

PAGES

MISSING

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THE DIGNITY OF A CALLING IS ITS UTILITY.

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Birds of Prey

BY J. F. CALVERT.

THE Birds of Prey hold the same position among the feathered tribes as the lion, the tiger, the hyena, and other carnivorous races among mammiferous quadrupeds. Their general appearance is indicative of the ferocity of their nature, and their whole life is devoted to carnage and rapine." These two sentences from Jones' "Natural History of Birds," 1872, though scientifically correct, lead the ordinary reader to conclude that the birds of this class are undesirable and should be destroyed. This, unfortunately, was the attitude of the last generation towards the hawks and the owls and other birds of prey. And in most quarters this attitude, we regret to say, has continued up to the present. Every hawk and owl has been considered a legitimate target for the rifle of the sportsman or the shotgun of the farmer. Have these birds done anything to merit such an evil name? Yes, certain members of the group certainly have. But there are hawks and hawks; injurious hawks and beneficial hawks. The man with the gun makes no distinction, and all the members of the group have been

made to suffer for the sins of the few. We shall consider in this article only those birds of the group that particularly affect the Canadian farmer. These may be conveniently considered under two headings, viz., the hawks or birds of the day, and the owls or birds of the night.

It is a most interesting study to consider how these birds are adapted by structure to the habits of their life. This study will afford us a splendid illustration of the modern method and standpoint of nature study. The student of the old school shut himself in his laboratory and dissected the dead specimen—structure was paramount with him. Now it is structure, also, but structure in relation to habit. Not the dead animal only, but also the living is studied, and that in its natural surroundings. We shall consider a few ways in which the structure of the hawk and the owl is adapted to the habits of their life.

Even the superficial observer has noticed that birds which spend most of their time in the air have relatively larger and stronger wings than those birds which spend most of their time

on the ground. The hawk is a bird of the air, and so has a large, strong wing. Furthermore, it must be able to turn quickly in the air, so its tail,



MARSH HAWK.

which is the rudder of this aerial craft, is large, strong and mobile. Contrast with the sinuous course of the hawk the straight course of the tailless duck or sharp-tailed grouse. As the hawk sweeps in great circles above the meadows its far-seeing eye catches the slightest movement of a field mouse. When prey is sighted, the bird literally drops from the sky, and, with its sharp curved talons strikes death to the un fortunate victim. With its strong curved bill it then proceeds to tear and devour. The hawk is a bird of the day; it has excellent sight and its eyes

are set on either side of the head so that no enemy may steal up unawares, but its hearing is not remarkable.

Now contrast with it the owl, the bird of the night. It is also strong of wing, possesses a fair sized bill, sharp curved talons (the third or outer toe being reversible), and a powerful curved beak. But since it goes a-hunt ing at night it has very large eyes in order that it may receive all the light possible. These eyes are set in front and both focus on the same object, thus making a clearer image. The eyes cannot be rolled, but change in direc tion is obtained by the movement of the neck. No enemies are feared from behind since it is dark. The eye has a thin lid which may be drawn over it during the day when the light is



SCREECH OWL.

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strong. The ears are very keen indeed since the bird depends largely on the sense of hearing to determine the loca tion of its prey. The feathers are par

ticularly soft and downy in order that the bird may fly without noise; and they may be erected like those of a game-cock to make the bird appear very formidable in the eyes of its prey. The prevailing color of the owl, as well as that of the hawk, is usually a brown or grey that it may blend with the surroundings. The snowy owl, which hunts partly in the day time, is white in winter and barred-brown in summer. Such coloring, intended to deceive the

hawks and owls. In one year and a half over one hundred thousand of these birds were killed, but it was very evident that in the same time the destruction of crops by field mice had increased to such an extent that the loss to the farmers amounted to millions of dollars. Doubts as to the wisdom of the law began to be felt. Finally the matter was submitted to Dr. C. Hart Merriam, Ornithologist and Mammalogist of the United States De



RED SHOULDERED HAWK.

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prey, is spoken of as deceptive coloration. What fine adjustment of structure to habit might well be the conclusion of any careful student.

