter of decoration was unique. The walls were literally hidden by evergreen, tastefully and effectively arranged. Standing out in relief upon this, were various designs in college colors, snowshoes, hockey sticks, tennis rackets and pennons. At the front was a platform, rendered

beautiful by a bank of the freshest and choicest potted plants.

The first hour was devoted to introductions, renewing of old acquaintances and the arranging of promenades, which matters were greatly facilitated by the unremitting and untiring efforts of the genial members of the committee.

Promenades commenced at 9 o'clock, each promenade lasting ten minutes. During the promenades lunch was served in the commodious dining-room on the ground floor. Here too, everything was suggestive of system, convenience and taste.

Thain's famous orchestra dispensed music, which in no small measure contributed to the enjoyment of the evening.

The rich, melodious voice of Harold Jarvis, the noted vocalist, and an ex-student of this college was heard in a number of selections, and needless to say was greatly appreciated by all.

The O. A. C. was honored by the presence of representatives of other institutions, Mr. Blue representing Varsity, Mr. Clarke, the S. P. S., Mr. Farrow, Victoria College, and Miss Auld, Branksome Hall.

The Ontario Government was represented by Hon. Nelson Montith, and Mr. J. P. Downey.

The committee to whom the credit for such a complete success is due, consisted of the following members of the Junior year: Messrs. J. B. Fairbairn, R. G. Mills, H. C. Wheeler, F. H. Reid, J. W. Crowe and R. S. Hamer, assisted by the following ladies of the Macdonald Institute: The Misses Gallup, Mc-Murchie, Carlye and Weir.

### CHAPEL SERVICES.

On Sunday, Feb. 4, Rev. Dr. Kierstead, of Toronto, preached in Massey Hall to a large and appreciative audience of students, members of the faculty and friends of the college from the city.

On the following Sunday the regular service took the form of a service of song. A lengthy and excellent programme of sacred music was rendered

by the choir. The programme consisted of solos, duets, choruses, a quartette, a quintette, and a number of hymns in which latter the congregation joined. Mrs. Fuller was the accompanist while Messrs. H. G. Bell and E. G. De Coriolis acted as chorus directors. Those taking a leading part in the programme were: Miss Springer, Miss Hunt, Miss Bigelow, Miss Fuller, Miss Drummond, Miss Lennox, Messrs. H. G. Bell, R. W. Mills, D. Weir and E. G. De Coriolis.

#### DAIRY COURSE.

The short course in dairying is now in progress at the Dairy Department, over which Prof. Dean presides. This course began on Jan. 2, and continues until March 23. This year there are fifty-one on the register. The course, though short, is an exceedingly practical one. In addition to the regular staff of instructors, Messrs. Wadde'l and McDougal, and Miss Rose are acting as special instructors during the course.

Among those taking the course is Mr. D. Schoenmaker of Holland. Mr. Schoenmaker is an expert maker of Edam and Gouda cheese, and has come to the O. A. C. to acquire the art of making Cheddar cheese.

In connection with the Dairy course, there is a Literary Society which holds its meetings in the lecture room of the Dairy Department every Saturday afternoon.

#### POULTRY COURSE.

The short course in Poultry raising

has just closed. This course lasts from Jan. 8 to Feb. 5. This year there were twenty-seven in attendance.

Among those attending were a number from far distant lands—R. A. Newman, of Australia; R. W. Chalmers, of Glasgow, Scotland; K. Markley, Rhodesia, South Africa; Mr. Millan, Kent, England; and G. Gibbs, Dublin, Ireland.

President Creelman has arranged this term, to have a series of lectures, at intervals throughout the term, on popular subjects outside of the regular course. The second lecture of this series was delivered by Professor Coleman, of Toronto University. Professor Coleman was one of the Canadian representatives to a noted association of scientists who held their last annual meeting in Zambesiland, Africa, this place being chosen because of the excellent opportunity afforded by the journey for the study of the geology botany and zoology of Southern and Central Africa.

The lecture given by the professor was an illustrated resume of the party's knowledge acquired by a trip to that far away portion of the earth. The lecture was one of great interest and profit, and is but another instance of President Creelman's untiring efforts to give students here an opportunity to cultivate and broaden their minds by an acquaintance with, and an appreciation of other useful subjects in addition to those bearing directly and solely on agriculture.

G. M. FRIER,  
Acting Editor.



We All Do It.

## Our Old Boys

THOSE who attended the college during the years of 1902-03, will remember with pleasure the face of H. Groh, who took the associate course during that time. Groh is at present at Goshen College, Indiana, but intends returning to the O. A. C. in the near future to complete his studies. He is aiding in inaugurating a short course in agriculture at that college, which is as yet a very young institution. The Review wishes him much success in this worthy venture.



W. A. Kennedy, Apple Hill, Editor of Review in 1894.

Pleasant recollections of a profitable time spent are those of W. J. Cohoe, who took the associate course in 1901-02. In a letter enclosing his subscription to the Review, he states that

he is at present engaged in dairy farming near New Durham, Ont. Situated in that part of the province where they raise the Holsteins that have made Ontario famous, his success along his chosen line has been phenomenal, due no doubt to the information acquired while at college. The course, he states, has been especially helpful to him in feeding and caring for stock.

Operating a creamery is the occupation of A. J. Wagg, B.S.A., 1900. After graduating, Allie went back to his island home and founded the first butter factory in that part of the country. His success has even surprised himself. His weakness for the gentler sex is just as great as ever, and the advent of Mrs. Wagg, judging from the plaintive tone of his letters, will soon be a matter of history. His address is Mindemy, Manitoulin Island.

D. F. Kidd, B.S.A., returned to the farm after completing his course and is still there putting into practice information picked up while at college. His farm at Egbert, Ont., is one which shows the result of scientific training, properly applied. Being of an unselfish nature, Ferg is not at all reserved with the results of his labors, for each year a great deal of time is spent on institute work. His bright, every-day common sense makes him a speaker always much appreciated and eagerly sought after by the agricultural element throughout the country. Mixed farming with a specialty in heavy horses is the line he is following. That the demand is greatly in excess of the supply speaks well of the class of stock he is raising.



Geo. B. McMillan, 1892-93, called at the college recently. After leaving here he went to a Minnesota experiment station and was there engaged as experimental feeder. He is now settling down on the homestead at Greenbank, Ontario, and will in the future devote his energies to the growing of pure seed grain. Success to you, Mr. Mac. Canada needs many more like you.

J. W. Henry, 1883, one of the early associates of the college, returned to the farm and has since been grappling with the problems of practical agriculture. Much success has attended his efforts and in addition to his agricultural pursuits he has demonstrated his ability and won the confidence of his fellow-farmers of that district to such an extent that he has been returned a member of the municipal council several times.

From an agricultural college to the ministry may seem to some a far cry, but we are pleased to state that H. L. Selwyn, 1895, has successfully bridged the chasm. After leaving the O. A. C., Selwyn entered the Victoria University and took a course on theology. Always an active and faithful worker, in the Y. M. C. A., he entered into this work with all the enthusiasm and earnestness which characterized him while here. He passed through his course very successfully and engaged in mission work in Canada. He remained at this for nearly two years and then went to India, where he is now stationed as chaplain to the troops at Sukkur Sindh. His broad sympathetic nature combined with his iron constitution fit him admirably for this work.

Another of the ex-students who has found his way to India is D. N. Russel, 1899. Coming as he did from England, Russel evidently found the climate of Canada unsatisfactory, and after a stay of two years during which he took the associate course and made for himself a host of friends, he departed for India and entered the army. That he has been appreciated is shown by the fact that he is now a lieutenant in the 64th Royal Artillery, situated at Peshawar.

Wm. Baillia, 1884, recently returned to Guelph and has bought a farm within a few miles of the city. He is going in for mixed farming. Mr. Baillia is a native of Jamaica, but has decided that Canada offers more opportunities than the sunny south. His choice in the selection of a country to live in, indicates his clear judgment, and the nature of the farm which he has bought also indicates that he knows what a farm ought to be.

