

Robert Bell

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**O. A. C.
REVIEW**

*Published by THE STUDENTS
of the Ontario Agricultural College,
GUELPH, ONTARIO, CANADA.*

**MARCH,
1904.**

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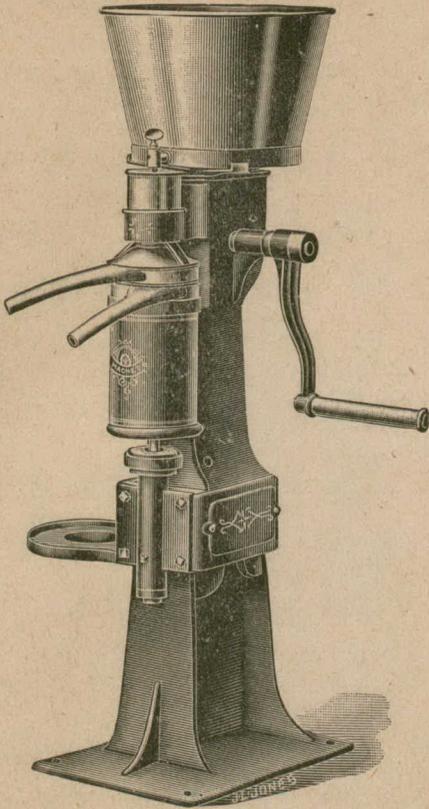
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PROF. DEAN'S TESTIMONIAL.

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H. H. DEAN, Prof. Dairy Husbandry O. A. College.

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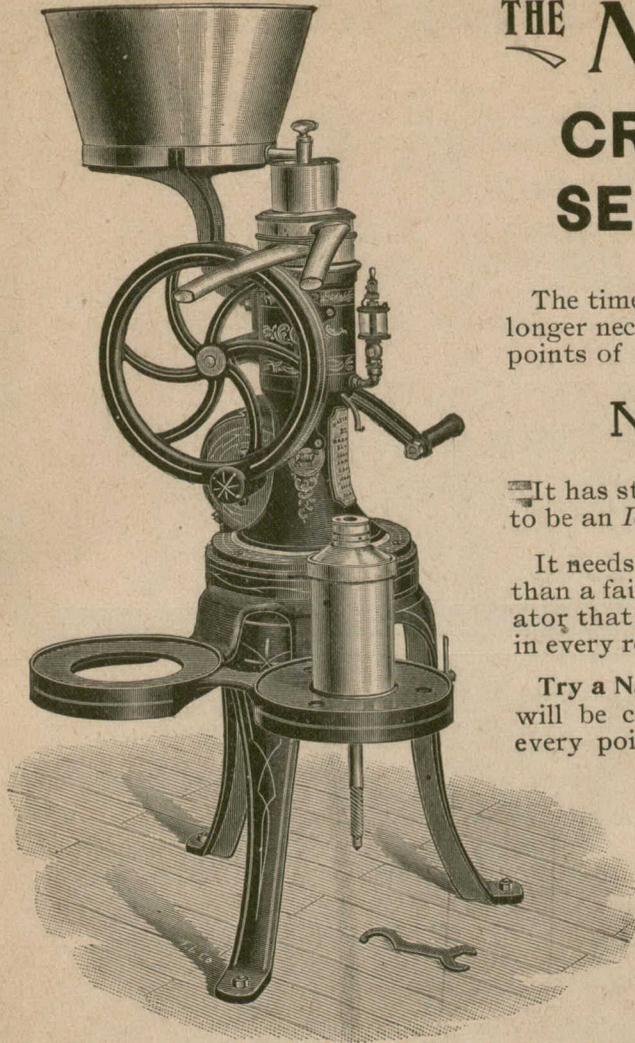
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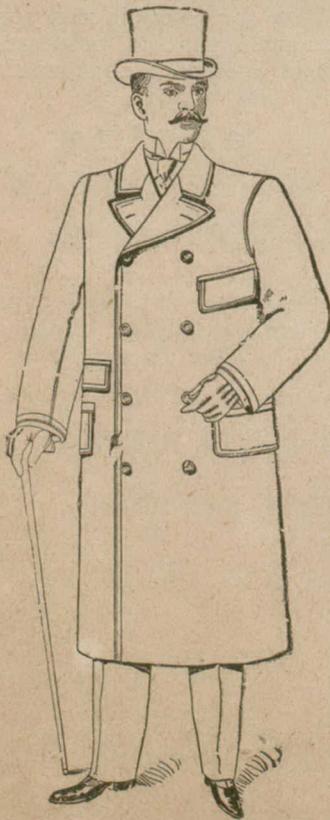
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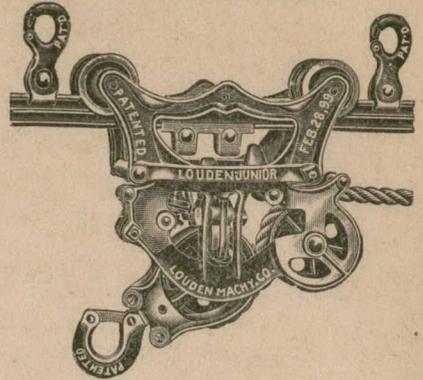
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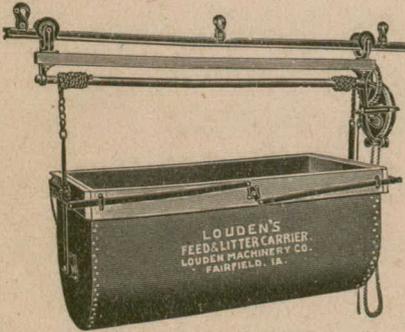
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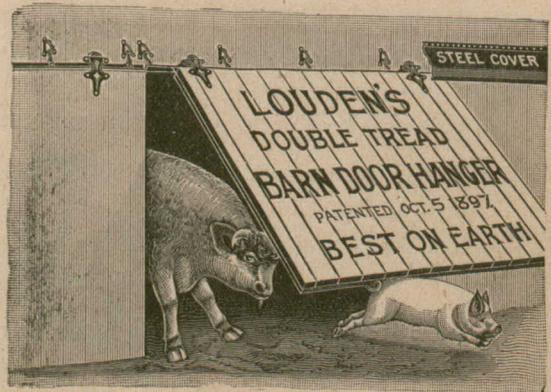
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The O. A. C. Review

Published monthly during the College Year by the Students
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THE DIGNITY OF A CALLING IS ITS UTILITY.

Vol. XVI.

ONTARIO AGRICULTURAL COLLEGE, MARCH, 1904.

No. 6

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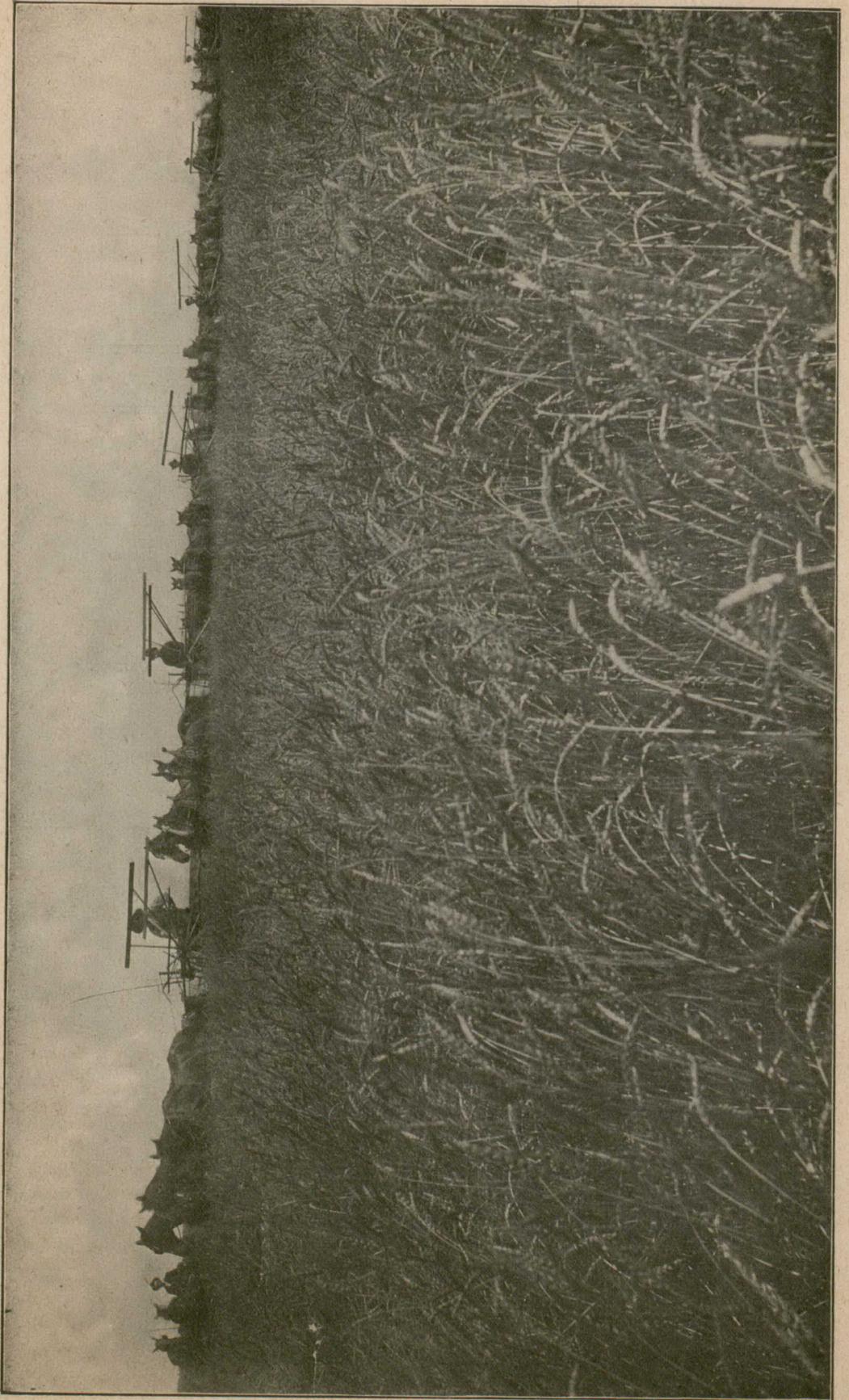
OUR CANADIAN WEST.

"I hear the tread of pioneers,
Of nations yet to be,
The first low wash of waves, where soon
Shall roll a human sea."

NEVER since the acquirement of our Canadian West, and the construction of that great work of national unification, the Canadian Pacific Railway, the efforts of our government have been directed toward the settlement of that vast heritage of Canadians, the prairies. But for years these efforts seemed unavailing. Immigration officers, extensive advertising, and the efforts of an energetic department of our government failed to direct to this region, one-tenth of the stream of immigration that seemed to flow naturally toward our great neighbor to the south. To-day that condition is changed, and the

tide which has now turned in our direction bids fair to pass into history as one of the greatest movements of population of the age. To account completely for this change would be to give the history of the West during this period, but suffice it to say, that the occupation of the cheap and the free grant lands upon the other side of the line turned the course of speculative and investment purchasers toward the lands in our own country, with results, which in appearance, seemed somewhat akin to a boom, but which in reality were of a much more substantial nature.

Scarcely more than seven years have elapsed since the commencement of this movement, and during that period its development has been truly phenomenal. In 1897 the total immigration amounted barely to 20,-



By courtesy "Farmers' Advocate."

Wheat!

000; last year this had grown to over 125,000. An equally important factor is the character of the incoming people. The majority of them belong to the Anglo-Saxon race. Mentally, morally, physically, they are the peers of any settlers in the world. They have come to secure a home in our western country, and make their permanent abode in our midst. In the language of Will Carlton:

'80's, and are now returning to find improved conditions in their native country:

"There's a bustle on the border, there's a shuffling of feet,
Where the greatest of Republics and the big Dominion meet;
For the sons of the Dominion who have wandered far away,
Are coming back to Canada to-day."

The immigration returns for the



Photo by
A. J. Lawrence
Bottle man

FARMERS' ADVOCATE

By courtesy "Farmers' Advocate."

Not always a dead monotonous prairie, but frequently a scene of rare beauty.

"They have come with heart-cheer in their songs,
And brought their wives and plunder all along."

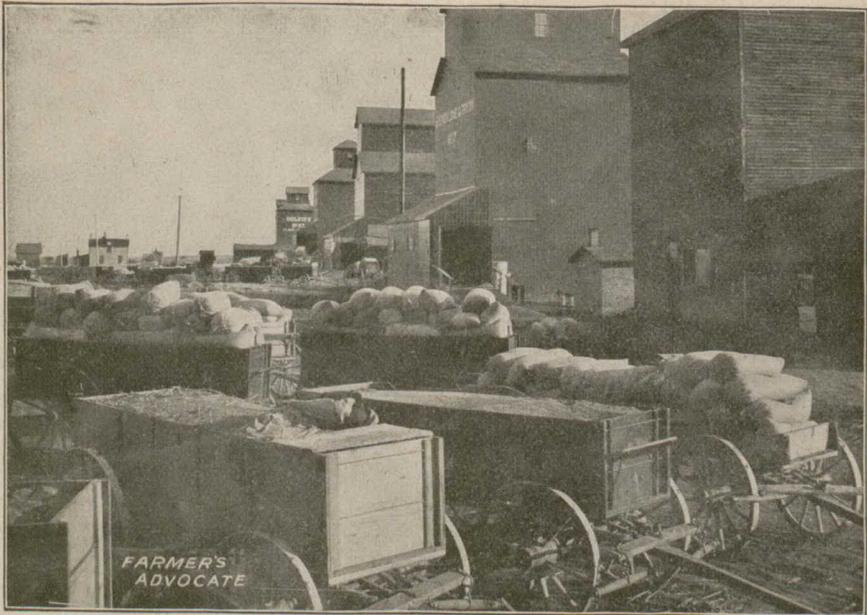
Among the most desirable classes of immigrants, from a Canadian point of view, are our American cousins. Their coming is largely a movement of repatriation, for many of them are natives of Canada, who left their homes in the dark days of the early

year 1896 show that in that year only 44 Americans found homes in Western Canada; in 1903 the number had grown to 47,780. These men are familiar with Western methods; they bring capital with them, and are undoubtedly the finest class of settlers that reach the West to-day. Naturally the growth in other lines has attempted to keep

pace with the influx of settlement. In 1878 the country could boast of only 64 miles of railway, a homely little line joining Winnipeg with Emerson and connecting with St. Paul. To-day the total railway mileage has reached 4,555 miles, and ten years hence, if present anticipations are realized, this will be doubled. One of the greatest needs of the country is

grain producing countries of the world.

What of the future? What are the limitations of expansion? The total amount of land sold, homesteaded or transferred to railway companies amounts to 25,750,000 acres. Of this only a small portion has been cultivated. More than 250,000,000 acres—after making liberal deductions



By courtesy "Farmers' Advocate."

In the hub of the wheat belt. An Indian Head Scene.

more railways. Lands may be taken up, settlers may come in, but production is stifled when wheat must be hauled twenty miles to the nearest railway. The record of the past few years has shown something of the growth of the country and the need of an energetic policy of development. A country producing fifty million bushels of wheat, with but a fringe of its fertile area touched upon, must surely stand among the foremost

for waste lands and water areas—still remain the property of the Dominion Government. Supposing that we consider this estimate too high, and that we take only the one-half, or 125,000,000 acres, we shall then have an area as large as the combined States of Iowa, Minnesota, and the Dakotas, with a little ranch left over equal in area to the State of Wisconsin. In view of these facts, he would be a bold prophet who would place a

limit to its possibilities, or estimate the growth of the next few years.

A common prophecy is that within ten years the bulk of population in the Dominion will lie west of Lake Superior, and present indications point in that direction. This displacement of the centre of gravity must bring with it a corresponding displacement of the centre of political power. Ontario will cease to be the dominant province in the Dominion. Western ideas, western ideals, will be more strongly brought to the attention of our

people, but these ideas are pregnant with the spirit of progress and will ever tend to the upbuilding of our country. Eastern Canada must realize that its hope of future greatness is bound up in the development of the west; while the west must be aware that much of its strength will come from the growth of the older sections of the Dominion. Thus united, shall we build up a great and mighty nation, for in very truth our time has come, our hour of destiny has struck.

DEACHMAN, '05.



A Glimpse of the Past.

Dr. Mills.