Returning now to the question suggested in the introduction—do hawks and owls deserve death at the hands of the gunner? A little biological history will supply the answer. A few years ago the farmers of Pennsylvania succeeded in having a law passed by the State Legislature offering a bounty on

partment of Agriculture, who turned it over to his assistant, Dr. A. K. Fisher. The latter concluded that nothing short of the examination of the stomachs of the birds in question at all seasons of the year and in different parts of the United States and Canada would give the desired answer to the great question. Some 2,700 stomachs were examined by Dr. Fisher and his assistants during a period of several years with a result

that was a surprise even to the most hopeful friends of the birds. A volume was prepared by Dr. Fisher entitled "Hawks and Owls of the United States in Relation to Agriculture," giving a full report of the work done. Forty



FOOT OF OWL, SHOWING REVERSIBLE TOE.

eight species in all were examined, with the result that six were pronounced wholly beneficial or wholly harmless; twenty-nine chiefly beneficial; seven neutral, that is, their good deeds balanced their evil deeds; and only six positively harmful. In the words of F. M. Chapman, editor of "Bird Lore," the food of hawks "consists to a large extent of small mammals and insects, birds and poultry forming a comparatively insignificant part of the diet of most species. Hawks

are thus of great value to the agriculturist as the natural check upon the increase of the myriads of small rodents so destructive to crops." "Owls—feed more largely on small mammals—most of which are nocturnal—than the diurnal birds of prey. They are therefore of even greater value to the agriculturist than the hawks."

We reach, then, the inevitable conclusion that a clear distinction must be made between beneficial and injurious birds of prey, and it is the plain duty of every farmer to become familiar enough with these birds to recognize which are his friends and which his enemies, or, failing this, to shoot no hawk or owl that he does not know is the enemy of his chicken roost. It is his duty to do all in his power to have the beneficial species protected by law and by sentiment. It is a matter which touches his pocket for it would be disastrous if the numbers of these birds were very much depleted. Mrs. M. O. Wright in an educational leaflet in "Bird Lore" on the Marsh Hawk, says, "Every farmer in North America who reads this leaflet should at once commence a campaign of education among his fellow-workers, and should make it a prominent plank in his platform that all the beneficial hawks should have legal protection." All day long the hawk is scouring the meadow for mice or grasshoppers and at nightfall the owl takes up the work, thus protecting the property of the agriculturist, and any farmer who shoots the beneficial species of hawks or owls may well be compared to a citizen who would shoot the policeman who is protecting his property.

In Ontario there are about twenty one species to be considered. These may be arranged as follows: (a) Those



FOOT OF FISH HAWK.

wholly beneficial or wholly harmless, Rough-legged Hawk. (b) Those chiefly beneficial, Marsh Hawk, Red-tailed Hawk, Red-shouldered Hawk, Broad-winged Hawk, Sparrow Hawk, Long-eared Owl, Short-eared Owl, Great Gray Owl, Barred Owl, Saw-whet Owl, Screech Owl, Snowy Owl and Hawk Owl. (c) Those whose good deeds balance their bad ones, Great Horned Owl and Pigeon Hawk. (d) Those which are positively injurious, Goshawk, Cooper's Hawk, Sharp-shinned Hawk, Duck Hawk, and American Osprey. Some of the more important of these birds may be easily identified by some distinguishing characteristic, the Marsh Hawk by its slow flight near the ground and by its long tail, which is white at the base; the Sharp-shinned by its swiftness and directness of flight and by its dark color; the Goshawk by its large size, its boldness and swiftness of flight; the Red-tailed by its size and slow movements; the Red-shouldered by its habit of sailing at great heights and screaming; the Sparrow Hawk by its small size, its reddish back and long wings. Every farmer should have a copy of the free illustrated bulletin, "Birds of Ontario in Relation to Agriculture" by C. W. Nash, which may be obtained for the asking from the Department of Agriculture, Toronto. He would also do well to purchase such a book as "Birds of Ontario," McIlwraith, published by Wm. Briggs, Toronto.

In conclusion let the importance of the legal protection of the beneficial species be urged upon the farmer. The tide of public opinion is turning. One State after another in the Union is legislating for such protection. In Canada, Manitoba is the only Province

which has a law on its statute books protecting all the beneficial birds of prey. Quebec specifically exempts hawks and owls from protection, while Ontario exempts the hawks only. At present an effort is being made in Ontario to have such a law passed as will give protection to all beneficial species of both hawks and owls, and every agriculturist should write at once to his representative asking him to support such legislation. Surely Ontario, the banner Province of the Dominion, should lead her sister Provinces in this important matter of protection for our long abused benefactors, the beneficial birds of prey.