Owning and operating a cement tile manufacturing establishment is the line of work engaged in by R. E. Elliot, 1899. Elliot manifested the true spirit of self-sacrifice when he turned his back upon the allurements of an agricultural life in order to aid his fellow-citizens in developing and improving their acres. His business has the advantage of being very lucrative and his past prosperity brands him as a man thoroughly competent and up-to-date.

In order to get a wide enough scope for his abilities, D. A. Aird, 1876, went South to the Argentine Republic. At present he is a director and overseer of a railroad company. As a great por-

tion of that country is as yet not developed, there is plenty of room for his efforts. Much of what is now developed and habitable is due no doubt to our energetic and enthusiastic ex-student.

Ralph E. Sneyd, 1902-03, entered the financial world. His success there is characteristic of the man. He is now manager of the Union Bank of Canada, at Montreal.

Among the early students who have been making a name for themselves, E. F. White, B. S. A., deserves a foremost place. In 1895 White served on the Review, and since that has been putting into practice ideas gained during this apprenticeship. After graduating, he went south and is now engaged in a printing and publishing business in Cincinnati, Ohio. In conjunction with his printing business, he is editing a paper, studying law, and raising a family. His keen interest in affairs Canadian, was conclusively manifested when he returned to this country a few years ago to secure a wife.

J. Ferguson, 1899, is farming at Dalmeny, Ont. He is demonstrating by every-day practice the value of his college training. He has a first-class farm and goes in for mixed farming.

C. H. Dixon, one of the most popular members of the class of 1900-01, is farming near Dromare, Ontario. He owns a fine raising farm there and goes in for the raising of pure seed grains. His work along this line has met with remarkable success, he having captured several of the red ribbons at the last winter fair held in Guelph.

After gleaning what pointers he could from the two years course, F. E.

Webster, 1888, returned to the homestead at Creemore, Ontario. Situated in the most fertile part of this province, he is "making it go" in every sense of the word. Times have changed since Webster trod the corridors of the college but his prosperity has been one continual flow from good to better. Of such men as he we may well be proud.

Stephen H. Pugh, 1895, is farming near Milverton, Ont. He is secretary of the Farmers' Institute of his district, and takes a keen interest in all the agricultural subjects.

W. S. Carpenter, 1886, is one of our most prominent feeders and breeders of sheep. Among his flock are many prize winners and the show ring is never complete without some of his there to stand at the top. Each year additional successes are his and the quality of the stock **he is breeding** leads us to believe that he will stay there for many more years.

D. A. Robertson, 1896, is running a large farm near Dumsford, Ontario. He is a prominent member of the experimental union and is engaged in raising pure-bred Shorthorns.

Another prominent member of that year is George B. Tupper, nephew of Sir Charles Tupper of political fame. George is not interesting himself in questions not relating to agriculture, and is doing a good work at Howard, Ill. Here he is manager of a large farm. His training is proving very convenient and his chief delight is to solve some problem of the soil or work out a new experiment. His thirst for new results has won him a name in the land of the eagle.

## Macdonald

**G**UIDED by the teaching of modern psychology it would be safe to say that one of the greatest problems of the day is the proper adjustment of sensory and muscular education. The lay mind fails to realize that well-regulated and systematic manual and physical exercises contribute to the growth of mind as well as muscle. Centuries ago the old Greek sought strength as ardently as he strove for wisdom, and the Roman expressed his idea of human perfection in the phrase, "a sound mind in a sound body." We on the other hand, have for generations crystallized the meaning of education into the idea of storing the mind with information, notwithstanding the true significance of the word—"e" "out of" and "duco" "I lead"—the drawing out of its powers—discipline is the essential thing; the getting of knowledge is secondary.

Scientific research discovered that all movements of the body are localized in the middle regions of the brain and that the training of these motor centres, as they are called, consists mainly in raising them to a higher individuality of action. This can only be done through the muscles with which they are in nervous connection, and nothing short of Manual training will reach effectively the important brain cells governing the fine motor adjustment of the muscles of the hand. Indeed, it is a matter of common experience that in education as in the nurture of the body, whilst a limited amount of food is

strengthening and stimulating to the digestive organs, too much, or too mixed a dietary is weakening; too much reading which is mental over-eating is destructive of mental power, by arresting reflection and negating action; and this at an age when all the forces in the child should be correlated to stimulate the brain to its fullest activity, best conducive to the most complete and harmonious development of the individual. Too much counting may, at a tender age, set the mind in the mechanical habit of looking for mere numerical relations in whatever it sees; and too exclusive mental training may develop certain motor centres of the brain, at the cost of weakening others as in the case of Darwin who lamented the loss of power to appreciate music, poetry and art.

There are nervous centers controlling as well as producing movements. Efforts of the will producing action, aid the development of the sensorial areas of the brain, but the amount of cerebral mechanism apportioned to the various movements of the body is not in proportion to the magnitude of the movements themselves, but is more closely related to the sensitiveness of the skin, which those movements bring to bear on the object. Generally speaking this sensitiveness increases towards the extremities, so that for instance, the movement of the fingers in delicate operations and those of the wrist and arm in handling tools in space, involve a much larger share of the cerebral

machinery than do larger actions of the body, on account of the extraordinary range and delicacy of control of the shoulder muscles. By exercising the hands and sense of touch, the nerves communicating directly with the brain are rendered more efficient and active in the discharge of their function, strengthening mental control, and so, through the brain, affecting human thought and reason.

A very apt and common illustration of leakage from one motor center to another may be observed in some children when engaged in such manual exercises as writing, drawing or throwing. They go through a most abnormal and obnoxious contortions of the mouth, eyes and tongue. Ladies, too, in using a pair of scissors, often move the jaw synchronously with the fingers, showing the individualism of the hand center to be imperfect. Science puts forth a theory that for every thought we have in the mind there is some kind of scar made on the brain, and that scar really means memory. The brain scars which thought makes are deeper and more lasting with practical application than when learnt with books alone. We have a practical illustration of this theory in the scratch of a thorn and the cut of

a knife. The thorn scratch soon passes away, but the scar of the knife remains. The inference is that for the real welfare of the individual the practical and the intellectual should go hand in hand, as, on the authority of Sir Creighton Brown, the hand that has not begun in its training for its life work before fifteen years of age never becomes thoroughly efficient. Hence the danger of postponing, out of deference to mere mental education, the



A Lawn Party in January.

manual exercises which are the basis of all manual occupations and so essential in every sphere of life.

Owing to the great industrial changes of the last century, mainly the substitution of machinery for hand labor, transferring the old time processes of various industrial occupations carried on in the home and its vicinity, and in

which every member of the household had a part, to the factory and workshop brain work is increasing at the expense of body work, leaving the centres presiding over the large muscles increasingly idle, and any atrophy on their part is a distinct mental loss. Through manual work we gather experience and knowledge, made by sensuous observation, chiefly the sense of touch exercised in all manner of manual activities. There it is that the hand must provide the beginning and basis of education, for "touch is the mother of all the senses." Through it all preparation of mental objects that is, of thought or ideas, is made in the beginning of life.

There is an element of certitude in touch unknown to either sight or hearing, in the living contact of the person with objects which establishes fuller electric connection. Hence, the number of fruitful perceptions which it provides for thought and memory is very considerable, and the progress of perception grows with the increase of visual and tactual discriminations.

Exercises in wood and metal, sowing and cooking, as carried on in the schools, must be regarded "as methods of life and not as distinct studies," as means to an end, and affording facility for training and developing the power for creating and making. There is no factor in the industrial or artistic world of to-day more demanded than the creative faculty, because it is the controlling element in every industry.

Besides, it constitutes an entirely different mental picture of things from the mere ability to understand them, and is, therefore, a special kind of intellectual training, which cannot be ignored in any rational system of education.