Regretted, missed, revered; out from our midst has gone;
He, who for long, long years, has led us bravely on.
Noble, just and true, yet stern at duties call,
True to his trust, and brave, thoughtful and kind to all.
Called to a higher place, among our nation's best,
Raised by a truemans' grand reward, above the rest.
Words cannot tell his worth, nor pen proclaim his praise,
But his work and name, shall live and reach, far into other days.
Afar into future years, the seed he has sown here
Will proclaim its birth, to the mighty earth, blossom and reappear.
From lands, where the 'southern cross' looks down,
To the land where the 'north lights' glow,
O'er wave and land, o'er desert sand,
The voice of his fame shall go.
So we bid God speed, to the man we loved,
The man, who was tried and true,
The man who laboured with might and main;
With a noble end in view.

*Yours truly,
Kerry Byrne.*

AGRICULTURE IN TEXAS.

AT the risk of dangerously surprising the editor, I will respond to an invitation received some months ago to write something of my experiences. If all the things said about Texas at our last American O. A. C. banquet be true, then it may be well to write before the promised perpetual particle cremation of the summer months is upon us. Texans all write assuring northern people of the beauty of the summer, weather by maintaining that, though the days may be extremely and dangerously hot, the nights are always delightfully cool and breezy. I was going to have written "evenings," but in Texas the evening commences immediately after noon.

This letter is written from Channing, a small town on the Fort Worth and Denver line, in the Pan Handle, the greatest cattle producing district in the world. Our party have been up here some days doing institute work, and we have, each one of us, caught the "investment fever" and written to all our friends to send us all their money to invest in cheap land in the most admirable stock country that, well, there is no better way of expressing it than by the old phrase—"that ever laid out of doors." Channing is located on the boundary of the xIT ranch that is carrying this winter 70,000 cattle. There is here an elevation of 3600 feet, and so clear is the atmosphere that, in any direction one may look, the mirage effect brings to mind the experience of the earlier explorers of the plains. Lured on by the lakes appearing in the distance, but ever receding and disappear-

ing, the thirsty traveller, convinced that his senses were no longer reliable, really became crazed, and the spot where last he lay now affords a more gruesome sight than is seen in the many skeletons of cattle that dot the plains. One would naturally think that if real wild western life can be found anywhere it would be in the newer parts of Texas, but the fact is that the "wild and woolly west" no longer exists. True, we are compelled, by the fact that there is only one train a day, to rise at an unreasonably early hour to-morrow morning, but aside from that there is little to suggest any lack of all the modern conveniences of older settled districts. At Channing we visit Mr. William Powell, the pioneer Hereford importer of America, who has associated with him his brother who brought to America Old Anxiety, a bull that has possibly done more to improve American beef cattle than any other one arrival known to cattlemen. Mr. Powell keeps about 800 head of registered Herefords, the sight of which grazing in the limitless pastures, small white heads just barely visible above the grass, with here and there an old matron in charge of a nursery of eight or ten babies, while her sisters graze, might tempt the pen of any one who has not dwarfed the natural fondness for animal life implanted in the breast of every member of the class of *really* higher animals. It requires a visit to the range to fully impress one with the utility of the various qualities of a prize winning animal; to see bulls, strong in the blood of famous prize winners in service in a steer breeding herd, where every steer is practically a

pure bred, removes all temptations to skepticism in regard to actual value of a good constitution or strong bone.

Mr. Powell has animals in his herd which might easily win prizes at St. Louis next summer, but as he says, orders are already ahead of stock on hand, and Pan Handle cattle are already famous, so what is to be gained by showing? But it was not of cattle I set out to write. Returning from inspection of the stock, we entered the most comfortably furnished of sitting-rooms, to be received by Mr. Powell's charming young wife, whose talents not only find pleasing response in Mr. Powell's aesthetic nature, but are the pride of her wide circle of acquaintances. It is indeed a pleasure to one who has—and who has not—met with people who think it necessary to blush to say "gentleman cow," to converse with persons who can turn from the discussion of the merits of Lord Wilton or Grove 3d to the qualities of the productions of Beethoven or Wagner.

The above calls to mind a conversation in which a friend referred to a budding dominie's reference to Samson's slaughter of the Philistines with the "jaw bone of a mule." My friend's recollection of American history was fresher than his memory of scripture, however, and in his narration it was not the Philistine who suffered but the Phillippinoes.

Down on the shores of the Gulf of Mexico, just above the city of Corpus Christi, there is a farm well calculated

to interest any lover of nature, in either animal life or landscape. It is the Shorthorn Farm of M. J. F. Green, Superintendent of the 163,000 acre ranch of the Culman-Fulton Pasture Co. Mr. Green, formerly an Illinois lawyer, has been very successful in building up a shorthorn herd and has had frequent recourse to the blood of Canada's herds. To appreciate the spirit that actuates these "cattle kings," consider the risk and expense of transporting the highest price Canadian animals from Ottawa nearly all the way to old Mexico, added to which is the certainty that on their arrival all will have to pass through the Texas or splenetic fever with a death rate of not less than ten per cent and perhaps permanent injury to some of the survivors. To be shown Canadian Shorthorns, bred by George Miller, of Markham, is a treat, especially when it happens to be out in the face of a breeze from the waters of the Gulf Stream. Mr. Miller's friends will find him at St. Louis next September prepared to win prizes from Ontario breeders with Scotch roans, bred in Texas.

By this time I have probably said enough to indicate that like every other American, "I live in the only state in the Union," it being at all times understood that old Kentucky leads in the quality of her legalized moonshine, the superiority of her horses and the beauty of her women.

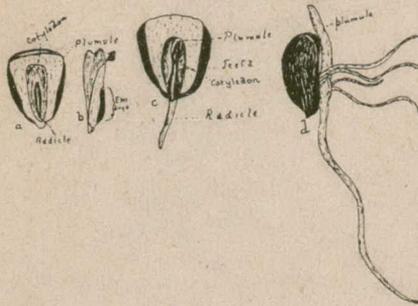
F. R. MARSHALL.

College Station, Texas.

NATURE STUDY No. V.

Studies of Seed Germination.

On May 18th seven different kinds of "seeds" were planted in fine sand. At the same time a number of seeds of the same kinds were placed in water, to cause the embryos or "germs" in the seeds to swell, thus making them more easily examined.



Corn.

Fig. 1—The Germination of Corn.

- a. Showing position of the Embryo on the flat surface.
- b. View of seed cut through embryo from front to back.
- c. Seed germinating—development of radicle.
- d. Germination more advanced—development of secondary roots.

Fig 1 shows the position and shape of the embryo in the corn. The embryo is situated just beneath the surface on the concave side of the seed, and is nearest to the end that was attached to the cob. The radicle, or

that part of the embryo from which the root springs, points downward and inward towards the small end, while that part from which the leaves and stalks come, or the plumule, points to the broad end.

On germination, the radicle is the first to appear, even the secondary roots starting before the plumule. The first secondary roots emerge from the axis of the embryo, and are usually two in number. The plumule bursts the testa by expansion and not by elongation. When the testa bursts, the plumule turns slightly upwards. As development proceeds, the plumule splits on the side at the upper end, and from this slit the young shoot appears, that is, the shoot arises from a slit between the dorsal side of the plumule and its upper end. The testa bursts at the side of the embryo, but never bursts in the middle line.

Pea.

The pea, like the bean and squash, has two cotyledons. These cotyledons, or seed leaves, as in the case of the bean, are held together by the axis of the embryo. This testa is easily removed if the seed has been soaked in water or planted for a short time.

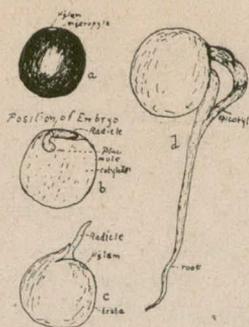


Fig. 2—Germination of the Pea.

- a. Seed showing position of hilum and micropyle.
- b. Inner face of a single cotyledon, showing position of embryo.
- c. Seed germinating—radicle breaking out through the micropyle.
- d. Germination more advanced—break- ing out of seed coat.

The embryo of the pea is thicker and shorter than that of the bean. There is a distinct contraction at the point which marks the division between plumule and radicle. Just before reaching the point of the radicle, the testa seems to divide into upper and lower portions, the lower passing under the radicle, the upper enclosing all. No trace of folded leaves is noticeable in the plumule, even with the aid of a lens, in the ungerminated specimens. At the end of about three days after planting traces of leaves could be seen. At this time the plumule is strongly bent, and points to the centre of the seed. The curved part is the first to appear, the part of the testa containing the hilum usually serving as a protective covering for the emerging plumule. The radicle of the pea has made a more rapid growth than has the radicle of any other of the seeds tested.

Bean.

The germination of the bean differs to some extent from that of the pea. In the latter the cotyledons are not lifted above the ground, owing to the fact that the hypocotyl does not elongate. In the bean the cotyledons are lifted above the ground by the lengthening of the hypocotyl.

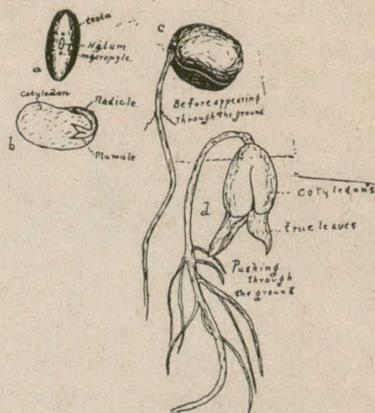


Fig. 3—Germination of the Bean.

- a. Seed view from edge, showing position of hilum and micropyle.
- b. Inner face of one of the cotyledons showing the position of the embryo.
- c. Seed germinating.
- d. Germination more advanced—break- ing this through ground.

The seed is kidney-shaped, and when the cotyledons are spread apart the two leaves of the plumule are easily seen. The radicle is first to appear, outside the seed, making its way out near the minute opening, the micropyle, on the concave edge. The axis is more protected by the cotyledons than is the case with the pea. While the stems of the pea and bean come above ground in the form of a loop, the corn stem comes up straight.

Squash.

The squash seed differs from the other seeds examined, in that it is then flat, and covered with quite a thick, hard shell, which must be softened before germination can take place. On the edges of the seed is a still harder protective covering. The sides of the seeds break down first, forming on their outside a paste-like substance.

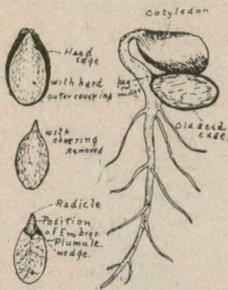


Fig. 4—Germination of the Squash.

- a. Squash seed, showing nature of covering.
- b. Seed with covering removed.
- c. Inner face of one of the cotyledons showing position of the embryo.
- d. Germination—The cotyledons breaking away from the seed coat.

The radicle lengthens rapidly, and soon forms rootlets. The hypocotyl also lengthens and forms an arch as it comes above ground. The embryo backs out of the seed coat. A curious peg at the lower part of the hypocotyl aids in keeping the two lips of the seed-coat apart as the young plant is getting out of its jacket. This jacket is usually left in the ground, but sometimes it is lifted upon the cotyledons when the peg fails to work properly. The cotyledons are flat, and do not contain much nourishment for the young plantlet, but once above ground and

freed from the seed-coat they rapidly enlarge when they get to the light.

Barley.

In the barley we have a grain with an outer husk. In this respect the oat and barley resemble each other, but the barley is plumper, and the seed-coat is much more closely attached.

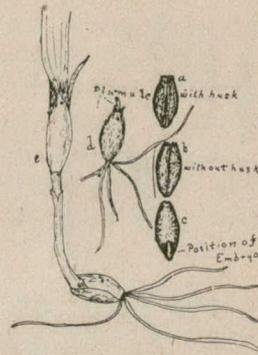


Fig. 5—Germination of the Barley.

- a. and b. Barley seeds with and without husk.
- c. Seed showing position.
- d. Seed germinating, showing the plumule emerging.
- e. The seedling plant.

The embryo of the barley is situated on the back or convex of the grain, on the end which was attached to the straw. The plumule points to the opposite end. The embryo is situated in the most protected part of the seed. The husk is not shed for several weeks after germination has taken place. The plumule makes its way out between the husk and the seed proper, at the opposite end of the grain. This, however, does not take place until the radicle has lengthened considerably. A constant feature in connection with the appearance of the radicle is its division almost immediately into fine rootlets.

Barley is a rapid grower, and, given exactly similar conditions with oats, will develop much faster.

Oat.

The embryo occupies the same position on this seed as it does in barley, but there are differences in methods of germination.

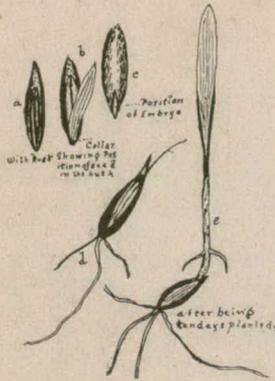


Fig. 6—Germination of the Oat.

- a. and b. Oat grain, with husk.
- c. Grain without husk, with embryo.
- d. Grain germinating.
- e. Seedling oat.

In the first place the single husk or palet, as it is called, is very easily removed, but the other part, though not closely attached to the seed, is securely fastened to it by a collar which fits round the axis of the embryo. The plumule is oar-shaped and pointed, and does not make its appearance until the radicle has made considerable progress. The radicle does not divide immediately, but is protected between two sheaths which grow about one-half inch in length. In about three or four days lateral roots are produced, one on each side of the main root, apparently arising from the axis, but appearing below and bursting the sheath.

Wheat.

Though a comparatively tender seed, it is not provided with a husk or hard outer covering. In fact, of the seven seeds examined, the embryo of the wheat is the most poorly protected, there being but a very thin testa between it and atmospheric conditions. The embryo occupies the same position as do the embryos of oats and barley, though with this difference: after germination the old seed in the case of the wheat assumes a position perpendicular to the young plant, while in the oats and barley it lies parallel.

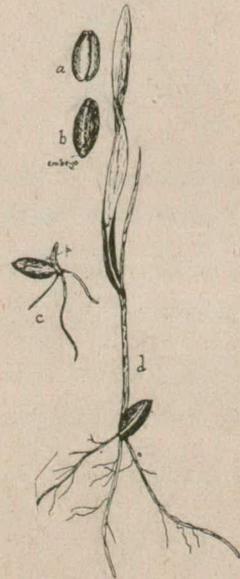


Fig. 7—Germination of Wheat.

- a and b. Wheat grains.
- c. Germinating grain.
- d. Seedling plant.

On germination, the radicle divides almost at once into three laterals, the laterals being placed one on either side of the main, but all appearing to rise from the axis. The plumule bursts

the testa just at this time, or in about three days after seeding. Of course in all seeds the time required for germination and the rapidity of growth will depend largely on the vitality of the seed, the condition of the seed-bed, as well as the season and condition of the atmosphere.

During these studies many other factors and conditions were determined. For example, it was determined that water, heat, and air are essential to germination; that carbon dioxide is produced when seeds are germinating; that the embryo is dependent upon the supplies stored in the seed for its early growth; that, no matter how the seeds are planted, the radicle turns straight downward and the plumule upward; that some cotyledons, like those of the squash, function as foliage leaves; that some cotyledons, like those of the pea and bean, serve as store-houses of food; that others are empty, like those of the corn, wheat, barley, and oat, the food supply being stored between the cotyledons and the seed-coat; that some seeds, like the cereals, have one, some, like the bean, pea, and squash,

have two cotyledons; that the food-supply becomes gradually used up during the growth of the seedling; that the root grows in length just behind the tip; that the young shoot grows throughout its entire length; that the root-hairs are most abundant just behind the tip; that the primary root of corn, oats, barley, and wheat is extremely short, the root-system being composed of numerous fibrous roots which arise from the short primary; that the root-system of wheat penetrates more deeply than that of barley; that the plumule of the cereals is erect and not arched, as it breaks through the ground.

Experiments were also carried out to determine the most favorable temperature for germination; the various uses of water in germination; the necessity of oxygen or air; the proper depth of planting; and the nature of the food-supplies of the different seeds, but want of space prevents a statement of the results obtained. These may be given in some future number.

J. C. READEY.



Agricultural Department.

EDITED BY J. C. READEY.

Prof. Harcourt's Article.

WE wish to draw the attention of our readers to an article in this issue by Prof. Harcourt, of the Chemical Department, on the bulletin lately issued by the U. S. Department of Agriculture on the "Chemistry of Soil Relating to Crop Production." The Bulletin has created a great deal of discussion and has drawn out much adverse criticism during the past few months. The space available for Prof Harcourt's discussion of the bulletin is altogether too limited to give the writer or the subject justice, but the article is, nevertheless, well calculated to give a good general idea of the principles set forth in the bulletin and their possible weaknesses.