SNOWY OWL.

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The Cecropia Moth

BY RAYMOND ZAVITZ.

[The following article very well illustrates the advantages of observations of this nature, in that a pupil fourteen years of age is enabled to write a clear and comprehensive treatise on this important subject.—Editor.]

THE Cecropia (*samia cecropia*) is our largest native moth. It is very easy to raise, the only source of trouble being the parasites. The following observations were made by the pupils of the Fourth Class in the Consolidated School.

Next spring the cocoons were brought out and placed in breeding cases in the school windows. On May 5 and 6 three adults emerged, two females and one male. The rest never hatched, as they had been attacked by parasites the previous summer. These



LARVAE OF CECROPIA MOTH.

In the fall of 1907 about thirty cecropia cocoons were gathered, mostly during Nature Study excursions. These cocoons were found in common trees, such as the maple, apple and hawthorn. When brought to the school they were stored in a cool dark place over winter.

parasites attack the Cecropia while in the larval stage. The female parasite deposits her eggs in the body of the larva, and, when the eggs hatch, the small grubs feed on the soft body of the larva. When the larva spins its cocoon its strength is nearly gone, and the parasites soon spin their cocoons

inside the dead body of the Cecropia.

The adults which hatched mated, and both females produced eggs on May 8th. The eggs hatched on May 24th, sixteen days after being laid. The larvae were very small, black objects; they were gently collected and placed on some green apple leaves, which they immediately proceeded to devour.

After eating ravenously for ten days they moulted on June 3rd. When the larva moults it is confined by the old skin very closely. The under skin is soft and lies in folds, thus allowing ample room for growth. The larva attaches itself to a twig or some such support by a fine silk rope. Then the old skin splits along the back, and the larva pulls itself out, leaving the old skin still on the twig.

After emerging from the first moult the larvae were large, of a slaty green color with small black tubercles. They ate apple leaves till their skins were

again drawn tight, and on June 9th they moulted for the second time. This time they were pea-green with red tubercles on the front segments.

The third moult was on June 18th. The larvae emerged bright green with orange colored tubercles on the front segments.

After the third moult the moults were very irregular, some of the larvae being much further advanced than others. There were in all probably five moults, possibly six. Each moult brought little or no change in color, but enormous change in size. They ate great quantities of leaves.

A number were placed on an apple tree in the school grounds, but did not seem to seek concealment on the under side of the leaves, probably due to their indoor existence. All were eaten by birds, or put in cyanide bottles by teachers of the summer class (reason not given).

Thirty larvae were kept in a large glass aquarium in the school and closely observed by both pupils and teachers. Two escaped, one scaling the window blind to the sash by its cocoon and the other spinning its cocoon on the leg of a child's desk.

The first cocoon was spun on July 13, fifty days after hatching. All the rest were completed in three days. This is a very early date, the larvae out doors not spinning till well on in the fall. The early date was due to the larvae being protected from storms, and being fed all they would eat with out having to forage for their food. Can you think of any other explanation?

The cocoons are being stored in the school cellar till this summer, when observations will be continued. No parasites can be in the cocoons, as



CECROPIA JUST EMERGED.

all were kept indoors. A great number of adults is expected.

These observations could be carried on in any school, whether rural or city, the cocoons being found commonly, even on the trees in the city streets. The only apparatus needed is a box letting in plenty of light, a notebook and plenty of green leaves, preferably apple, maple or hawthorn. It is very interesting to watch the stages in the change from egg to adult. Some schools are taking up this or similar work, and there is

nothing to prevent others from doing the same.

The accompanying photo shows the larvae a few days before the first cocoon was made. The coloring was beautiful, and we found the big fellows perfectly safe to handle—do not be afraid of them.

A photo and report of the observations were sent to the late Dr. James Fletcher. His response was full of praise and encouragement and expressed much satisfaction with the idea of keeping an accurate record.

Galls and Gall Flies

BY T. D. JARVIS, B.S.A.

THERE are sometimes swellings or excrescences upon the leaves and twigs of trees such as the ash, maple; willow, poplar and others as well as upon rose bushes and herbaceous plants, which, by their frequent appearance, have become well known and familiar to us. They are usually termed galls and have for a long time in connection with the insects which are contained in them and dwell therein been the subject of industrious research.