Constructive work is, for the dullard, more than manual drill, it is orderly processes, it is moral drill—it is a mental and physical stimulus. It gives knowledge, which such a pupil can

never draw from books, gives inspiration which never rise for him in routine class work. It affords that general mental quickening of which the dull child stands so much in need. It is the stepping-stone on which many a child is now assisted to rise from his dead self to a better knowledge of things and materials. Learning the meaning of things is far better than learning the meaning of words. To the child happiness lies in the enjoyment of processes rather than in the attainment of ends—"who draws a line, satisfies his soul, making it crooked where it should be straight." In advocating the claims of M. T., we have no desire to neglect, nor to underrate literary and scientific education, but to set forth the necessity for training the hand and the eye in order to attain a higher and a healthier culture, and that since a truly liberal scheme of instruction prepares for all spheres of usefulness in life, all elements should be included in just proportion. Why should a lad not become a clever handler of tools and implements, a well developed, adroit muscular lad and expeditious workman? Why should he not know the difference between an ugly curve and a comely shape. Why not know the difference between a clumsy way of doing things and a clever way? Why should he not be able to put on paper any shape he sees, and afterwards be able to model and cut out what he has drawn? And every girl, whether in the eventual capacity of a wife, head of a household, or as a domestic, will have to perform duties in which knowledge of cooking, laundry, needlework and nursing will be of the utmost importance to her. She should know more of such things than of painting or playing the piano. How many young women possess knowledge of the laws of health and disease? How many know what preserves and maintains heat and spreads it equally round a room, or

what creates smoke, draughts, rheumatism and colds?

Is it of no use for a wife to know thoroughly the things servants have to do and how they should be done? Should not servants, to be worthy of their hire, render just and intelligent service, enlightened and ennobled? To realize the aims and direction of what goes under the name of manual training we must get behind the wooden block and the colored paper, the baking of pies and the making of stitches to the practical psychology, which is behind it. Boys and girls have hands, as well as heads. Why, then, are they not taught to use them in the best possible way and to the best advantage, thereby strengthening the interaction between hand and head, making them work together with greater precision and accuracy and so raise the intellectual average which must improve the gainuses of the future.

Faults in the life breed errors in the brain,

And these reciprocally those again.

The mind and conduct mutually imprint,

And stamp their image on each other's mind.

#### THE PRESS AND THE O. A. C.

THE Canadian Press Association, which held its annual meeting in Toronto, prolonged the session one day in order that they might accept the invitation which President Creelman extended to them to visit the O. A. C. and to partake of lunch at Macdonald Hall. Accordingly on Saturday, Feb. 3rd, we find the hall invaded by a band of probably one hundred and twenty men, but some of the wives, no doubt, having heard of the charms of the "Macdonald girl," deemed it wise to be of the party, and one hundred and forty-three sat down to lunch.

The dinner-room presented an attractive appearance, when opened. Some of the decorations from the "Conversat." having been left in place, but in addition there were all the waitresses,

in their pretty uniforms of blue, with spotless aprons and cuffs. At the table of honor were seated the President and Mrs. Creelman, Miss Watson and the chief officers of the association.

After doing full justice to the luncheon provided, the President introduced the toast of the King, and after this had been honored in the usual way, he gave a short account of the work of the institution. One or two of the members then endeavored to give their impressions, but were too surprised to do themselves justice. One gallant man, however, expressed himself as "willing to sacrifice his four stalwart daughters, rather than see it languish." Another anxiously inquired when his six-year-old daughter might be admitted, while another has since been constrained to burst forth in verse and assure us that all the press men are willing to leave the pen for the plough, if only a Macdonald maid will lead them.

At the conclusion of the speeches, the visitors were shown through the Hall by Mrs. Fuller, after which they visited the institute, where, under the able guidance of President Creelman, everything was examined and properly admired, including the apartment with the attractive young housekeeper.

#### BREAD.

Beat! Beat! Beat!

In your little white bowl, oh, class  
And if you keep on beating,

You'll have as much muscle as  
brass!

It's oh! to be in the short course,

And work and play all day,

It's oh, for the Seniors' grim,

Who keep the Juniors at bay.

But alas! for the one year plugs,

Who their bulky note books must  
fill;

Their only way of skipping work

Is to pay a doctor's bill!

Then Beat! Beat! Beat!

With your little wooden spoon,

Till it's oh, for 4 o'clock p. m.,

Or 12 o'clock at noon.

## Athletics



HAT proved to be the fastest exhibition of hockey on the Petrie Rink this season, was the game between the Bankers and the O. A. C., on Thursday,

Feb. 1st. Firm in their faith in the four intermediate men, headed by the redoubtable Koyle, the Bankers sang in their hearts with anticipatory glee. But "never count your chickens before they are hatched," is a safe motto, especially when one is so accustomed to paying out money, that it is seemingly impossible to break oneself of the practice.

The first half was keenly contested, but despite the fact that the score was a tie, the honors really went to the college. Koyle made several splendid rushes, but could not score, while the combination and general team work of our men soon carried the puck out of the danger zone.

The second half of the game was an object lesson in good generalship and the advantage of having a clever captain. At the beginning, the eyes of those college supporters, not "in the know," began to darken with the gloom of defeat, as the Bankers seemed to be having everything their own way—only ill-luck preventing them from scoring. But during the last ten minutes they began to tire, then the college boys started in, and literally played them off their feet. College scored two goals in quick succession, winning

the game by the close margin of 5 to 3.

All hail to the Bankers, they played a good game, but the better team won. They have better players, probably, but individuality characterizes their play, whilst combination is the winning factor. Koyle, Buchan and Kennedy played well, but they could do nothing against the swift, accurate passing of our forward line. Our two stars, Foster and Savage, did not play quite as showy a game, because they believe in sacrificing personal ambition for the good of the college.

The team was as follows: Goal, Ferguson; point, Fairbairn; cover-point, Dan Johnson; rover, Savage; center, Foster; right wing, Foyston; left wing, Barton.

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On the 3rd we defeated Bells, the score being 9 to 1. Curran and Hodson replaced Fairbairn and Barton.

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On Wednesday, 7th, the O. A. C. team, went down to Berlin to meet St. Jerome's College. They had quite a surprise in store for our men. Brinkert, Berlin's senior spare, and one of their fast intermediates, both played; while the goalkeeper had, too evidently, been there before." The game was positively the hardest our team have participated in this winter, and we should like to see our Hardware friends meet that team.

At the beginning our men seemed to be suffering from an attack of "blue funk," as they allowed the Berlin boys

to run over them and score within a very few minutes. Then the feeling of constraint passed away, and they did some running over on their own account, and by means of their superior combination, succeeded in tallying two goals before half time.

The second half began rather disastrously for the college, as their opponents scored twice in succession, raising their total to 3. Again the college boys woke up and repeatedly carried the puck down the ice, but the close, hard checking of the Berlinites and the fine work of their goalkeeper, kept us from scoring, until a few minutes before time, when one of the numerous shots reached the net, making the score a tie—3 to 3.

In this game the difficulty of obtaining a suitable man for point was largely overcome, as Barton, though not perfect on the lift, cleared splendidly and kept out the opposing forwards. Dan Johnson played the same old cool game, making occasional effective rushes with the puck. Hodson and Foyston attended to their men and played the boards according to instructions. Hodson, especially, had a hard man to rush, and he handled him well. Tom Savage and Foster played their usual games. Ferguson stopped some hard shots. This game was his best performance. This comprises the team, every man except Barton, playing in his old position.

Saturday, the 10th, was our day of disaster. We were beaten by the Hardwares. Why? Just because we were. To be perfectly just to the team, "shinny" is the game they were beaten at, not hockey. Whilst to do the Hardwares justice, Cutten's work was a marvel, very largely contributing to

their victory, for the pluck which he exhibited in stopping Foster's lightning shots at close range with his shins was certainly deserving of victory, although worthy of a better cause than "shinny."

However, "shinny," or whatever the game, we were beaten by a score of 6 to 3, and excuses are out of order. The only way is to take our medicine like men and true college gentlemen, doing whatever we can to prevent a recurrence of the disgrace.

It would be an injustice to our goalkeeper to give the impression that he was solely to blame; once the whole team "went up in the air," this being the time which was most prolific to our opponents.

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Two games of basketball were played against a team from one of the city churches; both resulted in wins for the college.

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The Berlin Y. M. C. A. intermediate team worked the college Friday, the 9th. They were accompanied by their trainer, Mr. Dingman, and were small, but trim, muscular and gentlemanly fellows.