In Acknowledgement.

Last fall it was our privilege to speak a word in acknowledgement of the kindness shown to the agriculture specialists by the owners of live stock whose stables were visited during the term's work in stock-judging. During these visits the agricultural class judged sheep, beef cattle, heavy horses and on one or two occasions carriage and running horses. The present term's work has consisted of the judging of dairy cattle, light horses and swine. The system of visiting prominent breeders and stockmen was adopted in these latter classes as well, under the supervision of Prof. Cumming. The trip last week occupied four days and proved to be one of the

most profitable periods in the course. In every case the students were right royally received by the gentlemen whose stables were visited, and their kindness, together with the thoughtfulness and painstaking interest shown by Prof. Cumming, made the trip one to be long remembered. We know of no better way of broadening the education along live stock lines than by listening to the discussion of the living example by men actively engaged in the live stock business. Among owners of dairy cattle whose stables were visited we beg to mention the names of Messrs. Bull & Son, Jersey Breeders, Brampton, and Mr. Ketchen, of Dentonia Park Farm, Toronto. Messrs. Crowe & Murray and Mr. Pepper, of Toronto, kindly put their fine stables of hunters, standard breds, and carriage horses at the disposal of the students for examination and criticism. On the return trip a most profitable two hours were spent among the Shorthorn cattle and Shire horses of Mr. John Guardhouse, Highfield. We trust the time is not far distant when the students will be able to unite their energies with those of the men already in the business for the advancement of the greatest Canadian industry, the breeding of live stock.

How Shall we Measure the Fertility of the Soil.

Possibly no bulletin issued by any Agricultural Experiment Station has met with so much adverse criticism as the one on "The Chemistry of the Soil

as Related to Crop Production" recently issued by the Bureau of Soils, Department of Agriculture, Washington. During the last fifty years many investigations looking to the solution of this problem have been undertaken, and, while the question has been by no means settled, we are hardly prepared for such radically new conclusions as are therein set forth.

Briefly stated, the results given in this bulletin appear to show, contrary to opinions which have long been held, that there is no obvious relation between the chemical composition of the soil, as determined by the methods of analysis used, and the yield of crops, but that the chief factor determining the yield is the physical condition of the soil under suitable climatic conditions. As a result of the introduction of a new method of analysis and extended investigations the conclusion is arrived at that "practically all soils contain sufficient plant food for good crop yield, that this supply will be indefinitely maintained, and that this actual yield of plants adapted to the soil depends mainly, under favorable climatic conditions, upon the cultural methods and suitable crop rotation, a conclusion strictly in accord with the experience of good farm practice in all countries, and that a chemical analysis of a soil, even by these extremely delicate and sensitive methods, will in itself give us no indication of the fertility of the soil or of the probable yield of the crop, and it seems probable that this can only be determined, if at all, by physical methods, as it lies in the domain of soil physics."*

* U. S. Dept. of Agriculture. Bureau of Soils, Bull. No. 22, P. 64.

In a recent publication † from the Bureau of Chemistry, Washington, giving the results of an extensive study of the available mineral plant food in soils by pot experiments and chemical analysis, the statement is made that "with the exception of two instances, the analysis indicate to a remarkable degree of accuracy, the conditions as brought out by the crops." The uses in practical agriculture that could be made of chemical determinations of the available plant food are also discussed, and it is even asserted that as result of chemical analysis it would be possible to diagnose the crop most suitable for the soil, and how to manure the land to bring out the best results.

The conclusions arrived at from the two lines of investigations are so conflicting that it is not strange that they have caused considerable discussion. At the same time, they serve to show the present unsatisfactory condition of our knowledge of the fundamental principles of crop production.

The soil has two functions to perform in connection with the growth of crops. First, it forms a lodging place for the plant, in which the roots are extended, and it holds water; and second, it furnishes food for the development of the plant. Cultivation tends to open up the soil and allow free root development, facilitates drainage, and at the same time it helps to retain moisture. It also aids in the disintegration of the soil particles, thus bringing plant food into a condition in which it may be dissolved in the soil water. Good

† Journal of the American Chemical Society, Vol. 24, p. 79.

cultivation thus aids the soil in performing its duties. The climatic conditions effect the moisture and temperature of the soil and, in rotating the crops, advantage is taken of the various feeding characteristics of the plants and thus tends to husband the food in the soil. But is this all that can be done for the plant? Will the soil under the best methods of cultivation, the most favorable climatic conditions, and the most judicious arrangement of the rotation of the crops grown upon it, maintain its fertility indefinitely without the use of manures? The bulletin from the Bureau of Soils answers this question in the affirmative. Let us look at some of the methods of investigations followed in reaching this conclusion.

It has been contended, and fairly well established, that the roots of plants are capable of extracting more plant food from the soil than is dissolved in the soil water. In the bulletin under discussion it is assumed that the aqueous soil solution is the exclusive source through which plants derive their food and the amounts of the fertilizing constituents contained in it are determined by a new method, the accuracy of which, according to Dr. C. G. Hopkins, * instead of being "very accurate methods of analysis," are absolutely untrustworthy. By examining the water extract of the soil by this method, it has been found that the solutions from all soils contain practically the same amount of fertilizing constituents and the conclusion is reached that "there is no apparent relation between the yield of crops and the soluble salt

content of soils, even where the yields per acre differ as much as from 4 to 25 or 30 bushels." † As, according to this statement, there is no difference in the concentration of the salts in the soil water where these extreme yields were obtained, it must follow that more water passed from the soil to the plant where the heavier yield was obtained. If this be true, the question before the agriculturists today is not—how can the fertility of the soil be maintained, but, how can the water content of the soil be increased? According to this reasoning, rich virgin soils decrease in productiveness, not through loss of available plant food, but because there is less water to bring it into solution. It also implies that "rich" soils will not supply plant food more quickly and continuously than "poor" soils, and that manures increase the yield of crops by improving the physical condition of the soil. These contentions cannot be said to have been fully established by the work reported.

In the bulletin * reference is made to the Rothamsted experiments, where wheat has been grown since 1843 continuously on manured and unmanured plots, to show that the variations in yield from year to year due to the climate are greater than those due to manuring. But a study of these experiments † also shows that in the eight years, between 1843 and 1851, the average yield per acre from the manured plot was 11 bushels greater than that from the unmanured plot,

† Bureau of Soils, Bull. 22, p. 34.

* U. S. Department of Agriculture, Bulletin No. 22, p. 47.

† "Agricultural Investigations at Rothamsted," U. S. Dept. Agriculture, office of Exper. Stations, Bulletin No. 22.

* University of Illinois, Circular No. 72, p. 21.

for the eight years between 1884 and 1891 it was 26 bushels greater, and that the average yield for the first 50 years of the experiment was 20 bushels more from the fertilized than from the unfertilized plots. The plots received the same amount of cultivation. Is the larger yield to be credited wholly to improved physical condition of the soil brought about by the manure? The writer of Bulletin No. 22 does not admit that the application of fertilizers increases the concentration of the plant food in the soil water, except for a very short time. He then states that the only possible explanation of the effect of fertilizers is that it temporarily increases the concentration of the soil water and stimulates early plant growth. But we have no positive proof that the soil water is a concentrated solution of the fertilizing constituents, nor is it shown that if, as it is contended, the extra soluble plant food is removed from the solution, it is not held in a more available form than are the insoluble constituents of the soil. This brings us back to the point from which we started. How shall we measure the amount of available plant food in the soil? Is the amount that will dissolve in water all that is available, or are some of the soil constituents brought into solution through the agencies of the plant? Until this point is settled we cannot feel that the authorities in the Bureau of Soils have established their contention.

R. HARCOURT.

National Association of Canadian Stock Breeders.

A convention of great interest and importance is in progress in the City of Ottawa this week. Unfortunately, it is impossible to secure anything like full information regarding what has been accomplished up to the time of going to press. Representative stockmen are present from all provinces in the Dominion, and they have been called upon to discuss a number of subjects which are of vital interest to Canadian stockmen. One of the matters which has been under consideration is that of Herd Books. At the present time, a number of breeds of stock are not recorded in Canada; while in the case of other breeds, several herd books for each breed are in existence. The Association of Stock Breeders is asked to discuss the advisability of maintaining more than one herd book for a breed in Canada. Also, whether it would be advisable to amalgamate Canadian and American records, or British and Canadian records, together with a number of other problems connected with this question, such as, by whom these records should be conducted, etc. There is little doubt that the multiplication of records is apt to lead to a great deal of confusion which is not in the best interests of the breed concerned. At the same time, it is a long stretch from Halifax to Vancouver, and there is a great diversity in the interests of the breeders in different sections of the country. Such being the case, it will, no doubt, become a somewhat delicate matter to conduct an association which will meet the requirements of all, and the management of such an association will have to be conducted

with a great deal of tact. It has been suggested in some quarters that the control of the stock records should be in the hands of the Dominion Government. While such an arrangement would possess certain advantages, at the same time, it would present some very objectionable features. So long as it was kept entirely free from politics, and the management remained efficient, no doubt it could be made a success; but there is a great danger that sometime or other political influence might interfere with the usefulness of such a record. It seems only reasonable that the breeders themselves should control the recording of their animals, but even this arrangement is open to abuses. There are cases where records are under the control of joint-stock companies who run them for the money there is in the undertaking; while the rank and file of the breeders have no say in the matter of control. This is all wrong, and the arrangement at present in existence in Ontario is much more satisfactory. Here every breeder may become a member of the Association by paying an annual fee, and by so doing he is entitled to vote upon the election of all the Officers of the Association. It seems to us, however, that a similar arrangement could be made if only one record were maintained for Canada, and such an arrangement would be preferable to exclusive Government control. While we believe that it would be in the interests of the different breeds of live stock in Canada to have only one record for each breed, at the same time, we think it would be a serious mistake to wipe out the Provincial Associations. The Provincial Associa-

tions could work for the interests of their breed in their respective provinces, and could elect representatives to the National Association, which would in turn control the records for the breed. In this way, every breeder would be able to have a voice in the control of the breed records through the representatives elected by the Provincial Association. Just exactly what will be done is not yet known, but we trust that the breeders of live stock will not give up the control of their records.

Another subject which will, no doubt, create considerable discussion, is that which deals with the importation of horses, cattle, sheep, and swine into Canada. Possibly the breeders may be able to arrive at conclusions satisfactory to themselves, but the general farmers may raise very serious objections to what the breeders may recommend. It is a difficult matter to protect any one class in the community without injuring others to some extent, and this matter of regulating importations of stock is one which requires very careful consideration.

A topic which, no doubt, will be discussed with much interest, is that relating to the development of live stock trade with the West Indies, Mexico, Newfoundland, and the South American Republics. There is little doubt that some of these countries afford splendid fields in which to dispose of our surplus pure bred stock; particularly in the case of beef cattle and, to some extent, sheep. Of the different countries mentioned, possibly the Argentine Republic is the most promising field. It seems as if the demand

or stock were greater than the supply, and the prices paid for good stock in Argentina would cause a Canadian to open his eyes in surprise. But, while such is the case, it must not be forgotten that these high prices are paid for desirable animals. The breeders and ranchers of the Argentine Republic are pretty shrewd judges of stock. When they see what they want they are willing to pay for it, but it must be good. We must not, therefore, expect to make any of these countries a dumping-ground for our inferior stock if we expect to win their patronage. At present, the expense of shipping is so great as to make the venture almost too expensive for private enterprise, and we believe that the Dominion Department of Agriculture would be doing a good work if it could guarantee Canadian breeders a certain price for the stock shipped to these distant countries, would supervise the shipment, and make all arrangements with the transportation

companies. As the trade developed, no doubt carrying facilities would increase, and Government assistance could be withdrawn.

Several other important subjects are up for discussion, notably, the question of developing a dead meat trade with Great Britain. This question has been discussed a great many times and seems to be a difficult one to decide. It is, perhaps, quite safe to presume that every breeder would like to see such a trade developed; but the problem is, how is it to be developed? We trust that the National Association will be able to offer some concrete suggestions which may bear fruit in the near future. No doubt, great good will come from the gathering together of stock men from different Provinces, and much credit is due to our Live Stock Commissioner, Mr. F. W. Hodson for conceiving the idea of bringing them together.

G. E. DAY, B.S.A.

Experimental Department.

Our Live Stock Markets, Domestic and Foreign.

A COUNTRY depending so largely on live stock for its prosperity necessarily is very much interested in the live stock markets. And a little information as to where and how we market our live stock products may prove of some interest to the readers of the REVIEW.

1. DOMESTIC MARKETS. — In Ontario, with a large population enjoying a high degree of prosperity, there

is a very large consumption of meats and other animal foods. According to the Bureau of Industries' report for 1902, 673,544 head of cattle, of a cash value of \$23,340,908, were sold or slaughtered from Ontario farms. A large number of these animals were exported, others used for breeding purposes, and also for feeding purposes, so that it is somewhat difficult to estimate the value of those actually killed and consumed in the province, probably, though, \$12,000,000 would not be very much out of the way. Only our best cattle are exported, the

next grade, best butchers' cattle, are often very nice, smooth, well-bred cattle, but are not carried up to the weights required by the export trade. They furnish a very superior article of beef, such as is usually found in our best city and town shops. Then, following the down grade, we get poorer qualities of cattle, sold in the smaller shops, until finally, we find at the bottom of the list the canner, worn out dairy cows, scalawag steers and stags, dairy bulls, and, in fact, practically the refuse of the market. A very large trade is done in Eastern Ontario with Montreal and other eastern markets in this line. In addition to the markets mentioned, a very large number of animals are killed by the farmers themselves for home use, varying very much in quality, from the very best young beef animal down to the superannuated dairy cow, finishing a career of great usefulness by furnishing a very "lasting quality of beef." Then, in some sections, "Beef Rings" are very much in evidence, and the local country butcher now reaches nearly every home in the community.

For young stock, a strong market is found in the Northwest and Manitoba, large numbers of young cattle, calves, yearlings, and two-year-olds, being bought up and shipped to the Northwest for feeding on the range. Many of these cattle find their way out again as exporters, but a great many of them must be used locally and sent to British Columbia, as they are not good enough for exporters, and cannot be made so, even under the most favorable conditions. Indeed, I cannot see how,

even with free grass, it would be possible to make anything out of the miserably bred stuff that furnishes a very large percentage of our shipments to the Northwest.

The consumption of lamb and mutton in our local markets is not relatively large. Mutton is not growing in popularity, especially in the country districts. While the quality of our lamb is generally very good, that of our mutton is generally poor. The reason for this is that very few lambs are carried over and fed especially for mutton. The sheep for mutton are usually the ewes that have failed to breed, those that have lost lambs and the old breeding ewes that have finished their career. So we could hardly expect from animals of this stamp very good mutton. Our total value of sheep and lambs consumed in the Province will probably not exceed one million dollars. Besides those exported, a considerable number are sent to the city of Montreal.

There has been a very large increase in the amount of ham, bacon and other pork products consumed in the domestic markets of the country during recent years, and the tendency is for a still further increase. No animal food is increasing in popularity like ham and bacon. The superior class of hogs now produced, and the improved methods of curing adopted by our factories, produce a leaner, mild-cured, very appetizing article, that is steadily growing in popular favor. In addition to supplying the export foreign trade and the local markets of the Province, a large amount of stuff is shipped to the Province of Quebec and the Maritime Provinces, besides some to Manitoba and the North-

west. The consumption of fresh pork, while quite a considerable item, is comparatively small. It is estimated that about one-third of the total production of Canada is consumed at home; the balance is exported.

The export trade of live stock is large, and brings very large sums of money into the country annually. The first shipment of live cattle to Great Britain was made in the summer of 1876, and a part of the first shipment was fed at the O.A.C. The firm of Frankland & Reeves, of Toronto, made the first shipment. I happened to be one of the boys detailed to help drive the cattle down to the market. They were very heavy cattle, and I remember Mr. Frankland saying to Prof. Brown, "They are too fat, Professor; it's no use; I can't sell beef like that in Toronto in hot weather." So they dickered away, and were a long time making a bargain. After the bargain was concluded, Mr. Frankland told us that he was going to try the British market, and that they were just what he wanted.

The total exports of Canada last year to Great Britain were 161,170 head, valued at \$10,842,438. About \$300,000 worth was sent to the United States, so the export cattle trade of Canada brought in a little over \$11,000,000.