The word "gall" has three different and distinct derivations, which signify as many of its characteristics.

It is derived from the Anglo-Saxon word "gella," which denotes anything bitter. It has also the French word "galer" "to gall" for a derivation and from it come such ideas and expressions as "to tease," "to fret" or to annoy. The third derivation appears to

be from the Latin word "galla" meaning excrescences which appear upon the leaves and twigs of plants.

The word itself is very appropriate, as in most instances the flavor of these excrescences is very bitter and their manner of growth or the cause of them tend to annoy and harass the vegetable substances upon which they are found to exist. The word "gall" may, however, for the purpose of this treatise, be defined as a malformation of plant tissue induced by mechanical or chemical stimulus or by some cause not always known.

The excrescences are sometimes produced by fungus and bacteria, but those with which we now propose to deal are formed by the workings of insects and other small animals closely related to them, such as the acarids.

The abnormal, closed ball-like growths found so abundantly upon

oak trees and rose bushes, are caused through the irritation of the plant tissues by minute larvae of the cynipid gall flies. These flies are all very small, the largest of them being not more than one-third of an inch in length. The female flies have a long slender and flexible, yet strong, sharp pointed ovipositor, containing several needles or awl-like pieces, which they use to prick the soft tissue of the leaf or the tender twig, so that the egg may be deposited in this succulent tissue of the growing plant. In this manner one or more eggs are inserted into the leaves, twigs and roots of trees and herbaceous plants, where but one or two eggs are inserted into one leaf or twig, there the galls become large, on the other hand, however, if a dozen or so of eggs are inserted there the galls remain small.

In a short time the egg gives birth to a tiny footless maggot-like larva, which then feeds largely by absorbing the sap through its skin. At this time the development of the gall begins where the larva lies.

The stimulus for growth in most cases comes from the larva and probably arises from the irritation through special salivary excretions and to some extent through physical irritation caused by the wiggling of the larva.

The pupa is passed within the gall and the adult usually emerges in the Autumn or Spring.

Sometimes eggs are deposited by flies upon trees or shrubs different from those from which they emerged and the hatching larvae stimulate the growth of entirely different shaped galls and the larvae develop into gall flies of a markedly different species from their mother. The eggs of these gall flies, however, produce a species of larvae and gall flies similar to that of their grandparent.

It is frequently of interest to note the presence of other insects besides the gall maker in these galls.

As many as fifteen different species have been found in a gall upon the common golden rod. Some of these are parasites, others only guests or inquiline. The inquilines are often very similar in appearance to the species which actually produces the gall.

It is most remarkable to find the extraordinary instinct with which gall flies are endowed and which leads the adult flies to the right selection of the plant and the proper position and place on it, to lay their eggs, and the passive response of the plant to the growth and stimulating irritation of the gall fly larvae.



The School Garden

BY E. A. HOWES (CONS. SCHOOL).

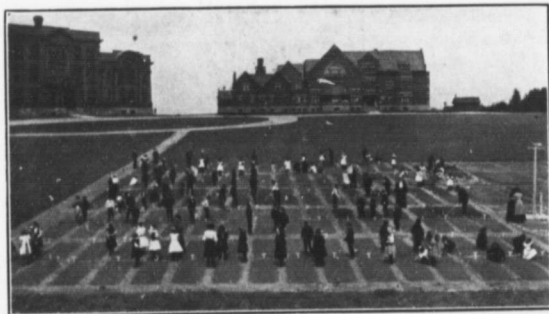
THIS article is but a bundle of hints culled from five years' experience. Its object is to aid the willing, but diffident teacher, who wishes to make the school garden part of the school life, but who fears lack of preparation. There is not the slightest doubt that the teachers of Ontario have in their hands in a marked degree the power to forward or retard this movement. They cannot stop it, but they can obstruct it. The remark often repeated by visitors from among the summer excursionists to the O. A. College is to the effect that the teacher should be the leader in the matter of introduction.