The first half was played under Canadian rules, and the second under American—the rules the college team had been following in their practices. Dingman refereed the first half, and although he called several fouls on the college, he was not nearly as hard on them as a strict interpretation of Canadian rules would have permitted him to be. The score at half time was 16 to 12 in our favor.

The second half was refereed by Fairbairn, who copied Dingman in courteously allowing the green side several immunities. As this half was



played under our accustomed rules, we soon gained a fair lead, ultimately winning out by 26 points to 19. The score does not necessarily indicate that ours is the better team, but our shooting was far superior. As a matter of fact, they had the better team, but the size of our men, the large capacity of our gymnasium, and the fact that the game was slightly rougher than any they had played, handicaped them severely. However, from a college standpoint, it was the cleanest, fastest and most interesting game of basketball ever played in our gymnasium.

The college team were: Right guard, Row; left guard, Atkin; center, Clowes; right forward, Treichler; left forward, Hayes.

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A schedule for inter-year games in indoor baseball has been posted on the bulletin board. Two of the games have been played. In the first the Freshmen defeated the Juniors by 27 runs to 13. In the second, the Seniors won by 10 to 9.

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A game between the college and city was played Tuesday, the 15th, at 7:30 p.m. The college scored 55 runs, whilst the city made 13. The city fellows have not much opportunity for practice, and always expect to lose. Still they went to pieces rather badly, especially in the eighth innings, in which the college gained 20 runs. Nearly everyone batted three times in this innings. The city men were Messrs. J. Morris, Fitzgerald, Kennedy, Howitt, Oliver, Carney, Ross, Mann and Kemp. The collegians were Messrs. Harrison, Zavitz, Jarvis, Buchanan, Foster, Johnson, Hibberd, Row and Hodson.

A very unpleasant incident occurred in a recent inter-year baseball game. One of the umpire's decisions was rather hotly contested. Now, in a game where the opposing sides ask a man to officiate as umpire or referee, it is taken for granted that they have the utmost confidence in that man's honesty, and are assured that all his decisions will be square. To deliberately combat any statement, the umpire may make, is a reflection on one's own judgment, apart from any considerations of the common politeness due to a fellow student, who is acting in an official capacity in a friendly game.

An umpire's or a referee's position is a difficult and delicate one at the best of times; there are several doubtful points in a game, which call for prompt, impartial decisions. The official is kept constantly on the alert. If he is a conscientious man his nerves are at a tension. If to this is added the worry and annoyance of having his decisions questioned, he cannot be expected to keep the clear mind necessary in the performance of his duty. Hence in the long run it pays to let the referee alone, as worse things might ensue.

Besides loss of temper is not conducive to good playing, but is apt to lead to the committal of some very babyish acts, indeed. We have only to contrast the actions of the two basketball teams, that have visited the O. A. C. within the past fortnight, and judge for ourselves which is the pleasanter mode of playing a game, and which impression we would like to leave with the spectators.

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We regret to learn that the "Jokes" has, through unfortunate circumstances, over which he had no control,

been forced to retire from the very arduous duties that belong to the position of rink attendant. We wish to commend him for the very able manner in which he accomplished his work, by materially assisting the hose in the task of flooding the rink, both in the matter of support and because he hastened the completion of the job by contributing a large share of the secretion of his salivary glands to the surface of the rink.

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The winners of the Marshall Harris cup for football have received their emblems. Rumor states that much dissatisfaction has been expressed by certain discontents among the recipients over the small intrinsic worth of the prizes. It seems strange that members of a year, who have so distinguished themselves in athletics as to warrant the belief that they were true sports, should demean themselves by such a paltry plea, as "we payed our dollar into the association and we ought to get our money's worth."

What do our victorious friends desire? They have no right to grumble. The members of the college football team are the men that deserve badges before the winners of a little inter-year game. It does seem hard that men who worked on the college team and played their best even though they did not win, should not have even the satisfaction of wearing such a cheap badge as two figures.

It must not be understood that all the members of the winning team are so sordid as to make a "kick," and even some of the "kickers" are broad-minded enough to see that they are wrong, when the matter is placed in its proper light.

In a conversation with the captain of the hockey team, regarding the Hardware game, and the reasons for defeat, he said that the almost total absence of supporters had as much to do with their losing the game as anything else. We certainly believe that had there been more encouragement during the second half, when they began to go to pieces, they would have "braced up," and kept the score down. We have no right to growl at every mistake made by our hockey team if we do not turn out to cheer them. The whole student body should join in the game. The team do their part by playing hard. We do ours by cheering loudly. Moreover, it is easy enough to cheer when we are winning, but the encouragement that is given when our opponents are ahead is of far more value to the players.

Remember this also—that the city people, naturally support the town teams in their games against us, that we are playing the lone hand in this league (we cannot blame them, they support us when we play against outsiders), consequently, all the city spectators at the rink are cheering our opponents, and we must turn out in force to cheer our own men. Show your interest in your college, and your desire to see them on top, by playing your part in the game.

---

A committee has been appointed to revise the constitution. A very good move, indeed, as certain modifications are necessary, and several new rules would be advisable.

---

With regard to one point, hitherto, the faculty have had no special interest in the association or voice in its proceedings, other than ordinary members. In most big colleges, the faculty have considerable power in athletics, i. e.,

a place on the football, hockey or basketball teams, and on the track or gymnasium teams, i. e., those who win championship events in outdoor or indoor sports. The number of medals will be restricted to one or two, and in there is a board of directors, which is composed chiefly of representatives of the governing body of the college. This is only right, and we are convinced it would be a wise step to take. We submit it to the careful consideration of the students of the Ontario Agricultural College.

Also, when a college team is away visiting, it should be accompanied by a member of the faculty. When any dispute or unpleasantness occurred, the responsibility would rest on his shoulders, and not on those of a hot-headed student, who, as a participant in the game, would naturally be more excited than an onlooker. In the heat of the moment the captain might say things which he would be sorry after due reflection. If a member of the faculty were there, we would be assured that our case would be presented in a manner forcible, yet not derogatory to our dignity.

Another rule which would be very beneficial to the cause of athletics, would be to insist on all men, trying for a team, making a certain percentage in their spring examinations. This would naturally preclude Freshmen, but we do not think it would do a Freshman any harm to prevent him from making the team, it would make the honor more valuable in his eyes (distance lends enchantment), and would certainly prevent the disease, known as swelled heads, in some of our young friends. This rule would enlist the sympathies of the authorities on behalf of athletics, by showing that the sole aim of the association is not to promote the sporting spirit at the expense of lectures and examinations.

The committee has at length made a definite move in the question of team emblems. The single letter "O" is to be the prize for which our athletes must strive on the playing field. This

"O" will be given to all those who gain future just as the olympic contestants strove for the laurel wreath, we, as students of the O. A. C., must fight for the honor of wearing "O" on our sweaters, and let us hope that in time "O" will become in the eyes of every student, as valuable as any article of high monetary value.

Inter-year games in football and hockey are a dream of the past, and a bad dream, too. No games which arouse the utmost enthusiasm of the students will, in future, be allowed to further the destruction of our esprit de corps.

Basketball will be made more universal by the appointment of five teams, chosen irrespective of years. These teams will be pitted against one another in a series of games, and from the players, the members of the first team will be chosen. This gives everyone an equal chance of making the team.

A new game has been introduced into the college—water polo. This game is rapidly becoming popular among the best swimmers in the college, some of them, notably Treherne and Tcherniac, promising to become adepts at the game. Spectators find water polo highly amusing; it is a game which calls for a vast amount of skill in handling oneself in the water.

We are thankful to say that the spirit of chivalry is very much alive in the college, and that our students are perfectly willing to show their appreciation of good clean sport in opposing teams. This was evinced by the marked cordiality that existed in the Berlin-O. A. C. basketball game, and by the hearty reception accorded our visitors. Their scoring and good plays were vigorously applauded; a generosity that always bears fruit, as it is remembered when the home team returns the visit, and we certainly expect a hearty welcome when we visit Berlin, and perhaps a good beating as well.