Large, heavy, very fat cattle were in demand in the early days of the trade; now the smaller, fleshier, tidier beast takes the cake. A large percentage of the cattle shipped were ranch cattle from the Northwest.

The export trade in sheep and lambs to Great Britain is not a large one, and does not seem to grow. Our shipments to Great Britain were a little over 116,000 head, valued at \$656,000; to the United States, principally lambs, 284,000 head, valued at \$961,000. The trade in swine products has become one of the most important lines of production. The live hogs are marketed at the packing houses, situated principally in central and western Ontario. When properly cured, the great bulk of the meat, after supplying the local demand, is marketed in Great Britain. The total value of all swine products exported last year slightly exceeded \$16,000,000.

I have not said anything about the export trade in horses, for the reason that we are not exporting many. A few years ago the Province went largely out of the business of producing horses, and now we can hardly meet our local demands. An excellent market exists both in Great Britain and the United States for superior horses of all descriptions, but we are not able to supply it. Our total shipments last year were, to Great Britain, 1,638 head, valued at \$224,845; to United States, 1,879 head, valued at \$336,519.

As to prices for the coming season, the prospects are none too bright. We have enjoyed a period of exceptional prosperity and of exceptional duration, and it would be only natural to expect that there will be a period of reaction. This period is already setting in. Although, owing to extremely favorable local conditions, we will probably feel it less than any country in the world,

still the fact remains that for a very large proportion of our live stock we have to depend upon outside markets, principally the British market, which under present conditions, is the food market for the surplus of all countries. So that anything that impairs the purchasing power of the British people, or that causes an excess of supplies in that market, will inevitably be felt here. There is not room in this article to discuss the general market situation, but the general tendency is to lower market values for nearly all leading lines of live stock.

T. H. MASON.

Treatment for Smut in Oats.

Many inquiries have been made by Ontario farmers regarding the treatment of smut in oats. Experiments have been conducted at the College, in order to ascertain the most effectual remedies which can be used for this pest. Two varieties of oats were selected in the spring of 1902, and again in the spring of 1903, and uniform samples from each variety were submitted to special treatments with the object of killing the spores of smut adhering to the grain. The various treatments were as follows:

(1). *Immersion in Hot Water.*—For this treatment, the grain was placed in a bag, which was then immersed in water at about 115 degrees F. Soon afterwards it was placed in water which was kept at a temperature between 130 degrees and 135 degrees F. The grain was occasionally stirred and was allowed to remain in the water for a period of fifteen minutes. It was then spread out on

a clean floor to dry, where it was stirred occasionally.

(2). *Immersion in Bluestone Solution for Five Minutes.*—For No. 2 treatment, a strong solution was made by dissolving one pound of Copper Sulphate (Bluestone) in one gallon of water, and then immersing the oats in the solution for a period of five minutes.

(3). *Immersion in Bluestone Solution for Twelve Hours.*—In this treatment, the bluestone solution was made by dissolving one pound of bluestone in 25 gallons of water, and the oats were immersed in this solution for a period of twelve hours.

(4). *Sprinkling with Bluestone Solution.*—This solution was made by dissolving one pound of bluestone in 10 gallons of water, which was used for sprinkling over the oats until they were thoroughly moistened after being carefully stirred.

(5). *Immersion in Potassium Sulphide Solution.*—The potassium sulphide treatment consisted in soaking the seed for two hours in a solution made by dissolving 8 pounds of potassium sulphide in 50 gallons of water.

(6). *Immersion in Diluted Formalin (Formaldehyde).*—The solution of formalin used for the immersion process was made by pouring one-half pint of the formalin into 21 gallons of water, and the seed oats were immersed in the solution for twenty minutes.

(7). *Sprinkling with Diluted Formalin.*—One-half pint of formalin was poured into 5 gallons of water. The oats were then sprinkled with this solution and carefully stirred until the grain was thoroughly moistened.

(8). *Untreated*.—One sample of oats of each variety was left untreated, in order that the influence on the various treatments might be observed.

Eight lots of oats of each variety were, therefore, used for this experiment. After treatments had been completed a few hours, the oats were carefully sown on separate plots. When the oats were coming into head they were examined frequently, and all smutted heads were removed and carefully counted from day to day. The following table gives the total percentage of smutted heads of oats from each treatment:

Treatments.	Percentage of Crops Smutted.
1. Hot Water.....	.0
2. Bluestone (5 minutes).....	1.3
3. Bluestone (12 hours).....	.3

4. Bluestone (sprinkled).....	1.4
5. Potassium Sulphide (2 hours).....	1.7
6. Formalin (20 minutes).....	.0
7. Formalin (sprinkled).....	.0
8. Untreated.....	4.7

The smut in oats very frequently causes a great reduction in the yield of grain. The treatments with hot water, formalin, and immersion in bluestone for twelve hours have given the best results at the College. The formalin is a clear liquid, which can be obtained from almost any drug-store. The treatment with formalin is easily performed, comparatively cheap, and very effectual. Farmers would do well to treat their oats before sowing in the spring.

C. A. ZAVITZ.

Horticultural Department.

EDITED BY T. C. BARBER.

Fire Blight.

“**T**HAT species of blight which is sometimes called the ‘fire blight’ frequently destroys trees in the fullest apparent vigor and health, in a few hours turning the leaves suddenly brown, as if they had passed through a hot flame, and causing a morbid matter to exude from the pores of the bark, of a black, ferruginous appearance. This happens throughout the whole course of the warm season, more frequently in weather both hot and moist.” So wrote William Coxe in a book on the “Cultivation of Fruit Trees,” published in 1817, which is said to be the oldest American book on fruit culture.

Nearly forty years before this we have a record of the disease mentioned,

in a letter written by one, William Denning, who first saw the disease in the Highlands of the Hudson, in 1870. He described the disease fairly well and thought it was due to a borer in the trunk of the tree.

From 1817 almost to the present time, we find in horticultural literature many theories as to the cause of the blight. It would be tedious to give an account of all the different theories put forward by various writers during this period. The most diverse views were entertained as to the cause of the disease and it was a constant topic for discussion in the horticultural journals and societies. These discussions were so wearisome and so barren of results that the Western New York Society resolved

that the subject should not be discussed at their meetings, unless some one had something entirely new concerning the disease, to communicate.

Amongst the numerous theories put forward to explain the cause of pear blight, we may mention the following:

1. Insects.
2. Rays of the sun passing through vapors.

7. Autumn freezing of unripe wood, which engendered a poison which destroyed the shoots and branches in the following season.
8. Electricity, or atmospheric influence.
9. Freezing of the sap, or freezing of the bark.
10. The heat of the sun, assisted by



A Pear Orchard badly infected with Fire Blight.

3. Poor or deleterious soil.
4. Violent changes of the temperature of the air, or the moisture of the soil.
5. Sudden change from sod to high tillage, resulting in surfeit or overplus of sap.
6. The effects of age; old varieties being most subject to it.
11. Fermentation of the sap.
12. The absence of certain mineral matters in the soil.
13. An epidemic transmitted from place to place by the air.
14. Fungi.

rain-drops acting as lenses, causing the scalding of the sap and bursting of the cells.

Each of the above theories was sustained by various writers, and it may be of interest to note that Henry Ward Beecher was an advocate of the theory that the cause of blight was due to the autumn freezing of unripe wood.

A. J. Downing, the distinguished author of "Fruits and Fruit Trees of America," applied the name "Frozen-sap blight" to the disease. His theory was that the disease was due to the freezing and thawing of the sap. The sap thus lost its vitality, became dark and discolored and poisonous to the plant.

Thomas Meehan, editor of the *Gardners' Monthly*, supported the idea that fungi were the cause of the disease; but no tests were applied to prove that the inoculation of these fungi into healthy trees would cause the disease.

It was not until the year 1878, when W. T. Burrill, the Professor of Botany in the University of Illinois, announced to the State Horticultural Society the discovery of bacteria, apparently connected with the disease. Burrill also proved that the disease was infectious and could be communicated to healthy limbs by inoculation, using the gummy exudation from an affected tree as a virus. Not only was he able to produce the disease in pears, but also in apples and quinces. Dr. J. C. Arthur, botanist of the New York Experiment Station, subsequently confirmed Prof. Burrill's results, and thoroughly established the fact that a certain species of micro-organism, named by the discoverer *Bacterium amylovorum*, or the starch destroying bacterium, was the sole cause of the disease.

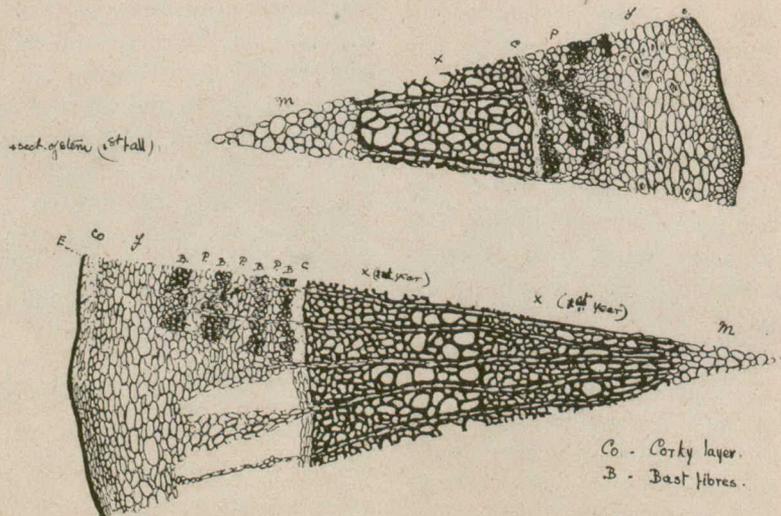
Geographical Distribution.—This disease is peculiar to North America. So far it has never been recognized in Europe. Prof. Budd, of Iowa, who is familiar with the disease as it occurs in North America, has inspected the orchards of Europe, and states that no trace of fire blight of pear or apple trees can be seen in Europe. It is also unknown in New Zealand and Australia. In North America the blight extends from New York to California, and from the northern counties of Ontario to Texas. Dr. Beadle, in a sketch of the history of the disease in Ontario, states that "in the early days of fruit growing in the Niagara district, we had no pear tree blight nor apple blight. With the advent of what people termed grafted fruit there came, after a few years, 'blight' on the pear tree" * * "By the year 1840 it had spread considerably."

N. J. Clinton, of Essex County, S. Hunter, of Oxford, E. D. Smith, of Wentworth, Stone and Wellington, of Welland, R. Hamilton, of Argenteuil, reported its presence in their respective counties about 35 years ago. The colder parts of the Province have suffered as severely from the disease as the more favored districts. The orchard of the Dominion Experimental Farm at Ottawa has been attacked and the 140 Russian varieties of apples cultivated there have suffered severely. In warmer countries, however, the disease has been much more severe. Whole orchards have been completely destroyed in the State of Texas, and certain pear growing districts in that State have been practically ruined by this parasite.

Losses.—No statistics are available

to give us an idea as to the amount of loss to fruit growers from pear blight, but a few references to losses by this destructive disease will help to give us an appreciation of the subject. Coxe in 1817 reported that he had lost upwards of fifty trees in twenty years. In the years 1826, 1832 and 1844 there was an increased prevalence of the disease, and few pear orchards escaped without partial or total loss of many trees, and

while A. Noice, of the same State, doubted "if one-tenth of the pear trees that are planted lived ten years on account of this destructive agent." E. H. S. Dart stated that the severities of winter were not so much to be dreaded as the ravages of blight. He had, in 1874, one to two thousand trees affected. Dr. P. A. Jewell, in 1876, lost 10,000 Tetofsky apple trees by it. Bailey, of Cornell, declared that fire blight was undoubtedly the



Cross section of a 1 and 2 year old stem. Fire blight bacteria grow in the cambium; (C) and inner bark; E.—Epidermis; Co.—Corky layer; B.—Bast fibres; P.—Parenchyma; C.—Cambium; X.—Xylem, or woody tissue; M.—Medulla or Pith.

some orchards were quite destroyed. Downing called it the "monstrous malady of the pear." Lyons stated, as the opinion of many cultivators in the State of Michigan, that "the pear tree cannot be grown with financial success on account of the blight." Hallam, in 1882, reported that, "in Southern Illinois pears have failed—utterly failed, so that none are now cultivated for market. The blight has destroyed the trees, branch and root,"

most serious disease with which the quince grower has to contend. It was the same disease which was so destructive to pear orchards in certain years and to certain varieties of apples, particularly the crabs. Selby, of Ohio, reported that the disease ranked among the most destructive known to the orchardist in his State. Chester, of Delaware, announced that pear blight was of unusual severity during the season of 1901 and caused

much alarm because of its rapid spread through the orchards of the State. In 1895 its ravages were most severe on apple trees in the vicinity of Hamilton and Burlington Bay. J. Craig gathered information as to the character of injury of the disease from fruit growers throughout this Province, and a number of these state that the injury was very severe.

These citations are enough to show that the disease is of special economic importance and greatly dreaded by many fruit growers.

Symptoms.—The first indication of fire blight is seen either in the browning and subsequent blackening of the leaves or of the young twigs or of young tender shoots. When the twigs or shoots are the principal parts affected the disease is spoken of as twig blight. Pears show the presence of the disease more frequently by the blighting and blackening of the leafy tufts of the spurs, and show it especially by the darkening of the blossom clusters on the larger branches; while, later, the branches themselves become blackened. The progress of the disease is always downward; an inch or more each day, depending upon the season, until the larger limbs are infected. In the more susceptible varieties it spreads more quickly, involving the whole tree; but in the more resistant varieties the progress of the disease is not so fast. When the disease is active, the bark of the diseased branches cracks, and a thick, blackish, gummy fluid exudes, and, later, the affected bark becomes hardened, dry and shrunken. The disease occasionally

appears on the larger branches and trunks of fruit trees, when these have been bruised or otherwise injured, when its appearance is similar to the injury known as "sun-burn" or "sun-scald." This disease of the trunks or larger branches is sometimes spoken of as "body blight" or "rough bark." The inner bark and cambium layer of the limbs and trunk are the most important parts of the tree killed by the blight. Instances are known of its attacking the fruit, producing watery ulcers, accompanied by brown discoloration and decay. The disease may be known by its peculiar odor; said by some writers to resemble putrefaction.

When the disease is in progress, the discolored blighted portion blends gradually into the color of the normal bark; but when the disease has stopped there is a sharp line of demarcation between the diseased and healthy portion. (Waite.)

Microscopic appearance of the diseased tissues.—The most conspicuous change in the tissues, affected with the blight, is the disappearance of the stored starch, and on account of this peculiarity the organism has been named the "starch destroying bacterium" (*Bacterium amylovorum*.) The germ penetrates from one cell to another and produces a gummy or mucilaginous matter which is found on the exterior of the affected parts. The microbe is found, as a rule, only in the inner bark and in the actively growing tissues (called the cambium, which produces wood on the inner side and bark on the outer side.) The organism is unable to grow in tissues that are lignified or woody.

Life history of the Pear Blight Germ.
 —The organism which produces the disease is a small motile bacillus, which increases with great rapidity in the succulent parts of affected trees. The microbe is of microscopic size, so small that 25,000 placed end to end would only measure an inch. They are able to live and multiply in the nectar of the blossoms, from whence they are carried to other flowers by bees and insects which visit the blossoms for honey and pollen. From this locality the germs extend into the tissues and then downward into the branches by way of the inner bark, girdling the limbs and causing a large amount of damage. The blight germ also gains entrance to the plant through the tips of growing shoots, thus producing twig blight. The organism is not killed by the winter frosts, but lives in the bark in a dormant condition until spring. As soon as the plant tissues become gorged with sap in the spring, the microbes, which have remained alive all through the winter, start to grow and extend into the new bark. This new blight which develops in the spring can be recognized by its moist and fresh appearance from the blighted, dead and dried bark of the previous summer. A large amount of gum is exuded from the affected bark and runs down the tree and attracts to it bees and other insects, which carry the microbes to the early blossoms, and from these first flowers it is carried to others, and thus the disease extends.

The germ has never been discovered in the soil, although careful search has been made; hence the importance of recognizing the winter form of the disease, for if these affected portions

of the tree are cut out and destroyed, the pear blight question is solved, for without the microbes there can be no disease.

Conditions affecting the spread of the disease.—Fire blight differs in severity in different localities and there are a number of conditions which affect the character and progress of the disease.