We of Ontario are now living in a dawn which portends a bright day for the child life of the future. And what could be more important? Surely that which offers the child a brighter and happier life, at the same time better preparing him for his future duties as a citizen, will best merit the "Well

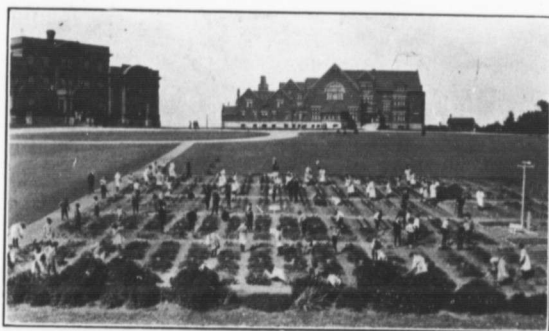
Done" of Him who thought so much of the little ones.

We seem lately to have rubbed our eyes and to have taken notice that it is far from a matter of pride that the school life of the child is shaped by a plan, boasted as resembling a ladder in its reach from primary to post graduate. Ontario is essentially an agricultural province; should not the child receive such training as will cause him at least to think along agricultural lines? What excuse can there be for a system that crams the young head with a lot of information about things at a distance while he is left lamentably ignorant of the things at hand? Call it Nature Study, call it Elementary Agriculture, call it what you wish, the people of this province are awakening to the fact that it is not only rational and advisable, but necessary. The place of the teacher, then, is that of a leader.

There is a striking similarity among



SOWING THE SEED—APRIL 27.



CLEARING UP FOR VACATION—JUNE 27.

the different teacher's county conventions—a few teachers making desperate efforts to improve the occasion, and the many looking on with good natured tolerance. I was one of the many, seven years ago, when, at a meeting of the teachers of Carleton County, a teacher asked the chair for an explanation of the use of dormant buds on trees; one could feel the shock—discussion of dormant buds at a teachers' convention! The question might be an opportune one for every convention, only the chair need not restrict the discussion to trees. There may be some dormant buds in the profession. However, it is to the real teachers that these hints, imperfect, but well-intended, are offered.

The school garden is the proper foundation for Nature Study in the public school. Our Provincial Government has shown true interest in its encouragement of the school garden idea. An initial grant of \$100, a yearly maintenance grant of \$20, and a special yearly grant to the qualified teacher of \$30, with the germ of a hope of increase, should encourage trustees to

purchase necessary land and teachers to undergo preparation for the work.

Many teachers cannot take immediate advantage of these grants, yet by these teachers a splendid work can be done. Be content with small beginnings. I began with one little fuschia with six leaves, donated by a mother of that section. The section is barren indeed that cannot boast one successful grower of house plants, and if the teacher feels the lack of experience, ample information can be secured during a pleasant visit to such a home. In two years the little fuschia became a noble plant enjoying the company of fifty-eight other plants among which was a splendid collection of abutilons. I found it always in order to ask for "slips."

Perhaps a hint as to Arbor Day is not out of place. I well remember my first Arbor Day. I worked faithfully all day, as about thirty little witnesses could testify. Next year matters were reversed; there was but one witness and much mutual benefit resulted from the change. Of course Arbor Day suggests tree planting, but other things may be done. The grounds must be

pretty well limited if there is not space for a few flower beds or borders. They may not draw a government grant, but they will pay their way in a higher sense. As to tree planting there is now opened a new field. Make a bed or border of tree seedlings, to be transplanted later. These will be gladly furnished, along with necessary instruction, by Prof. E. J. Zavitz, of the O. A. Forestry Department at Guelph.

No set directions can be given for laying out a school garden; size of lot and number of pupils will govern the plot arrangement. In the regular ungraded school I would have the plot as large as possible up to 10 feet by 20 feet. In this sort of school the plan of dual ownership of plots is very satisfactory, a senior pupil having as assistant a junior, thus removing much care from the shoulders of the teacher. The shape of the plot and the arrangement of plots is largely a matter of taste on the part of the teacher. I began with the simple oblong plot marked out by four painted stakes and separated from its fellows by paths, and I still use the same plan, but I quite realize that a teacher with a more artistic eye might with benefit depart from my system. Besides the individual plots there may be larger class plots in which to conduct simple experiments or demonstrations. A good way to separate the garden from the playground is by means of a perennial border. In early spring levy a contribution from the section of roots of perennials. The arrangement may not be satisfactory the first year, but a readjustment may be made the next spring. A splendid accessory to the garden is a work-bench with a few tools, for at this bench the pupil may make his stakes, labels, etc.