## Locals

An effusion from "Saturday Night,"  
which may bear diffusion:

### The Macdonald Institute Girls.

The editor men who visited Guelph—  
The bachelor chaps at least—  
Are all dreaming still, dear Macdonald  
girls,

Of your luncheon that was a feast;  
As back we have come to the hurried  
meal,

To the restaurants' bustle and noise,  
Don't you think we recall rather wist-  
fully

Your quietness, deftness and poise?

Don't you think when our copy is in  
for the day,

And there's time after dinner to  
smoke,

That we think then of you and make  
plans far ahead—

Don't laugh, please, because it's no  
joke,

We dream that some day all our meals  
will be like

Your luncheon of Saturday—

All properly cooked and daintily served  
In Macdonald Institute way.

They say that you learn to do sewing  
as well,

And to "do up" things plain and with  
frills;

You're certainly going the right way  
about

Relieving poor man of his ills.

Indeed, Mr. Creelman, you've tempted  
us all

To throw down the pen for the  
plough.

And to lead the life simple and happy,  
care-free,

A Macdonald girl teaching us how.

What a country 'twould be if each  
home in the land

Were but marked by your orderly  
quiet,

If each boarding-house, hotel, and  
restaurant, too,

Learned from you to exchange rest  
for riot!

For the lessons you're learning and  
learning well, too,

Are more useful than lessons by  
book.

Art and music are good, but the aver-  
age man

Cries, "Hurrah for the girl who can  
cook."

So here's to you all, wholesome Guelph  
College girls,

With your faces so rosy and bright,  
Go on learning how to bring joy to the  
home,

In your dainty blue toggery and  
white,

Good health and good fortune to you,  
every one;

We hope life will be fair to you,

And bring happiness to each heartsome  
lass there—

You deserve it—yes, really, you do.

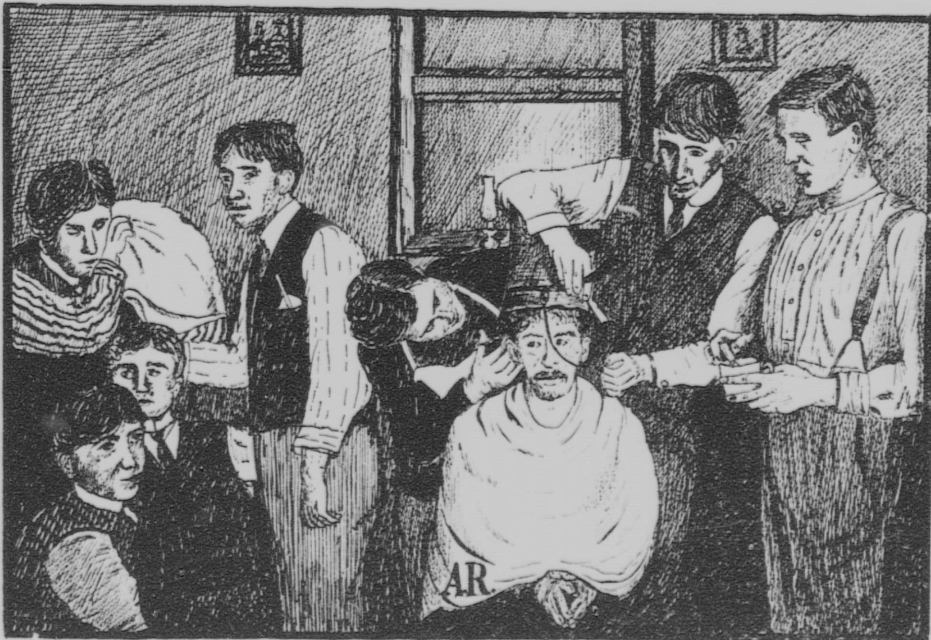
—Hal.

The Review desires, in this issue, to offer its gratitude to the scores of Old Boys who have written us such encouraging letters since the beginning of this College year. Almost every day we have had some helpful suggestion, and numerous have been the enquiries received as to how the ex-students might help their paper. Perhaps a hint at this time of the season may do more good than tons of instruction later on. There is scarcely a supporter of the Review who will not between now and September next be making purchases of

problem of how the Review may best serve Canadian agriculture.

Lend us a hand, old man, wherever you are—just an enquiry, just a request for catalogue, just a little purchase, with the name of the Review thrown in, and the trick is done. You have already shown your faith in us. Show us now your love.

Atkins—In analytic chemistry—The longer you wait, the longer you're in the way, and the more you weight the more the blooming thing weighs.



A Hair-Raising Experience.

most reliable class of advertising of any publication in the province. Look through it for yourself and see if you don't send us next day a note to the same effect. Now, an article bought from one of our patrons, or even an enquiry made, mentioning our name, will lubricate the entire machinery of the "Old Reliable." It will enable us to give you better value for your money and will assist more than anything we know in solving the great some kind or other for farm or home. We have been complimented time and again upon carrying the cleanest and

#### A Ripping Time.

Plunged in ribbons and silks and lace,  
Her busy fingers worked apace,  
"You're having a pleasant time," said I,  
Seeing her deftly the scissors ply.  
She jerked and pulled the crinkled  
thread;  
"I'm having a ripping time," she said.

Mr. Reed—What are you trying to light that gas get for, Tothill?

Tothill—We need a little more light on the subject, sir.

A freshman to Macdonald girl,

"Please, Miss, why are you like a tree?"

"Because, because, I'm bored," she spoke,

"Oh, no, because you're woo'd," said he.

Why are you like a tree?" she said;

"I have a heart?" he asked, so low,

Her answer made the young man red,

"Because you're sappy, don't you know?"

"Once more," she asked, "why are you now

A tree?" He couldn't quite perceive,

"Trees leave sometimes, and make a bow,

And you may also bow—and leave."



**Galt Sure Grip Shingles**

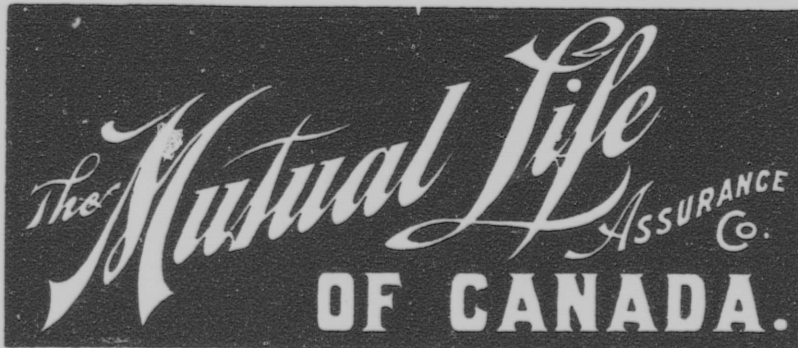
They grip tight, cannot warp, crack, rust or burn, and will outlast any roof made. Formed from best galvanized steel.

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**GEO. CHAPMAN** - **GENERAL AGENT**  
McLaren's Block, Guelph, Ont.

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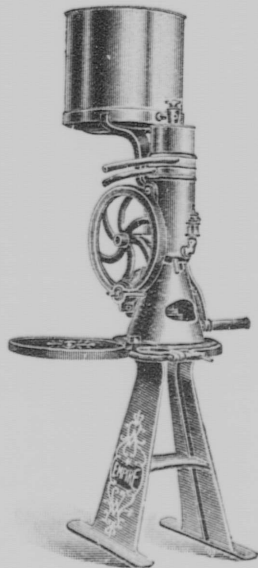
is the separator that embodies the newest ideas with the most approved methods. It is the most popular cream separator in the world—simply because it has *proved* that it does

## *The Best Work*

Its light bowl, its simple construction, its lack of friction, its ball bearings, its great ease of cleaning, its close skimming and its durability are all explained in our

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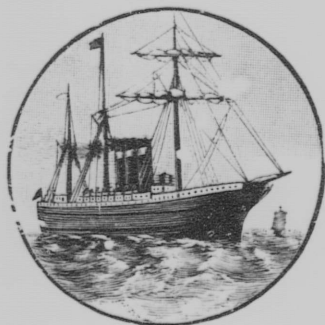


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Market Square, Guelph, Ont

## Destructive Fire!

### IN THE FROST & WOOD COMPANY'S IMMENSE PLANT AT SMITH'S FALLS, ONT.

The main part of the Frost and Wood Company's plant was recently destroyed by fire. The big machine shop with its very costly machinery, the carpenter shop with its entire contents, the paint shop and the plow shop are a mass of ruins. Their large blacksmith shop was badly damaged but not ruined. In a short time it can be repaired and in working order again.