Every tree of the pomme family is subject to the blight, but pears and quinces are more susceptible than plums and apples. The mountain ash, service berry and hawthorn are frequently diseased, but not to such an extent as the first named trees. There is a difference in the susceptibility of varieties. Thus, among pears, Clapp's Favorite, Flemish Beauty, and Bartlett, are more liable to the disease than Keiffer and Duchess, and amongst apples, the Crab varieties are the least resistant.

Climatic conditions influence the disease; warm, moist weather with much rain favor it, whilst bright, dry, sunny weather tends to check it.

High cultivation, rich soil, heavy manuring, free use of fertilizers, heavy pruning, or any other treatment which has a tendency to induce new and succulent growth, favours the disease, as the bacteria grow with far greater rapidity and penetrate more quickly from cell to cell when the tissues are gorged with sap. Insects are more partial to young succulent shoots and leaves, and the bites and punctures of such insects whose mouth parts may be contaminated with pear blight germs often serve to infect the tree.

It is thus manifest that healthy, thrifty, vigorous, well-fed and well cultivated trees are more liable to the disease than others, and hence the severity of an attack of fire blight may be lessened by conditions which are under the control of the grower.

Treatment.—The treatment of fire blight is of two kinds—That which is designed to put the tree in a condition to withstand the attack of the blight microbe, and those methods which aim at the extermination of the causal bacterium. Unfortunately all methods which are used for hindering the attack of the microbe consist of restraining the full development of the tree, and hence any such system of procedure should not be followed, unless an orchard is very badly attacked.

High cultivation, winter pruning and the other conditions already mentioned as predisposing trees to blight, should be avoided, but the trees should be allowed to ripen the wood, and in order to do this the fruit grower must use any method which will check the amount of moisture in the soil, for instance, by the growth of a clover crop.

The fire blight organism cannot be exterminated by spraying, as the microbe lives in the tissues beneath the outer bark, and it is impossible to reach it with any spraying solution, for unless the bacteria come into contact with the germicide, spraying is ineffectual.

There is, therefore, but one remedy, to cut out and burn the affected parts of the trees. It is very necessary when cutting out a diseased branch or twig to cut well below the discolored portion, as the bacteria

are in most cases far below the discolored portion, the discoloration not being produced immediately upon the appearance of a few bacteria, so that if only the discolored portion were cut off, numbers of bacteria would still be left in the stump, and these would continue to multiply, and the disease would soon be evident again.

Cutting of affected parts may be done at any time in the winter and spring, but it is not advisable to cut in the growing season, as fresh cases may be constantly occurring, and these, owing to lack of sufficient development, would not be seen.

The best time for cutting out affected branches is towards the fall, or when the trees have stopped forming new wood, when most of the blight has developed, and when the contrast between the discolored leaves and branches and healthy tissues is easily seen.

Trees should be carefully inspected for blight during the winter, and in spring before the blossoms come out, in order to destroy any affected parts that may have been missed at previous inspection.

All wild trees of the pomme family in the vicinity should be examined, as these, if blighted, may serve to reinfect an orchard which has been carefully treated.

In cases where the bark of the trunk is affected, it can be cut out and the wound covered with a lead and oil paint. The cut surface of branches over one-half inch in diameter should be painted.

F. C. HARRISON.

The Cineraria.

There are about nine or ten species of the cineraria known to floriculturists, most of them being classed as greenhouse perennials. The varieties represented in the accompanying cut are known commercially as *Cineraria hybrida grandiflora* and *Cineraria stellata* (star-like). Both of these are

best types from which to save seed, as well as by a judicious selection of plants for cross-fertilization purposes. The flowers of the original type, *C. cruenta*, were of a reddish-purple color only, and about an inch in diameter, whilst now, from a packet of seeds of the improved type, flowers upward of three inches in diameter



Cinerarias and Primulus,

O. A. C., 1904.

The mass of bloom in the immediate foreground is composed of plants of *Primulu obconica grandiflora*.

improved types of *Cineraria cruenta* (purple leaved), a variety introduced from the Canary Islands into England about the year 1777.

The large flowering type, *C. hybrida grandiflora* affords a striking illustration of what can be effected in the improvement and development of plant life by a careful selection of the

are quite common, varying in many shades of color, from pure white to deep red, purple or blue, a large percentage of the plants also having flowers with a disc or centre of pure white, varying in size from the smallest spot, until in some flowers the margin of the petals only are tinged with hues of the more decided colors.

In the collection, as seen recently in the Intermediate greenhouse at the College, many of the flowers were close on four inches in diameter. It is, perhaps, questionable whether these abnormally large flowers are to be preferred to the more moderate sized flowers, as oftentimes—more especially with chrysanthemums—other good points, such as beauty of form, habit of growth, and robustness of constitution, are often lost sight of in the endeavour to secure flowers of enormous size.

The variety *C. stellata* is of a tall branching habit, and in many respects resembles the original type *C. cruenta*, with the exception that the flowers of *C. stellata* are seen in various shades of color ranging, from creamy white, to pink, red, and blue.

The flowers of *C. stellata* keep fresh much longer when cut than do those of *C. hybrida grandiflora*, a point that will enhance its value as a florist's flower. The flowers of *C. stellata* are usually self-colored, (one color), and are only about an inch in diameter. (The plants of *C. stellata* can be seen in the background of the accompanying cut, in the centre row of plants).

There is no winter or early spring flowering plant that will give such a gorgeous and varied display of blossom as the *Cineraria* if the plants are well grown. Greenhouse cinerarias are grown from seed usually, and treated as annuals. Seed sown in June, July, or August will produce plants that will flower from Christmas until April or May. A cool temperature, about 50° at night to 65° in the day time, will suit them very well. A moist atmosphere and plenty of water at the roots are also desirable. Frequent syringing of the foliage whilst the plants are growing, is necessary. Partial shade must be given the plants during hot, sunny weather. The green aphid and red spider are the worst insect pests that attack the *Cineraria*. Tobacco smoke or tobacco water will kill the aphid. Copious syringing with water, and a moist atmosphere, are the best preventives of red spider. Thrip sometimes attacks *Cinerarias*. Dipping the foliage in strong tobacco water is the best remedy for thrip. *Cinerarias* cannot be grown very successfully as window plants.

W. HUNT.



The O. A. C. Review.

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MARCH, 1904.

Editorial.

The Matriculation Standard. This month is a momentous one in the lives of many of our students. The Sophomores especially, are now considering where shall be their future sphere of usefulness, where they may do the most good, both to others and to themselves. There are many of them, born and educated on the farm, who worked hard to come to college, having in mind the joys and possibilities of a good education. By dint of earnest application they have accomplished wonders, some even placing themselves on the honor roll. These men see themselves prevented from gaining that knowledge which they so much desire by a regulation which protects men who have neither the experience nor interest of their unfortunate classmates. Thus the very government which is devoted to the interests of the rising generation of agriculturists is driving them to accept one of two evils. Either they must expatriate them-

elves, break the bright chain of college life and accept new doctrines from the mouths of foreign professors, or they must return to their farms, with blighted hopes, saddened by the thought that a mere sentence on the College Circular has been the means of limiting their possibilities, preventing the development of their minds and decreasing the field of their services to their native country.

On the other hand, the increased standard of preparatory education which brought this about will prove a boon to scientific agriculture. Why should not an agricultural college, where all the natural sciences are taught, demand as sound a foundation on which to build its many storied edifice as a college of one science whose most pretentious architecture is a single hall? Because of this lack of foundation valuable time is consumed pursuing high school studies, this time if devoted to expert agricultural work and scientific research would double the

efficiency of the College. If our College is to hold her premier position she must produce graduates who in breadth of education, thorough development and scientific training are capable of proving themselves superior to the graduates of other institutions. It is with this in view that the far seeing Minister of Agriculture has brought about the much debated change. Those students who under previous conditions would have proven themselves the first, are the men whose concentration, perseverance and ability will enable them to lead the class under the new ruling. It may seem hard on the boy from the farm, but when has the boy from the farm been known to fail? It is placing a stumbling block in his path, but a block which when surmounted will prove merely a step to future greatness, a means of reaching the height, from which he will command the whole world.

* * *

Past Editorials. In turning over back numbers of the REVIEW, one cannot help feeling surprised at the changed tone in the editorial columns. In the good old days the O. A. C. had to fight for its very existence. Every dollar voted to it seemed to be wrung from the treasury in the teeth of strenuous opposition, and our editors were called upon to defend appropriations now never questioned. Right royally did they stand to their guns, and many a sound piece of economic reasoning was set forth in this struggle for needed support. At present we have changed conditions. Our legislators meet, talk, adjourn, or dissolve, and we heed not

their coming or their going, for we are confident that though they may not see their way clear to come down with a "million of dough," yet a goodly measure of support will be forthcoming, and that is all we can expect, for the millenium is not yet reached.

* * *

The Forestry College. The Forestry Convention is past. The little band of men devoted to the great national work of forest preservation has met and discussed ways and means for the attainment of that end. Much has been said, much still remains to be said along these lines, but the pivotal point on which the whole subject rests is the development of a provincial system of education, tending to the wide diffusion of the knowledge of the principles of forest growth and protection. This is the problem that now lies before the Government and which should receive immediate consideration. Forestry lectures, institute work, and possibly short courses in forestry, should all be brought into requisition, and the establishment of a School of Forestry should receive prompt attention. The latter is perhaps the most important of all. We need trained men who have taken a thorough course in the work to act as teachers, take charge of the educational work, and form a band of foresters, knowing both the science and practice of forestry.

We must have the college, and we believe its establishment has been decided upon, but so far no definite conclusion has been reached as to its location. To us there seems but one place. The forestry question is essentially an agricultural problem. With

the immense influence of forests upon climatic conditions and fuel supply, the question affects more directly the agricultural than any other phase of our national life. Then, why not establish the college at Guelph? Our institution comes more closely in touch with the rural population than any other college in the land. The work already done would form the nucleus for further operations, and the thousands, and tens of thousands, who visit the College every summer would carry away with them lessons learned from actual contact with the work.

But we are told that forestry is a branch of engineering, and can best be taught at a University in conjunction with other branches of engineering. Granted that this is so, we, on the other hand have exceptionally good facilities for instruction in those natural sciences associated with forestry and a department in engineering is needed and should have been established long ago. We have been the pioneers in forestry education and in the organization of nature study work which fits so closely into the work of forestry and which has done so much to develop the love of nature.

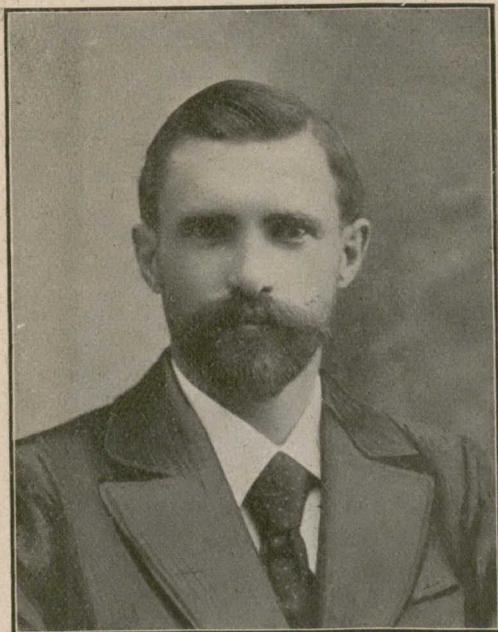
It has been urged against the establishment of this college in our midst that it would tend to draw students from the pursuit of agricultural science to the study of forestry. Perish the thought! Our students come to college to study agriculture. They are as firm in their conviction that agriculture is a science worthy of study, a

profession equal to the best, as are the students in any other line of work in regard to their chosen profession. It is possible that if this school of Forestry were established in close proximity to some university it might tend to draw students from the courses taught there. Arts, medicine or even theology might lose some of its brightest votaries and thus do an irreparable injury to our educational fabric. By all means Guelph has the primary claim upon the Forestry College. The establishment of the provincial nursery at this place, the pioneer work already done, the fact that some of the subjects are already taught here, all point in one direction—the building of the school in connection with our college.

The aim of a college education is not the accumulation of a definite number of facts. It is rather the development of a personality thoroughly equipped for life work. Where can this be best secured for the student of Forestry? Where a more fitting place than at the Ontario Agricultural College? Our whole course is closely interwoven with just such problems as confront the student of forestry. He will be here in close touch with the work in which will lie his future sphere of usefulness. Let the school be established at Guelph, and from the very nature of the work, and from the associations by which we are surrounded, we shall bring the student into the fullness of life, along the peculiar sphere of his own personality, in close touch with his life work.

Our Old Boys Page.

Graduates We Seldom See.



Mr. Adolph Lehmann, B. S. A., Ph. D.

We have the pleasure of presenting to our readers, a photo of Adolph Lehmann, B. S. A., Ph. D., ('89), formerly of Orillia, Ont. Mr. Lehmann was a specialist in chemistry, belonging to the second graduating class. After graduating, he remained for some time in the Chemical Department here, and after a few years he went to Germany to continue his studies, obtaining his degree of Ph. D. He has, during his life in America, been connected with the Louisiana State Experiment Station, and with the Central Experiment Farm at Ottawa. About six or seven years ago, he went to India to take charge of the chemical department of a large

manufacturing establishment near Bangalore, Madras, India.

The appointment was for a term of five years, which expired about a year ago, and he was immediately reappointed for another term, with increased salary. His residence is in one of the most pleasant places in India, on a large plateau, 3000 feet above sea level, where the temperature ranges from 50° to 99-9° F., during the year. We are sorry to be unable to give more definite information of his movements since graduating, but at time of printing an expected letter from him has not arrived.

W. J. Stover, ('85-88), formerly of Norwich, Ont., went to Jamaica after leaving the College, as manager of the Balsam Fruit Co. He returned afterwards to Canada, and from here went to California, where he is engaged in fruit growing.

C. F. Whitley, ('91), at one time on Prof. Robertson's staff at Ottawa, has quite recovered from the severe illness which necessitated his resignation, has taken a trip around the world, and is now back at Ottawa.

J. F. Webster, ('78-'80), is a prosperous nursery man and fruit grower at Vernon, B. C. After leaving College he spent two years in Montana and nine years in Manitoba.

Walter Cathcart, ('88-'90), who went to Manitoba for a few years after leaving the O. A. C., afterwards went to Edinburgh University, where he studied veterinary medicine. He is now connected with the Vet. Branch of the Department of Agriculture in Ireland.

W.A. Mattice, ('89-'90), is also connected with the American Horse Exchange, at the corner of Broadway and 50th Street.

E. L. Kenyon, ('98-'99), is a fruit-grower at Beaucoir, West Derby Village, Liverpool, Eng.



By courtesy "Farming World."

G. A. Putnam, B. S. A., Superintendent of Farmers' Institutes.

Prof. H. H. Hume, ('97-'99), Horticulturist of Florida Expt. Station, has been appointed Professor of Horticulture at North Carolina State University.

William A. McGibbon, ('78-'80), deals in high-class driving and saddle horses, in New York. His headquarters are at the American Horse Exchange.

D. Buchanan, ('91), missionary to the Argentine Republic, is returning to Canada on furlough this summer.

Lewis A. Merritt, ('93-'95), died about two weeks ago at his home in St. Catherines.

R. Gadd, ('94-'96), is in the creamery business in Winnipeg, Man. Box 68, Winnipeg, is his address.

A. E. Rastich, ('79-'80), who went out to Africa in 1900, as a lieutenant in the West African Field Force, died in London, England, a little more than a year ago.



Roland Craig, B. S. A., F. E.

Mr. Roland Craig, B.S.A., F.E., has recently accepted a position on the staff of the Forestry Department, Ottawa. Mr. Craig is too well known to the readers of the "Review" to need any introduction. He is a graduate of the O.A.C., and also of Cornell, and for the past year has been in the employ of the U. S. Department of Forestry, in California. He brings to his new position, the benefits of a thorough education, and considerable experience in practical forestry work, and we bespeak for our friend an abundant measure of success in his new field of labor.

B. M. Eftyhithes, B.S.A., ('03), is at present travelling through the middle and western States, in the pursuit of his agricultural studies.

A. M. Brouse, ('98-'00), is assistant general manager for the firm of Doran, Brouse, & Price; Oil-well, Road Oiling, and Grading Contractors; 258 North Union Ave., Los Angeles, Cal.

Hugh A. McElroy, ('98-'99), is farming at Chesterville, Ont. He writes that he has found his course here of the greatest benefit to him in his work.