The fire is supposed to have started in the vicinity of the dry kilns and notwithstanding the fact that two night watchmen were on duty, it got considerable headway before it was discovered. The fire was a hard one to fight on account of the size and arrangement of the buildings, and burned fiercely from 3 a.m. till 7 a.m., when it was gotten under control. The loss, while extremely heavy, was well covered by insurance. The large moulding shop, together with a pattern building, which adjoined it, were unharmed, and this leaves the Company in an excellent position to go right on and supply the demand for their machinery. Their big warehouse containing the entire season's output was untouched by the flames, and, while the Company is hampered for the time being, they are very far from being "out of business" or incapable of supplying machines to fill their orders. The work of clearing away the debris is well under way and as soon as possible the Company will begin to erect new buildings, bigger and better equipped than ever. They are going at it in the right way and are certainly bound to succeed.

In the meantime they intend putting up some temporary quarters and in that way look after the large business they handle throughout the entire Dominion. This Company was established as a private business in the year 1836, and is, therefore, one of the oldest manufacturing concerns in the Dominion.

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Although a part of our Manufacturing Plant was destroyed by fire on February 8th., still we have our immense storerooms intact, and in them we have enough machines to meet the demands of our customers.

We have tried to serve you well in the past and trust that, if we have been successful in doing so, we may still have the honor of your business. We have commenced the erection of a much larger and better plant than we had before, and with increased facilities we will be able to manufacture lines that heretofore we could not handle.

Don't allow anyone to tell you that we cannot fill orders or that we cannot go on with our business—the Frost and Wood "Quality" line of Farm Implements **MUST** remain in the enviable position it now occupies.

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*LIMITED.*

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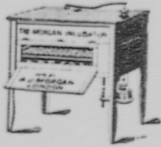


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for sale at all  
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Quality Guaranteed.

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**Poultry Supplies**  
of all kinds  
Large Catalogue  
Free

**A. J. MORGAN**  
LONDON

Professor—Is Timpany here?  
Timpany—Here, sir.  
Professor—Why didn't you say so  
before you spoke.

An illustration of mass action in  
chemistry—Even as alcohol may be  
derived from rags, so also are rags de-  
derived from alcohol.

One of our dignified Seniors recently  
found his way into the college kitchen  
in search of comfort for the inner man.  
Anxious to show his never-failing zeal  
where Domestic Art is concerned, he  
commenced a critical examination of  
the apparatus. Coming to a mysterious  
piece of mechanism, he cautiously  
turned the handle, lifted the lid, peered  
in, and, with a knowing look, hazarded  
a rash guess as to what it was. Imagine  
his discomfort, when one of the  
maids quickly retorted, "No; that's a  
pumpkin smasher; better put your head  
in and try it."

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slippery places -- prevent  
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PUT ON BY  
ALL BLACKSMITHS

**DUNLOP**  
TIRE & RUBBER  
GOODS CO. LIMITED

HEAD OFFICE AND FACTORY:  
Booth Ave., TORONTO

Count that day lost

Whose low descending sun,  
Views not at thy hand,  
Something doing and somebody  
done.

Mac. (who has been suffering with  
inflammatory rheumatism)—I think I'll  
go to a glazier and have these pains  
taken out.

Symathizing Junior—He'll have to  
take great pains, won't he?

It is bad enough to include "mixed  
alcohols" in the third year course, but  
when the professor goes on to speak of  
taking up "straight" alcohols, we wonder  
how many of the class understand  
him.

What is the difference between the  
quick and the dead?

The quick are those who get out of  
the way of an automobile. The dead  
are those who don't.

Men's  
Goods

**E. R. BOLLERT & CO.**

Ladies'  
Goods

THE Faculty, Students of the O. A. C. and Macdonald Institute will find this store ready to serve their wants to the best advantage. We are pre-eminently a Ladies' and Gentlemen's Outfitting and Furnishing Store. No matter what your needs this store is ready to supply them with good goods at moderate cost. We have always been favored with a large business from the personnel of the College. We shall pay special attention for its continuance and crease.

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Fine Ordered Clothing at Moderate Prices.  
Fit-the-form Ready-to-wear Clothing, very  
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Best Styles of Hats and Caps at closest  
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Up-to-dhite Shirts, Collars, Ties, Gloves, and  
Fancy Furnishings, not at fancy prices.  
Underwear, Hosiery, Etc., grand values.

**Ladies' Section**

Dressmaking at very reasonable rates.  
Ready to wear Coats, Skirts, Blouses, Etc.,  
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**MILLINERY**—All the Novelties of a first-  
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The Underwear and Furnishing Stocks are  
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Belts, Collars, Gloves, Hosiery, Handker-  
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25 and 27  
Wyndham St.

**E. R. Bollert & Co.**

25 and 27  
Wyndham St.



This Season  
Gives  
Promise of an  
Early Spring.

Why not put yourself in  
Harmony with it and take a  
Cooling Drink

or a Wholesome Dish of  
Ice Cream

THE  
Kandy Kitchen

Lower Wyndham, - Guelph



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That I carry one of the largest and most select stocks of **Hats, Shirts, Ties, Socks, Collars, Underwear and Men's Furnishing Goods** in the city.

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I have a select stock of **Suitings, Overcoatings and Trouserings** to select from. Styles, Trimmings, Fit and Workmanship the very best, and prices as low as any in the trade. Our motto is: "The best possible value for the least money." All goods marked in **PLAIN** figures and **ONE PRICE TO ALL**. Be sure you come to **73 Wyndham Street** for your Furnishings and Clothing.

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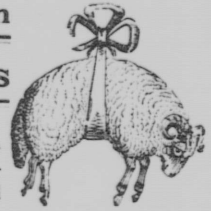
for your  
**Photograph Supplies,  
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**Remember the Place.**

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Is the latest report from the big Fur Centres. This will make no difference this season with us. We have an immense stock bought and paid for; so it is up to you to get your money's worth this fall.

Our experience and guarantee should be worth something. We take the responsibility if everything should not prove satisfactory.

In FINE TAILORING we are in the First Division in Canada.

**Keleher & Hendley**

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Supplies, etc.**

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EVERYTHING NEW  
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**THE STORE FOR STYLE  
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EVERYTHING THAT  
WOMEN, GIRLS AND  
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Furnishings for the House

Earliest with the Latest Things.  
Fairest Price on all Things.

Nothing that is not Good.  
'Most Everything that is Good.

**G. B. RYAN & CO.**

UPPER WYNDHAM STREET. We Do What We Say.

**The Canadian Bank  
of Commerce**

Established 1867. Head Office, Toronto  
B. E. WALKER, General Manager

Capital (paid-up)	\$10,000,000
Rest	4,500,000

**GUELPH BRANCH**

A general banking business is transacted.  
Bankers for the Dominion Live Stock Association.  
Farmers' notes discounted  
Drafts issued payable at all points in Canada, and the  
principal cities in the United States, Great Britain,  
France, Bermuda, etc.

**SAVING BANK DEPARTMENT**

Deposits of \$1.00 and upwards received and current  
rate of interest allowed.

Interest added to the principal at the end of May  
and November in each year.

Special attention given to Collection of Commercial  
Papers and Farmers sale notes.

**J. M. DUFF, - Manager**

**R. B. Kennedy**

**PHOTOGRAPHER**

The best place to get a good Group  
Photograph or a Portrait of yourself

## THE LITTLE TAILOR STORE

### COLLEGE MEN

Are usually particular about their appearance. They demand character in their clothes.

We make the kind of Suits and Overcoats that give a man that "well-dressed" appearance so much desired.

We make the Clothes to fit the man; TAILOR individual style and shape into them.

### ABOUT OUR PRICES

Being on a side street, our store rent is very small compared with main street rentals.

It is this combination—a big business done in a small store, with very light expenses—that makes it possible for us to turn out such high grade work at prices so much less than other tailors have to charge you.

<b>Tweed and Worsted Suits</b>	<b>Blue and Black Serges</b>
\$15 to \$25	\$18 to \$27
<b>Overcoats \$16 to \$25</b>	<b>Trousers \$4 to \$7.50</b>

## R. J. STEWART

Opposite Knox Church, Quebec Street

## McKEE'S DRUG STORE

### MACDONALD INSTITUTE TEXT BOOKS

McLellan's Psychology.....	\$1 00
Food and Dietetics.....	3 00
Cook Book— <i>Farmer</i> .....	2 00
Elementary Chemistry.....	1 00

### NATURE STUDY DEPARTMENT

Sylvan Ontario.....	\$0 40
H. S. Botany.....	1 00
Science Note Book.....	35
Plants— <i>Coulter</i> .....	1 80

### 1ST YEAR BOOKS

West's Grammar.....	\$0 50
Alexander's Anthology.....	50
Carpenter's Rhetoric.....	60
Soil— <i>King</i> .....	75
Elementary Chemistry.....	1 00
H. S. Botany.....	1 00
Poultry Craft.....	1 50
Canadian Dairying.....	1 00
Soils and Crops.....	1 00
Testing Milk.....	1 00
H. S. Book-keeping.....	60

A complete stock of 2nd, 3rd and 4th year Text Books always on hand.  
Fountain Pens, Note Books, Scribblers, etc.  
Try our \$1.00 Fountain Pens.

## McKEE'S BOOK STORE

## Central Book Store

Opposite where the Street Cars stop

Text Books. Exercise Books.  
Foolscap. Writing Pads. Up-to-date Note Papers and Envelopes, Papetries, Etc., Etc.  
Bibles. Hymn Books. Books by Standard Authors. Poets  
Prayer Books.

In fact, everything that is kept in a well-ordered Bookstore.

## C. ANDERSON & CO.

Please mention the O. A. C. REVIEW when answering advertisements.

ONLY  
ARTISTIC  
CLOTHING

IN OUR READY-TO  
WEAR CLOTHING  
AND FURNISHING  
DEPARTMENT

THE  
DOWLER CO.

*Burr &  
Ainsworth*

FURNITURE  
DEALERS

Guelph, - Ontario

**One**  
**for**  
**the**  
**Boys**

94 SUIT ENDS  
worth \$24 to \$30  
WHILE THEY  
LAST  
\$18.00 to \$22.00

*Work:  
High Class*

**J. A. SCOTT**

*Maker of Men's Clothes*

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**GRANT & ARMSTRONG**

Furniture Dealers  
and Upholsterers

WE MAKE A SPECIALTY OF

**Repairing  
Upholstered  
Goods. . .**

COSY CORNERS AND SKIRT BOXES MADE TO ORDER. **TRY US**

Quebec Street phone 488

**BELL** *HIGH CLASS*  
**PIANOS**  
 PIANO-PLAYERS, ORGANS  
 MANUFACTURED BY  
 Bell Piano & Organ Co., Limited  
 CATALOGUE FREE. GUELPH, ONTARIO

**MEN'S CLOTHING**  
 PAR EXCELLENCE

There is no reason in the world why you should not wear the best clothing made—we sell it, and at a price no greater than some inferior kinds are sold at. There is style to our clothing—there's wear and there's value—what more can you ask? You cannot get more than we give for the money—anywhere.

Do you realize that we also sell the best lines of furnishings you have access to? This is news to scores of men in this vicinity—good news, and if they will, they can profit by it. Just come and see.

**D. E. Macdonald & Bros.**

5 and 7 Lower Wyndham. 56 McDonnell St.  
 3 Entrances

**J. A. McCrea**

INVITES YOU

To inspect his beautiful display of China, Fancy Art Ware, and Cut Glass on the second floor. It is one of the sights of Guelph and as such should not be missed. We consider it a pleasure to show our goods and do not ask you to buy. We supply the O. A. C. and Macdonald Hall with groceries and can deliver anything you might require. Fresh Oysters, Oranges and Chocolates are our specialties.

**NOTED TEA STORE**  
 and **CHINA PALACE**

**J. A. McCrea**

PHONE 48  
 Lower Wyndham St. - - - GUELPH

**STALL No. 3, GUELPH MARKET**

**ALFRED HALES**

Wholesale and Retail Dealers in

**Fresh Meats, Pickled Beef and Tongues,  
 Poultry for the Students a Specialty,  
 Fresh Pork, Hams, Bacon, Lard,  
 Sausages and Bologna**

Shop—Telephone 191

Residence—Telephone 405

Please mention the O. A. C. REVIEW when answering advertisements.

**UNDERWOOD**  
VISIBLE TYPEWRITERS



Used by the Ontario Agricultural College  
All Makes of Rebuilt Typewriters  
Write for Price List.

**UNITED TYPEWRITER CO., LIMITED**  
TORONTO, ONT.

**New Oak Hall Store**

**MR. O. A. C. MAN!**

We keep a Practical Tailor to do your Pressing and repairing. Monthly contracts taken. All goods called for and delivered. A post card to Box 807 will bring our boy for your parcel.

**CUMMING'S**  
OAK HALL STORE

*Guelph's Leading House*

For Stoves of every Description.  
Sheet Metal Workers, Kitchen  
and Dairy Supplies. Expert  
Heating Contractors.

**H OCCOMORE & CO.**  
86 Upper Wyndham St., Guelph

THE  
**Electric Boiler  
Compound Co., Ltd.**

PHONE 396, BOX 409, GUELPH, ONTARIO

**Walker's Electric  
Boiler Compound**

High Grade Lubricating Oils, Greases Pack-  
ings, Belt Lacings, Flue Scrapers, Etc.

**Crystal Cream Separator Oil**  
A SPECIALTY

THE  
**PRINGLE JEWELER**

Entomological Supplies,  
Magnifying Glasses, all qualities,  
Fountain Pens,  
Rubber Stamps,  
O. A. C. and Macdonald Institute  
College Pins

**Horse-Spramotor**  
**Power**

FOR ORCHARDS, VINEYARDS AND ROW CROPS  
Our Patent Automatic Regulator stops the machine at 125 lbs. pressure starting again at 100 lbs. pressure.  
Automatic Nozzle Adjuster, insuring correct direction of spray.  
Automatic Nozzle Protector, guaranteeing nozzles against clogging.  
Everything under control of driver without stopping.  
Is used and recommended by the Department of Agricultural.  
Send for 86 page booklet O.  
Agents wanted.

**SPRAMOTOR CO.,**  
BUFFALO, N. Y. LONDON, CAN.

## FOSTER AND FOSTER

**DENTISTS**

Office and Surgery:  
 Corner Wyndham and Macdonnell Sts.  
 (OVER DOMINION BANK)  
 Residence—"Sunset," Paisley Street  
**TELEPHONE 14**

W. J. STEVENSON      ANDREW MALCOLM  
**PHONE 143**

## STEVENSON & MALCOLM CO.

Late Members of  
 THE BENNETT & WRIGHT CO., LIMITED, TORONTO

### CONTRACTORS

For Steam and Hot Water Heating,  
 Ventilation and Hydraulic Engineering,  
 Plumbing and Gas Fitting,  
 Specialties in Sanitary Appliances.

Upper Wyndham Street, Guelph, Ont.