D. Schooley, ('96-'97), who has, since he left the College, been managing a farm in the County of Middlesex, has recently started to take a business college course at Chatham, Ont.

P. B. Smith, ('93-'95), has just lately returned to Bermuda, after having been for eighteen months in New York, with his father, who is engaged in mechanical engineering.

E. A. McCallan, ('93-'95), of St. Georges, Bermuda, is now in the civil service there. For the past two years he has been a postmaster, but has been recently connected with the Government Survey Department.

W. J. Palmer, B. S. A., who left for South Africa in December, to take charge of agricultural affairs there, was presented with a daughter a few weeks after his arrival at Cape Town.

R. H. Woodcock, ('95-'97), studies veterinary science at the present time. Address, 64 Alma Road, St. Albans, Eng.

MOSS-HERRON.

The home of Mrs. Wm. Little, at Grovesend, was the scene of a very pleasant event, on Wednesday, February 3rd, when her pretty granddaughter, Miss Minnie Herron, was united in the holy bonds of matrimony to Mr. D. Evert Moss, (01-02). The bride was assisted by Miss Ethel Moss, while the groom was supported by his old room and class mate, Leonard D. Hankinson. After their wedding trip, the happy couple intend to settle down on Mr. Moss' homestead and make the pursuit of agriculture their chosen occupation.

W. J. Carson, B. S. A., ('02), has recently been appointed to the position of assistant professor of dairying at the Wisconsin State College. His duties will consist of experimental work, under Messrs. Babcock and Russell, and lecturing to the students during the college course. Since his graduation he has been instructor in the Kingston Dairy School, and has been connected with a syndicate of factories for the Eastern Dairymen's Association. Mr. Carson was considered to be the strongest man that ever took the dairy course at the O. A. C., being an expert butter and cheese maker before he came to the College. We may safely predict for Mr. Carson a bright and prosperous future.

J. M. Mather, ('95-'96), writes from Peninsula, Bridgetown, W. Australia. He went out to that country in 1887, and took up the farm on which he now lives, after working in the bush for eighteen months. He went in for mixed farming at first, but found it uphill work, as their nearest seaport and market was Branbury, 61 miles away, which was reached only by horse or bullock train. This is changed now, as railway lines have taken the place of the old trail. Mr. Mather took an active interest in their Agricultural Society in its early days, and was connected with it as secretary for three years, as president for three years and now as vice-president.

Just before Christmas, the member of the Legislature for Mr. Mather's constituency, died, and Mr. Mather was elected unanimously to the vacant seat. He married a West Australian girl some years ago, and has a family of four, two boys and two girls.

The only ex-student of the O. A. C. that he has met is W. E. Ash, ('77-'79), who is farming and fruit growing on the Harvey River, 100 miles from Bridgetown.

Some years ago, when Mr. Mather was fixing up exhibits at the annual Bridgetown fair, he was accosted by a passer-by, whom he immediately recognized as Ex-Professor Brown, of the O. A. C., who was looking well and hearty then, but who has since died at Victoria.

Mr. Mather sends his membership fee to the Union, and his subscription to the O. A. C. Review; and we hope that he will become still more prominent, a striking example of what an Associate of the O. A. C. may be.

Book Review and Exchange Column.

A MANUAL FOR THE STUDY OF INSECTS, by John Henry Comstock and Anna Botsford Comstock, is a book which should be, and practically must be, in the hands of every student of Entomology. It is for the learner, as well as for the advanced student, or teacher, and has been prepared to meet the need for a general work, including analytical keys to all the orders and families of Hexapoda common to North American. In this work the needs of agricultural students have been kept constantly in view, and those species that are of economic importance have been described as practicable, with methods of combating. However, this work is essentially a systematic one and the best general manual of such at present in our library. A fifth edition has just been issued by the publishers and in this several corrections have been made upon previous editions. For instance, in the earlier editions it was believed that the elytra of the beetles were not wings, but greatly enlarged paraptera of the mesothorax. A later study of the development of the elytra has proven that they are the fore wings. Another correction: the honey-dew of the aphids is now supposed to be excreted from the posterior end of the alimentary canal, instead of through abdominal tubercles, as previously stated.

This book is published by the Comstock Publishing Co., Ithaca, N. Y.

How to keep posted is the problem that presents itself to the college student in the midst of his strenuous

life. Demands upon his time are incessant. Literary, athletic, and social duties curtail the hours for study, and it is little wonder that in knowledge of current events and the practical political affairs of the day he finds himself steadily falling behind. How is this to be overcome? Mere cursory glances at current literature, fail to sift the wheat from the chaff. This work of selection must be done for us and such is the task performed by that breezy little compendium of current history, "World Wide". This publication selects from contemporary periodicals the finest of the wheat, and without comment gives us the story of leading events. It places no limitations upon its field; letters, art, science and world politics are all alike, the scene of its efforts. Bright, crisp, and full of vigor and freshness, it is essentially a busy man's paper, and well worth a position on the table of any man of affairs.

Considerable difficulty is frequently experienced in remembering past events, which have scarcely yet crystallized into the form of history, but he who has a bound volume of this paper has a work of reference that will prove an invaluable aid to memory, in keeping a record of things that have been. College students of to-day are the Captains of Industry a few days hence. They must keep in touch with the march of progress, and we know of no better means to this end than the investment of one dollar with John Dougall & Son, Montreal, for a year's subscription to that brightest and most reliable of digests, "World Wide."

I went to see a foot-ball game,
Thought that I could play the same,
Straighway I joined the eleven,
I am writing this from heaven.—Ex.

“Go to my father” was all that she said, and
She knew that I knew that her father was
dead.

She knew that I knew what a bad life he
led,

She knew that I knew what she meant when
she said,

“Go to my father”.

It took place in a dairy. The milk-
man was pouring the milk through a
fine wire sieve. Hundreds of microbes
caught in the meshes. The other mic-
robes sat on the edge of the crock and
looked grieved. Their relations were
being strained.—McMaster University
Monthly.

Something like the case of the cow
who slipped in the stable and strain-
ed (?) the milk we had the other day.

College Reporter.



Walter Hamilton, '04.

Walter Hamil-
ilton, better
known among
his classmates
as “Hamy,”
hails from the
town of Raven-
shoe, in the old
historic County
of York. This
county has al-
ways sent a
strong quota of young agricultural
enthusiasts to the O. A. C., and in the
subject of this sketch it has a worthy
representative, and one who has al-
ways upheld its honor in the class of
'04. “Hamy” is a splendid specimen
of Canadian manhood—physically,
morally and intellectually. Standing
over six feet, and when in earnest,
with the frown of Jove, “he doth seem
to bestride (his) narrow world like a
Colossus”. For “Hamy” has been
President of his class for the college
years of '03 and '04, and throughout
his term of office has held mighty
sway, suffering no one to depose him
even from leadership in midnight
raids on cellar and storehouse, or day-

light captures in the Royal City. Yes,
Hamy is taking! In the sphere of
moral activity, enough to say that he
was honored with the first office in
the Y. M. C. A., for the calender year of
'03, and was chosen as one of the Col-
lege representatives to the Lakeside
Conference during this incumbency.
His executive ability was further recog-
nized by his being appointed President
of the Alpha Literary Sub-Society for
'03. Intellectually he is not a genius
but a worker, and a strong student,
who has always claimed a high stand-
ing in his class examinations. We do
not intend this for a panegyric and
hasten to say that “Hamy” is human,
like the rest of us, and for this reason
we respect and *know* him.

Debating.

On the evening of March 4th,
Messrs. Pickett and Deachman met
Messrs. Landen and Snell, of Western
University, in debate on the subject
of Hon. Joseph Chamberlain's policy.
Everyone enjoyed the keenly con-
tested debate, and felt that each de-
bater deserved high compliments.
The subject of debate, the speeches,

and the attitude of the audience were all that could be desired, and we hope that many similar contests, with Western and other colleges, may take place, and that the O. A. C. will continue to win the laurel.

Debating is one of the most important features of student development. It is the best, the most essential training for men who are to be active citizens, true patriots. And who should be a better citizen, a more zealous patriot, than a college man. Breathes there an individual, not a man, with soul so dead who, after receiving the benefit of a college training, refuses to fight vice and corruption in the nation? If one there be, brand him with the lasting mark of infamy, for he, though educated, thinks only of self, is not a man. It is the noblest trait of manhood to help others, to strengthen the weak, and it is the manifest duty of an educated man to use his power in the nation to accomplish this. All cannot be politicians, but all may be citizens, and pure citizenship is essential to pure politics.

Debating live questions of the day, and these are the best subjects for debate, stimulates a desire for wide information, which is really as essential to the citizen as to the politician. Knowledge is power, as truly in citizenship as in industrial pursuits. An enlightened community ensures liberty.

Knowledge of policies and events is not the only, or even the most important, result of debating. Independence and individuality are the natural accompaniments of investigation and argument, and are quali-

ties sadly lacking in the average individual. The careful study of a topic, and the upholding of one side in the face of opposition, cannot but develop these qualities. A definite belief and decision in supporting this belief are necessary to argument, are the essential elements of successful controversy.

The reasoning power is increased, the intellect is trained to act more quickly and more keenly; and, with mental acumen, goes the greatest influence and power.

Now is the time, and the Literary Society is the place, for this important development. Not only should debating be entered into with zest, but the subjects chosen should be up-to-date, that the information gathered may be interesting and useful. Subjects, such as county versus city life, celibacy versus matrimony, should give place to live, social, political and economic questions. We should seek questions which are practical, which develop our powers. Opportunity is passing; future responsibility awaits us. He who neglects to prepare for responsibility, is not a true man.



J. E. Bower, '05.

“Dad” Bower first loomed upon the horizon in the Township of Minto, in this County, Wellington. He worked, in his youthful days, upon the farm, as many another celebrity has

done, and, during these happy days, he gained at the country school a

firm foundation for the educational superstructure he is at present building. Later, he attended High School, where he took his matriculation, after which he ruled for three years with a rod of iron over wilful and wayward scions of humanity in a country school.

The characteristics of his earlier days still cling to him in college, and to these he has added others, as men always do when placed in new surroundings. His name suggests those ancient days when belted knights courted and won noble ladies in the feudal mansions of old nobility. That the spirit of chivalry has not yet died out, least of all from the subject of our sketch, many members of the fair sex will affirm.

Combined with chivalry and true greatness of mind, he possesses industry, that one essential of genius. He is able to toil terribly, especially

in those occasional athletic meets in the dormitories. As a student, he has always held a high place in his class. As an orator and debater he excels—his deep voice rolls from soul to soul, and goes forever and forever. It is said that whenever he speaks, the bust of Sir John A. Mac. betrays an expression of interest, and is with difficulty retained by its pedestal.

His many good, genuine and manly qualities, combined with his well-known executive ability, caused him to be chosen president of his year, on the resignation of Mr. F. H. Reed. He has shown himself to be an energetic worker, and in every way worthy of this honor; he is an O. A. C. man, and a zealous promoter of college and student interests; so let us give three cheers for "Dad," and wish him a long and successful life.





Macdonald



Notes



“My Hope is Constant in Thee”.

Miss R.—in chicken cleaning lesson
—“Let’s call the party off!”

Prof. L.—“I lent her my coat. It was a little stretched.”

Problems on how to enter a locked pantry solved by the girl from N. B.

“A fire! Whose room, did you say? Oh, that will be interesting to Miss B.”

NOTICE.—“Visitors must not talk to the students during the cooking lessons.” Poor boy, and he didn’t even get the right girl.

It is all very well for the Seniors to invade the cold storage for lemon pies, but the Juniors—those naughty Juniors!?

The demonstrations this month were as follows:—“A Breakfast”, by Miss McVannel, “A Dinner”, by Miss Black, and “Made-over Dishes”, by Miss Mills.

A maiden fair with sun-kissed hair,
Came tripping down the street,
Her face serene, her age eighteen,
Gee whiz! but she was sweet.
The ice was slick, she sat down quick,
With a jolt that shook her curls,
And the words she used must be excused,
For she’s a Macdonald girl.

In the rabbit dissecting class the other day, each girl was given a bottle of oil of cloves—in case of sudden faintness. Why are not the girls of the chicken-drawing class treated likewise?

With the departure of Dr. Mills we lose two of our Macdonald girls, Miss Mills and Miss Georgie Mills, who will be greatly missed. We are glad to say that Miss Pansy will remain until June.

The short course girls have decided to have a photograph taken. It is to be hoped that they will leave one behind them, to decorate the walls of the Library. We should like in the years to come, when other short course girls are enjoying the luxury of the residence, to show them the brave pioneers, who so energetically tramped to and from the City, during that record breaking winter of 1904.

Mrs. Hoodless gave her first lecture on “Ethics of the Home,” on Tuesday, February 23rd. She may be always sure of a hearty welcome from the girls of the Macdonald Institute, for it is safe to say, that, had it not been for Mrs. Hoodless, no Macdonald Institute, or at least, no Domestic Science course, would ever have been started here.

Athletics.

“Perseverance, Integrity and Enthusiasm are Paths which lead to Success.”

KERRY O'BYRNE.

Where, Where! Oh! ye fates, is the portal of fame?

Where the anvil and hammer to forge me a name?

Where! where; is the glory we hoped to enjoy,

Where the beautiful dreams, we had when a boy?

They're ahead of you yet, if you burrow them out;

With integrity's spade, and excelsior shout, They're ahead of you yet, take courage and climb,

Keep steadfastly moving, you'll get there in time.

As dripping of water wears granite away
By constantly falling by night and by day;
So you by prevailing may reach, in the end,
The top of the ladder you strive to ascend.

Take courage, and climb to your place in the world,

Keep the banner of hope forever unfurled,
Keep grinding and grinding. Keep grinding away,

Keep steadfastly moving. You'll get there some day.

KERRY O'BYRNE.

Inter-Year Hockey.

The inter-year games have all been played as per schedule, and there now remain only a few tie games to be decided at some time in the near future, if the weather “cheers up”. The ice has been in good shape, for the most part, and the games, keenly, even hotly, contested throughout. Much tense excitement and rare sport have been afforded on many occasions, the Hockey Bacillus, seeming to have entirely replaced the small-pox germ.

For a time no team seemed to have a decided “drop” on the others, but towards the close of the series, the Sophomores gradually became stronger in their position, and finally won the championship, with the splendid record of having been successful in five games in the series, the sixth of which resulted in a tie. It is only fair to them to mention, that in no game was more than one point scored against the Second year by their opponents. The Fourth year obtained second place, having won, lost, and tied two games in every instance.

The following is the standing of the Years to date:—

	WON	LOST	TIED
First Year.....	1.....	4.....	1
Second Year.....	5.....	0.....	1
Third Year.....	1.....	3.....	2
Fourth Year.....	2.....	2.....	2

For the First Year, Greenshields, Peck and McBeath, played good fast hockey; while Young was very useful in goal. The Second Year rush was mainly in the hands of Scott, Halliday and Duncan; while MacMillan stopped a number of hot shots on his goal. Prittie, Cooper and McKillican played steadily and well for the Third Year; and the Seniors were much strengthened by Fansher, among the forwards; Carpenter, on the defence; and MacRae, in goal.

The representatives of each year were as follows:—

Fourth Year:—Goal, MacRae; point, Carpenter; cover point, Baker; rover, Arkell; centre, Pickett; left wing, Fansher; right wing, Rothwell.

Third Year:—Goal, Leitch; point, Cooper; cover point, McKillican; rover, Lennox; centre, Brereton; left wing, Hoodless; right wing, Bartman.

Second Year:—Goal, MacMillan; point, Monroe; cover point, Bracken; rover, Scott, (Capt.); centre, Halliday; left wing, Elderkin; right wing, Duncan.

First Year:—Goal, Young; point, Broderick; cover point, Clark; rover, Montgomery; centre, Peck; left wing, Greenshields; Right wing, McBeath.

GUELPH CITY LEAGUE.

Our games with the teams in the City League have all been played off, with the exception of the last on the card, which still remains to be fought out with the Bankers, as it has been postponed indefinitely owing to the interference of weather conducive neither to hockey nor to good walking. The Moulders have had rather the best of the argument throughout the season, and have succeeded in bearing away the palm and the tankard. The College, however, ranks second; having been beaten in only two games—both of them with the Moulders. On almost every occasion, the rink was well patronized by townspeople, as well as students, which shows the keen interest taken by all in these games.

The Bankers and the O.A.C. crossed sticks in a well contested and interesting game, played on February 13. The score at the close of time was 9-1 in favor of the College. This was the first game, in which MacRae took up his position between the goal-posts, and he proved a most efficient puck-stopper. Prittie and Hutcheson played their usual brilliant rush and com-

bination on the forward line; while Baker rendered valuable assistance at cover-point.

The next game was with the Moulders, and proved a most exciting contest from beginning to end. The Moulders had slightly the best of the score until within eight minutes of the time limit, when Baker, in a grandstand play, lifted the rubber, from his position at point, and succeeded in landing it in the Moulders' net. The score stood 4-4 at the end of time, and in the extra ten minutes that was played to decide the game, the Moulders added two points to their score and were consequently declared the winners.

With the Page-Hersey team, the College had an easier time, and meted out defeat to them to the tune of 11-0. The O. A. C. proved their superiority all through the game and had but little difficulty in holding down their opponents. In the second half of play, so effectively did the College boys work, that not a single shot on goal was made by the Page-Hersey aggregation.

The following players represented the College:—Goal, MacRae; point, Cooper; cover point, Baker; rover, Prittie; centre, Hutcheson, (Capt.); left wing, Parkins; right wing, Scott.

A glance back at the past season reveals a very creditable performance on the part of the College team all through the year. True, we have not always achieved success, but have won distinction on all occasions. The reputation of the College has been sustained; possibly improved, and all rejoice in the fact that hockey is becoming so popular and is so enthusiastically played at the O.A.C.

THE ANNUAL INDOOR SPORTS.

The indoor sports will take place this year on Wednesday, March 30th. and the following programme of events has been arranged by the Athletic Committee:—

EVENTS:

1. *Standing High Jump.*
2. *Fencing*—Foil and Sabres.
3. *Clubs and Bar-bells.*
4. *Boxing*—Four classes: light weight, up to 135 pounds; welter weight, up to 150 pounds; middle weight, up to 165 pounds.; heavy weight, above 165 pounds.
5. *Horizontal Bar*—(a) Circle bar from floor, not touching body. (b) Upstart and Circle Bar at stomach. (c) Hock swings. (d) Vault Bar with the upstart. (e) Pull in and lay out.
6. *Parallel Bars*—(a) Pump swings. (b) Grasshopper. (c) Cuts off, etc. (d) Forward and backward rolls. (e) Vault between and clear over bars.
7. *Vaulting*—(a) Straight vault. (b) Feet between hands. (c) Military vault.
8. *Horses*—(a) Military vault, right or left. (b) Feet between hands and feet outside of hands, (from floor and

from horses). (c) Handsprings. (d) Combination Cuts off.

9. *Flying Rings*—(a) Cuts off, front and back, (on the swing and standing). (b) Somersault, front and back. (c) Kip up and pull in on the fly. (d) Dislocate, standing and swinging.

10. *Travelling Rings*—(a) Travel with all the rings, (one round). (b) Cuts off.

11. *Climbing the Rope*—(a) Straight. (b) Right-angled.

Under the efficient management of the Athletic Committee, who have been sparing no effort to provide an entertaining programme, the Indoor Sports may confidently be expected to prove a brilliant success. The Committee, however, must be supported by the student body, and it all, who have any latent athletic ability whatever, would turn out regularly to the gymnasium to practice, they would not only reap the benefit themselves, but enhance the evening's entertainment. Our athletics this year have been characterized by wide enthusiasm and a fair degree of success. Let us, then, do what lies in our power to make this last athletic event a crowning achievement.

Locals.



Our Germ Professor.

Our Germ Professor here we view—
A man of sense and science, too.
His recommended fumigation
Of small-pox germs the College freed ;
And charmed all those who use the "weed",
For nicotine's our one salvation.

Our Germ Professor might appear
To those, that know not him,
A man with an abnormal head ;
Of stature, short and slim.

Our Germ Professor has used us "white,"
The Artist views him in that light ;
And magnifies his head with care,
Not just to show that brains are there ;
But that 'tis level, also square.

Query—"Why didn't the conversat
sit?"

Not seen at the conversat:—Any
species of the genus "hobo."

Macbeth—Do plants expire regu-
larly?

Julio Pabelo, anxiously (to gentle-
man with fancy stationery)—"Won't
they catch cold in the winter?"

At the conversat.
He—Won't you take this chair?
She—After you.

Hart—What would you do if a girl
kissed you?
McKillican—Kiss her back.
Hart—I'd kiss her face.

Heard at the Square as Mulloy
alighted from the car — "George,
George, here am I."

Our friend, Monroe, is developing
extremely sporty tendencies of late.
It is rumored that he is very success-
ful in his Hunt for dear.

In spite of speeches to the contrary,
we venture to assert, that no member
of the conversat committee went beg-
ging for support.

Jim. Morse (while eradicating the
tender tufts from his cheek)—"My
pa always had a stiff beard, too.

Halliday (at work) — "Good
heavens! I've been caught bumming
seven times and I haven't been caught
working once."

Heard at Church,—You should never
do in private what you would not do
in public.

Hg. Bell,—"What about taking a
bath."

"I reckon I won't get no recompensation for all this work short of heaven". Poor Jones! he had been working like a trooper for the conversat committee.

Roast an everyday, ordinary Macdonald girl, until she is red in the face, stuff with knowledge, sweeten with fudge, serve with soda-water, and get the m-i-t-t.

MacRae — "What are the three ways of converting logs into lumber?"

Bray (who had been thinking) — "Broadcast 'em, drill 'em, and transplant 'em."

MICHANEL SCHBJVERNAL,
TREFERGYVALGA.

This is not a remnant from a bargain sale in names, but simply the address of a Doukhobor girl — friend of mine! Wonder if her life's insured?

When girls are babies,
Their mammas insist,
That they, by us, against our will,
Be kissed, kissed, kissed.

When these girls are sweet eighteen,
Their mammas say we shan't,
And though we'd like to kiss them then,
We can't, can't, can't.

When you LIE, let it be down to pleasant dreams.

When you STEAL, let it be away from immoral associates.

When you SWEAR, let it be that you will support your college paper through thick and thin, and never be a corpse in any college institution.

PHUNNY PHEATURES OF PHONETICISM.

We phind phewer phallacies than phacts in the phophecy that the phys-

cal phight will phix England's phuture physcal phorm.—With phears for the phophessor.

Second Year refrain:—

We won,
Three one,
We one,
Four one,
We won,
Five one,
Wee one,
Six one,
[WE WON].

A breeze from a northland subscriber, lucidly expresses the sentiments of the editors, as they ramble through the drifts while pursuing their avocation.

God pity us here, sweet angels a tear,
In the time of our isolation,
Some people I fear, and it ain't very queer,
May whisper aloud——

We laboriously go through the beautiful
snow,
We manfully battle the storm,
While the words that we use, in expressing
our views,
Call to mind the long home where it's warm.

There are four bright, intelligent, earnest, patriotic O. A. C. *Men* who do not subscribe to the REVIEW. You have the permission of:

The Ex-President,
The President,
The Faculty,
The Matron,
The Athletic Association,
The Literary Society,
The REVIEW Staff, and
The Y. M. C. A.

To tap them.

Professor of Horticulture—One row spinach is enough for any ordinary family.

Jesse B.—How large is an ordinary sized family.

Prof. H.—That is for you to judge.

NEW VERSIONS OF OLD SONGS.

“The Girl I swung Behind Me.”
Bill Bailey.

“Under the Bamboo Tree.”
J. B. Elderkin.

“All Unseen the Master Walketh.”
F. H. Reed.

“Nearer My God to Thee.”
“Pat.” Twigg.

“And Through the Window they did Climb.”
Prof. Cumming.

“They Won’t be Home till Morning.”
Prof. Dean.

“From Greenland’s Icy Mountains.”
Monkman.

NEW DEGREES.

C. M. MacCrae, F. F. M.—Fit for Matrimony.

Alfie Howes, L. L. D.—Last to Leave Dinner.

Jimmie Trenholme, J. P.—Just a Pumpkin.

Tommy Atkin, M. P. P.—More Pie, Please.

A. L. McCreadie, G. C.—Good Catch.

M. R. Baker, M. S. S.—Master of Small Surfaces.

“Rusty” Rivett, M. E.—Mushroom Enthusiast.

In vain we have pored over cook books, in vain we have digested the encyclopedias, in vain we have read the *Ladies’ Home Journal*, in the

search for that philosopher’s stone which would convert prunes into an edible fruit. It was not for us, who are of common clay, but for a Macdonaldite to discover the priceless boon. Now the future wears a rosier hue, for we offer the formula freely and without reserve to those pruners, who, by their skill and thoughtful kindness, transform our humble dining-room into a hall of “piece” and plenty. We place our hopes, our prunes, in their hands, whispering a prayer, that they may be moved to action by the one or the other.

First, you take one-half pound of prunes (first point in its favor, it doesn’t require many prunes), pick them over, this may seem unnecessary and unusual, but is a very interesting operation. Then, wash them in *clear*, cold water. By doing this, you remove unpleasant associations, here it is well to remove the stones. Cook them (the prunes) until soft, then add a cup of the sugar so lavishly distributed in chemistry, also the whites of the five eggs we don’t get, or, what is just as good, an equal amount of the albuminoid left over after the last chemistry exam.

To this, add a little lemon to remove the taste of prunes, bake the whole twenty minutes, serve with custard in large quantities.

We trust that now the undergraduates of the O. A. C. may look forward to happier days, when prunes will either be an eagerly sought for, or an unheard of delicacy.

NOTE.—Pineapples or oranges may be substituted for PRUNES.

Domestic Economy.**BUTTER SCOTCH.**

Take three pounds of sugar, one-quarter pound of butter, half a teaspoonful of cream of tartar, and add sufficient water only to dissolve the sugar. Boil without stirring until it will break easily when dropped in cold water. Then pour into a well-buttered dripping pan, and, when almost cold, cut into small squares. If desired, a dash of lemon may be added to the mixture before putting on to boil. Eight drops will be sufficient.

THE REVIEW would be pleased to receive a tangible testimonial as to the practical utility of the paper to the Macdonaldites in shape of two pounds of the above, plainly addressed to the editor and his assistant.

Farm-reared Boys.

The reason why farm-reared boys achieve success in all lines of business and the professions is not far to seek. It is due primarily to the habits of industry and thrift and self-reliance which they acquire in youth and retain through manhood. The farm boy learns to get up early, and if there be any of those proverbial fat worms around, this bright bird is apt to catch it. He has half a day's work done before the city boy has left his downy couch. As he rises early, so he retires at a seemly hour, healthily wearied with his work, and in condition to enjoy "nature's sweet restorer, balmy sleep," as only a tired country boy knows how. He grows up strong, healthy and energetic, and, best of all, has that best equipment for worldly success, a sound mind in a sound body.—*Ex.*

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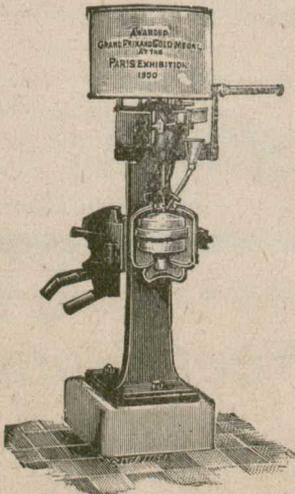
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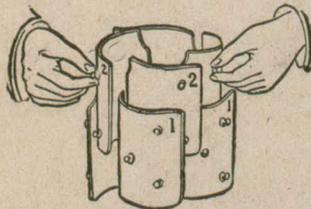
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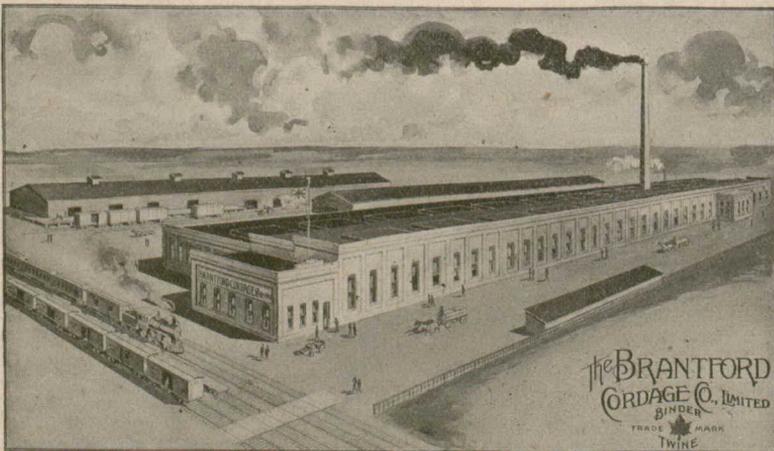
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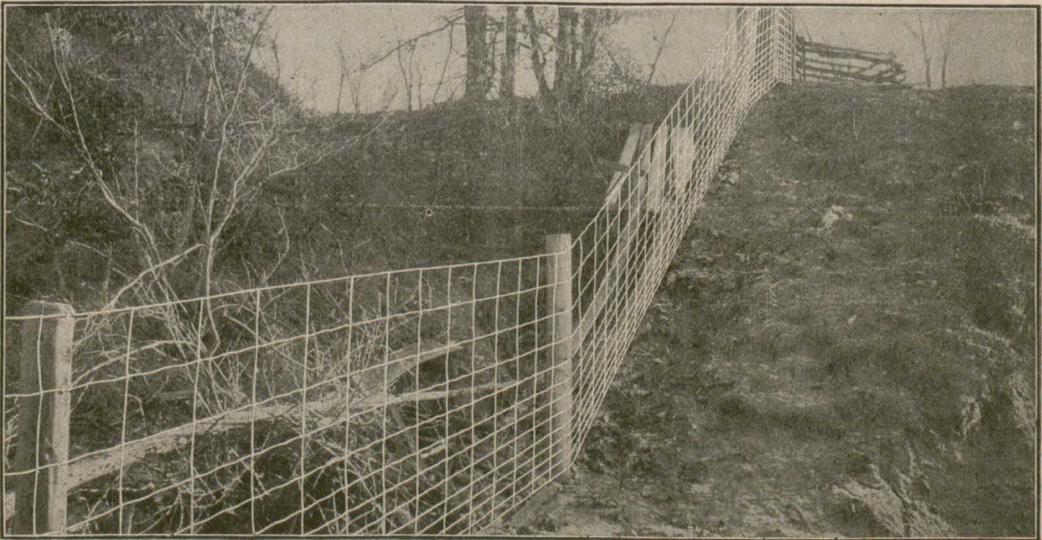
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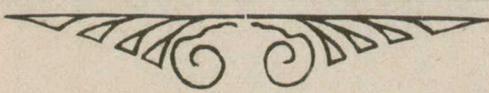
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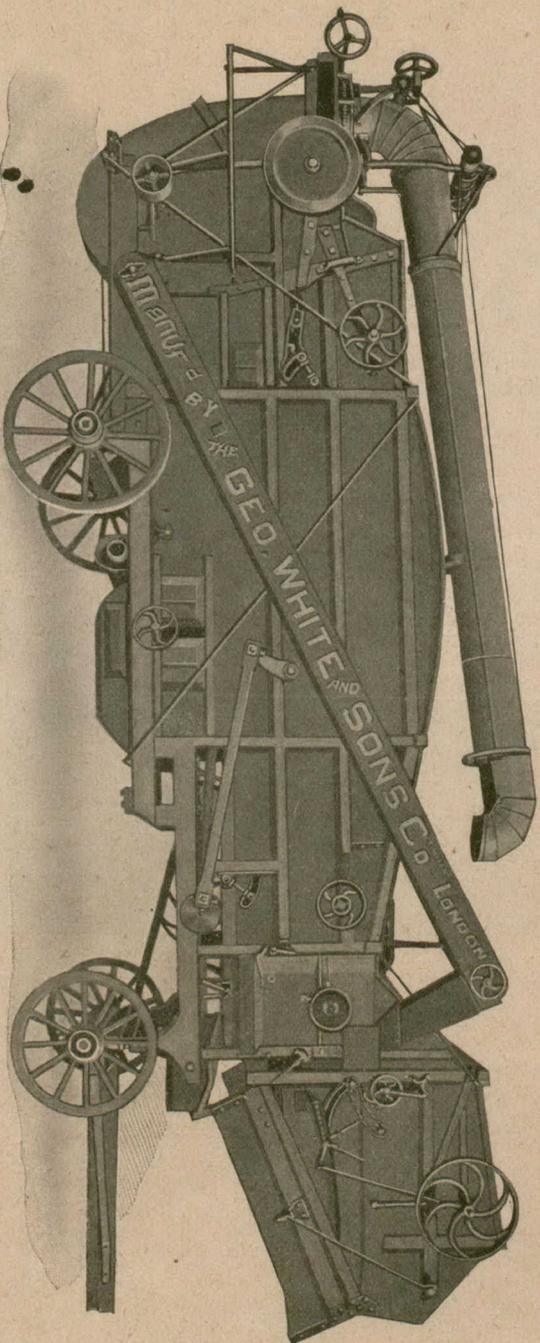
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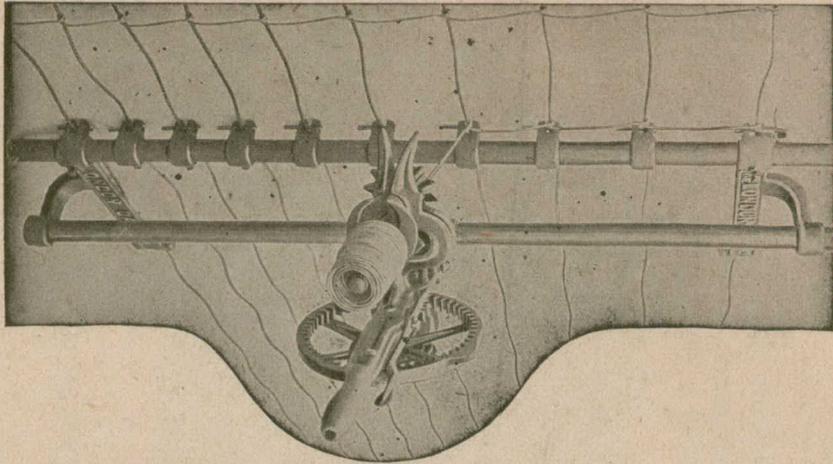
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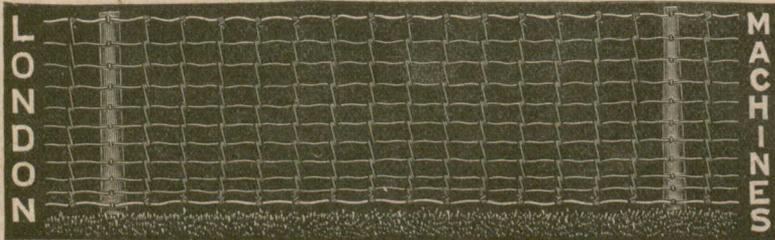
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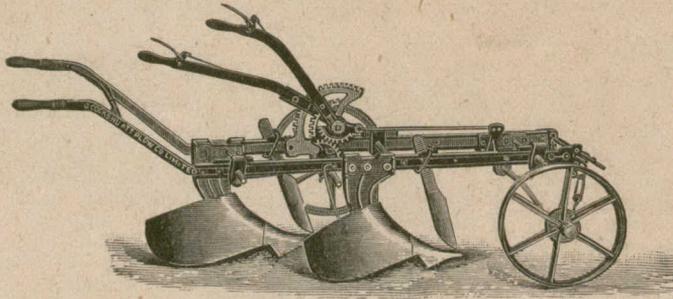
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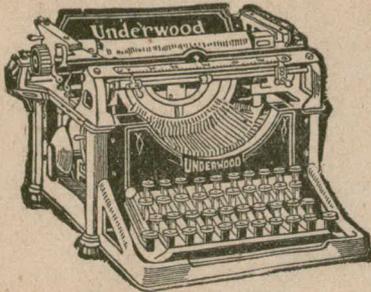
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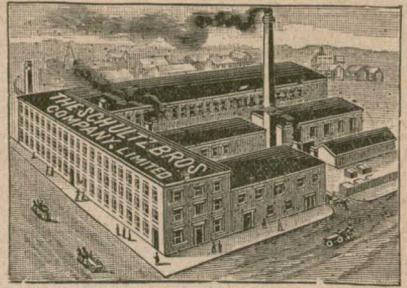