## THE TYSONS

WHOLESALE AND RETAIL

**Butchers and Cattle Dealers**

**J. & A. TYSON**

No. 1 Stall, Guelph Market  
 'Phone 78

**TYSON BROS.**

Shop Cor. Green and Norfolk Streets  
 'Phone 152

## JACKSON & SON

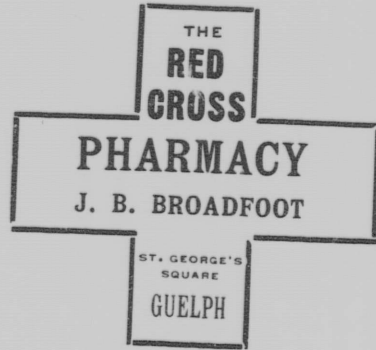
**GROCCERS**

FIRST-CLASS FANCY GROCERIES  
 IN ALL LINES

17 Lower Wyndham Street

**TELEPHONE 112**

Established 40 Years



**2 NEW LINES**  
 College Folder  
 and  
 "Chic" Folder  
**BOOTH,**  
 Photographer

## NEILL THE SHOE MAN

SOLE AGENT FOR

THE  
**SLATER SHOE**

GUELPH, - ONTARIO

### G. A. C. STUDENTS

Like Smart Shoe Styles  
 So do the Macdonald Girls  
 We lead in the Newest  
 Footwear.

**W. McLaren & Co.**

'PHONE 370

South-west Corner from the Post Office

Please mention the O. A. C. REVIEW when answering advertisements.

**Thornton & Douglas**  
LIMITED

Makers and Importers of Wearing Apparel for Men and Boys

**Dairy Suits**  
a Specialty

Stratford, Chatham,  
Guelph

**HEADQUARTERS**

FOR HARDWARE AND  
SPORTING GOODS  
AT LOWEST PRICES

**G. A. RICHARDSON**

Upper Wyndham Street, - GUELPH

**GUELPH AND ONTARIO INVESTMENT AND SAVINGS SOCIETY**

SAVINGS BANK DEPARTMENT  
Deposits of \$1.00 and upwards taken.  
Highest current rates allowed.

**J. E. McELDERRY, Sec.-Treas**

**EYES TESTED**

BY AN EXPERT OPTICIAN  
(No Charge)

**SAVAGE & CO.**  
OPTICIANS

**JAMES LAW**  
UPPER WYNDHAM STREET

Manufacturer of all kinds of

UNDERWEAR, JERSEYS, HOSE, ETC.  
NEAR GEMMELL'S DYE WORKS

**FOOTBALL and HOCKEY GOODS**

Made to Order in College Colors

**Bicycle Stockings**

**STUDENTS**

When You Want Material to  
Smoke or Chew, Call at the

**Senate Cigar Store**

You find everything you want there

**McHUGH BROS.** 26 Lower Wyndham

**GEO. HARPER**

**Picture Frames**  
QUEBEC STREET  
NEAR CHALMERS' CHURCH

**T. H. GEMMELL and CO.**

Steam Dyers and Cleaners

No. 70 Wyndham St., West Side

Suits Cleaned, Dyed and Pressed.  
Pressing Done on Shortest Notice.

Also Agents for Parisian Laundry. PHONE 69

— TRY —  
**BURGESS**  
FOR  
GROUPS

There is as much difference in Barbers  
as in any other Tradesmen.

The Royal Opera House Barber Shop

Is the place to get the finest work in Guelph,  
and when the best can be had at the same price  
as inferior—Why not have the best?

**DR. COGHLAN**

**DENTIST**

Cor. Cardigan and Woolwich Streets

TELEPHONE 223

A CHOICE STOCK OF  
**FOOTWEAR**  
FOR LADIES AND GENTLEMEN

And a RELIABLE  
Repair Department

**W. C. GOETZ,** UPPER WYNDHAM STREET  
Opposite G. B. Ryan & Co.

**W. A. CLARK**

Watchmaker  
Jeweler and Optician

79 Upper Wyndham St., Guelph

Issuer of Marriage Licenses

**WATERS BROS.**

Wyndham Street

**O. A. C.**  
**SUPPLIES**

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## Windsor SALT

### Makes Prize Butter

For years, the prize winners at the leading Agricultural Fairs throughout Canada, have used WINDSOR SALT.

They know by experience that WINDSOR SALT is the easiest to work — quickest to dissolve — and, because it is pure, gives the most delicious flavor to the butter.

Use WINDSOR SALT, and put your butter in the championship class.

**CANADIAN OFFICE & SCHOOL FURNITURE CO. LIMITED**  
PRESTON, ONT.



**OFFICE, SCHOOL, CHURCH, & LODGE FURNITURE**

FINE BANK, OFFICE, COURT HOUSE AND DRUG STORE FITTINGS  
A SPECIALTY

SEND FOR CATALOGUE

## Dominion Bank

GUELPH



Capital Paid Up - - - \$3,000,000

Reserve Fund and Undivided Profits \$3,565,000

A General Banking Business Transacted.

Savings Bank Department in connection with all Offices of the Bank.

Deposits of \$1.00 and upwards received.

BANKERS FOR THE O. A. C.



Manager Guelph Branch

**H C. SCHOLFIELD**

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## The Busy Bookstore

26 Lower Wyndham Street

City Headquarters for  
O. A. C. Students' Supplies

*College Text Books*  
*Fine Stationery, Etc.*

And for those who are planning for a gift for the folks at home, we are opening up and showing the finest range of goods in the city.

**Scott & Tierney**



## The Up-to-Date Oxford Cream Separator

---

You no doubt are satisfied it will pay you to buy a CREAM SEPARATOR. To satisfy yourself which is the best one to buy is the next question. We can assist you by having you try the Up-to-Date "OXFORD." It is a perfect skimmer, easy to wash and turn, interchangeable ball-bearings throughout, is low down and a beauty in appearance.

---

**SOME GOOD LIVE AGENTS WANTED.**

Write for Catalogue.

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**Farmers' Mfg. and Supply Co.**  
Limited.

**DURHAM, ONT.**

# Re-Built Engines Second-Hand Engines

---

**FOR FARM USE**

---

The advent of the wind stacker and self-feeder has forced a number of threshermen to trade in portable engines that are just as good as new for working purposes—some of them not having been used more than one or two years.

Threshermen having to use large engines takes away the market for the smaller ones and we are offering now from the best stock we ever had, at the following low prices:

**Re-built return flue portable engines from \$250.00 upwards.**

**Return Flue engines as received in trade by us, from \$150.00 upwards.**

**Re-built locomotive style portable engines, from \$300.00 upwards.**

**Locomotive style engines as received by us in trade from \$210.00 upwards.**

**Re-built return tubular style traction engines from \$450.00 upwards.**

**Re-built locomotive style traction engines, from \$600.00 upwards**

Rebuilt engines are all guaranteed.  
Write us for particulars or come in and see us.

---

## THRESHERMEN

DON'T FORGET OUR FIRST QUALITY LINE

---

**The Geo. White & Sons Co. Ltd.**  
**LONDON, ONT.**

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# THICK CREAM

Sells for One Cent More Per Pound  
Than Thin Cream

The creameries of the country have become so convinced of the increased value of thick cream over thin cream that many of them are paying one cent per pound more for cream testing 30 per cent. and over, than for that testing under 30 per cent.

The reasons for this are :

**First**—Thick cream makes better butter because it contains less milk and therefore keeps in better condition.

**Second**—Thick cream is so much less in quantity that the cost of transportation is less.

It is so much better for the dairyman to make thick cream because he has more skimmed milk left at home to feed calves. It then follows that dairymen should buy only such separators as can separate thick cream.

## U. S. CREAM SEPARATORS



LEAD THE WORLD IN  
THIS PARTICULAR

Beware of the cheap and poorly constructed separators that cannot make thick cream. They would be expensive even if furnished without cost.

---

VERMONT FARM MACHINE  
COMPANY

Bellows Falls, Vt.

---

Eighteen centrally located distributing warehouses throughout the U. S. and Canada

PARSIMONY  
vs.  
BUTTER-MONEY

*Cheapness in FIRST COST in a Cream Separator is bound to prove costly expenditure eventually. LOSSES of divers kinds are continually sustained where cheap and inferior machines are purchased : : : :*

DeLaval Cream  
Separators

*ARE THE REVENUE OFFICERS OF  
THE DAIRY,*

*and return the profits in full ::: GET ONE*

**The DeLaval Separator Co.**

Winnipeg

TORONTO

Montreal