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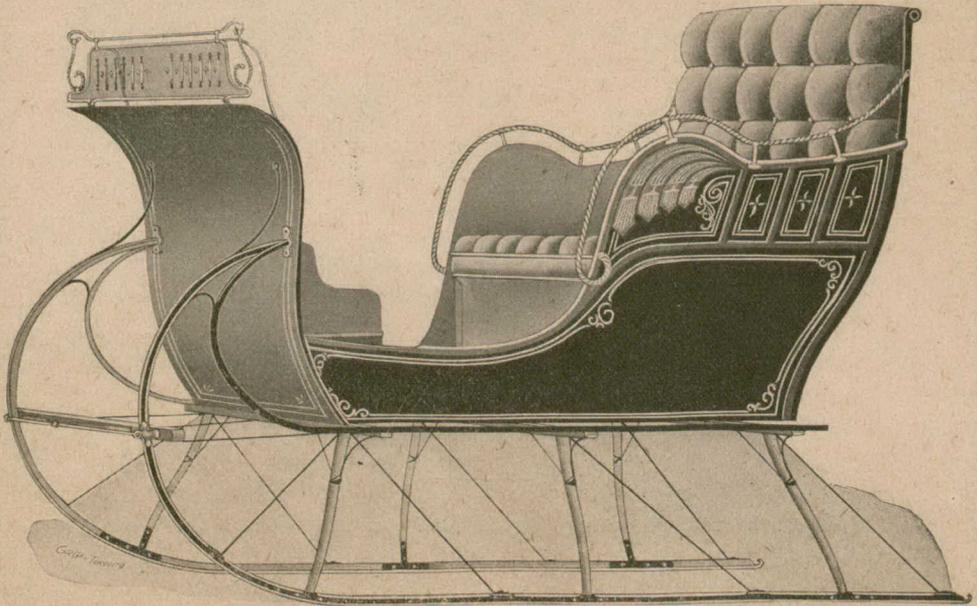
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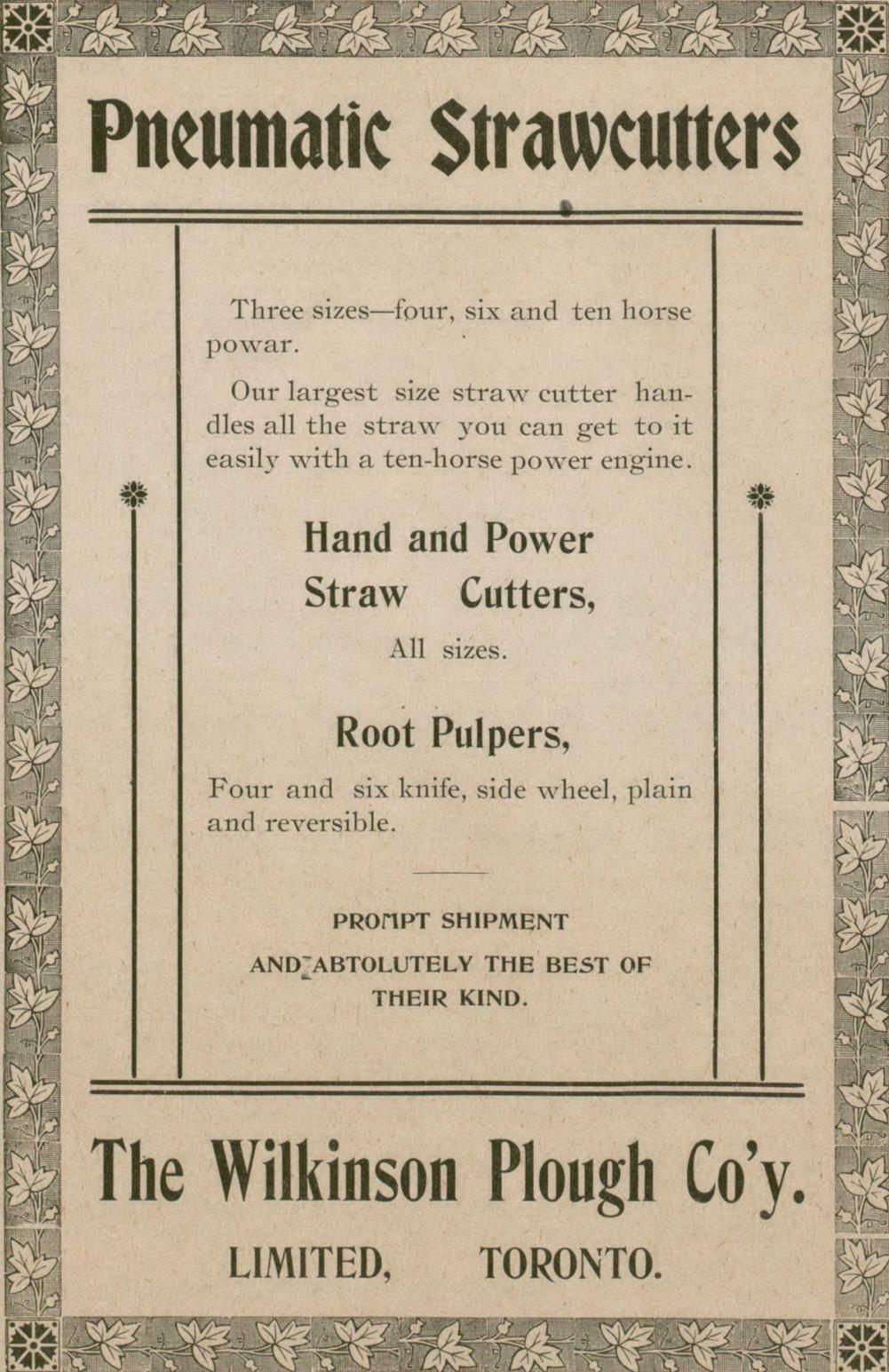
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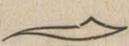
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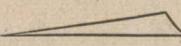
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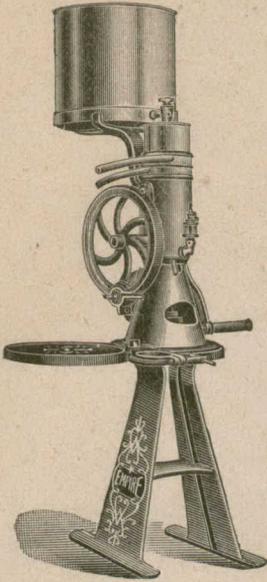
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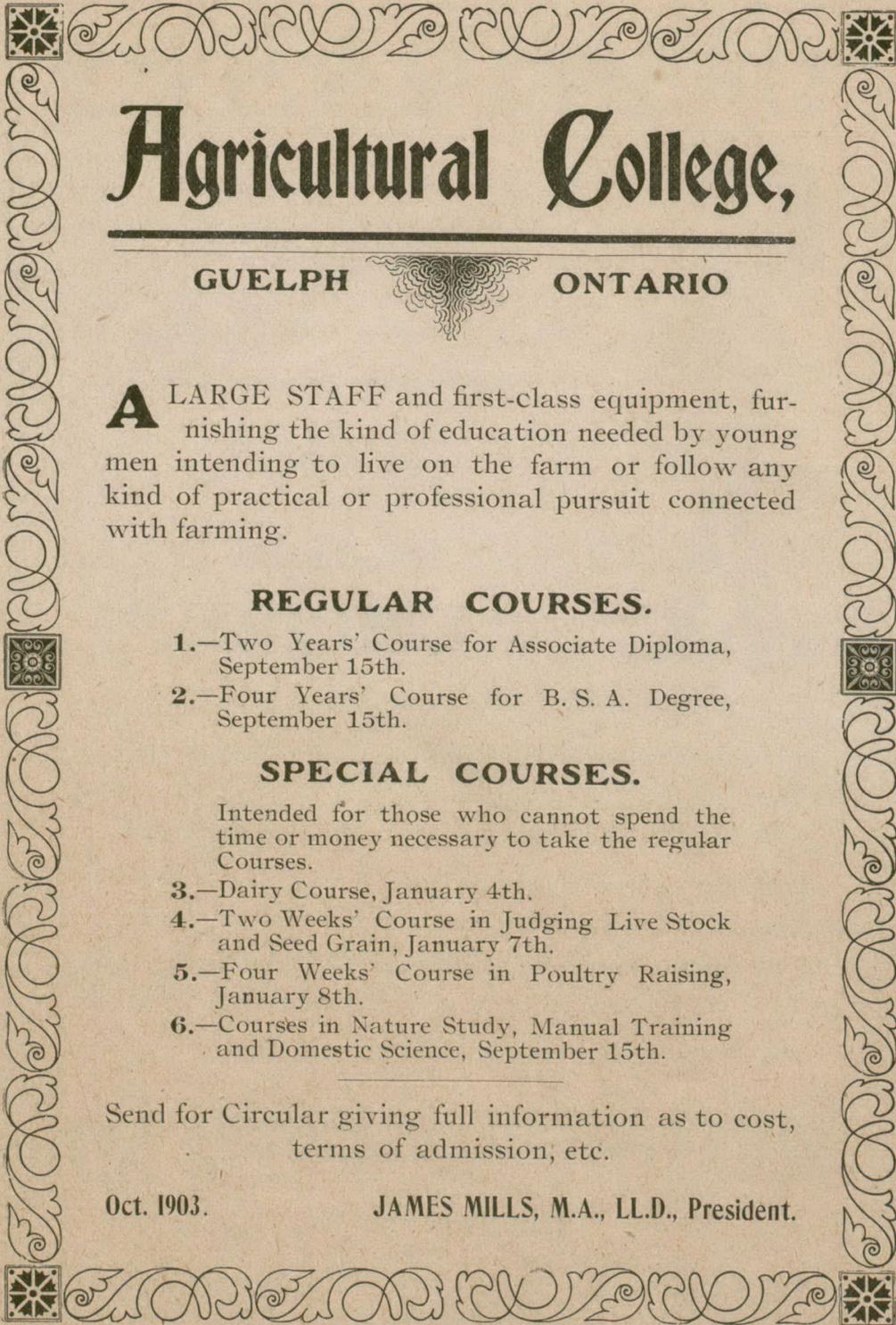
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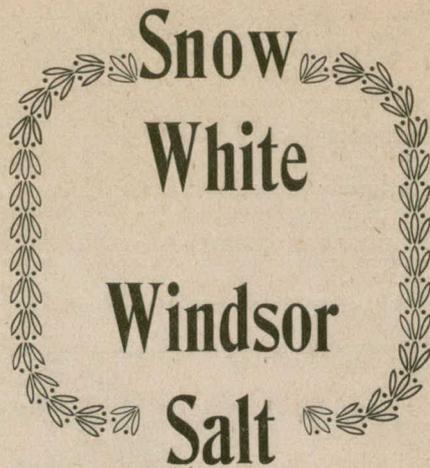
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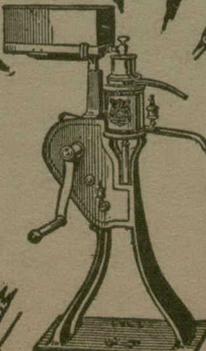
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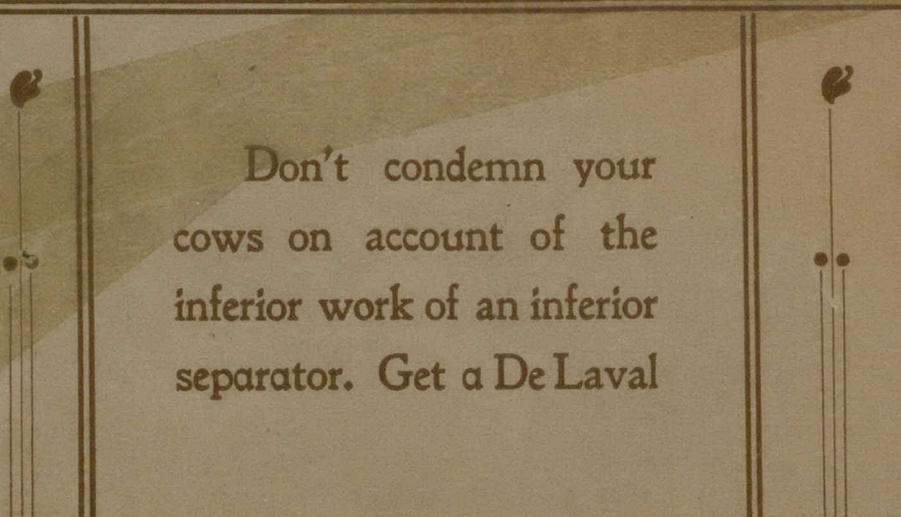
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