As the school garden in connection with the Consolidated School is, from its position, so much in the public eye, I thought it would be a good idea to here demonstrate certain features of school garden work which might be of aid to teachers and ratepayers from other sections. Our school is large and our garden is large, so that only certain phases will likely be found desirable of imitation in one garden. The portion shown in the photographs comprises the individual plots, all 3 ft. by 10 ft. In the front ranks are the plots of the Second and Third Classes laid out somewhat as follows: A small flower plot of common annuals (nasturtiums, marigolds, candytuft, asters, etc.), and rows across the plot of carrots, beets, onions, parsnips, lettuce and radishes. When the lettuce was removed peas were sown in the blank space. There were two rows of radishes between which a row of parsnip seed was sown, so that when the radishes were removed, the parsnips had already a good start. The remainder of the space photographed, belonging to the Fourth Class pupils, was occupied by Experimental Union work. As a juvenile member of the Union, each pupil in this class undertook one variety test from seeds furnished by the Department of Horticulture, testing three varieties of onion, beet or carrot. As a result the class declared in favor of the Prizetaker Onion, Chantenay Carrot and Detroit Dark Red Beet. (I would advise teachers to communicate with Professor Hutt, of O. A. College, about this phase of the work). The pupils of this class had two ranges of plots, into which they transplanted asters, balsams and zinnias, started in boxes indoors early in the spring. The results from this last were most grati

ying. Each Fourth Class pupil had in charge one from the junior room, and the little junior did not suffer at harvest time. We are often criticized for our "extras" in this school. In reply I would call attention to this class. Besides the garden work the girls had instruction in Household Science and sewing while the boys took Manual Training and Drill, yet twenty out of a possible twenty-four were successful at the H. S. Entrance examinations. As a sporting writer would say "this will take a lot of beating." So much for the individual plots.

Next we had two ranges of plots, 10 feet by 20 feet, in which the girls of the Fourth and Fifth classes grew material for their work in Household Science—a regular kitchen garden containing a little of everything. The remainder of our garden space was taken up by work of the boys of the Continuation school. This was largely demonstration work, a simple exhibition of two or three of the best varieties of wheat, barley, oats, peas, vetches, roots, etc. This was a most interesting and instructive feature of the work, the neat plots, 6 feet by 10

feet, presenting lessons of a varied nature. In addition to this the class, on the advice of Professor C. A. Zavitz, tried some experiments. Two potato plots were planted at the same time and received the same treatment, except that one was sprayed three times with Bordeaux mixture. As a result of spraying we found an increase equivalent to 141 bushels, 24 lbs. per acre. Another experiment was a test of potato sets of different sizes, 2 ounces, $\frac{1}{2}$ ounce and $\frac{1}{8}$ ounce. As a result the pupils found that while the 2 ounce sets gave the largest aggregate yield, they also gave the largest percentage of unsalable potatoes. The smallest sets gave the lightest yield. Two plots of alfalfa, the seed of one treated with bacteria culture, gave no marked result, but we will repeat the experiment next summer. Oats tainted with smut were sown, in one plot the seed being treated with formalin. A neighborly cow ate the experiment, so we cannot report though we did hope for results on the cow.

In as short space as possible I have detailed our work—the mixed plots, the Experimental Union tests, the flower



A BOUNTIFUL HARVEST—AUG. 27.



THE HARVEST HOME—SEPT. 25.

garden, the kitchen garden and the demonstration and experimental plots. Perhaps, one of these features is enough for the teacher to begin with. I will be proud to find our work here copied, and better pleased when it bears the improvement stamp of an other teacher's individuality.

Teachers, I find, consider this work either too difficult or too elementary, and both classes are wrong. Many still fail to grasp the idea that it is not the amount of information imparted that counts, but rather the trend of thought induced in the pupil. Several counties held their conventions here last spring, and we were glad to meet so many teachers and get their views. One inspector, no back number either, thought the be-all and end all of our work was the sum total of agricultural facts delivered to the pupil in his school-garden work—a sort of young O. A. College training. Looking at it from this point of view, one can readily understand why so many teachers think they should be trained almost as professional gardeners before daring to take up this work. The only comparative failure I know along

this line was a garden conducted by a semi-professional gardener, and one of the most successful in my experience was managed by a teacher, who previous to entering the work knew but two flowers, one was the orange lily, and the other was not. The benefit received from the school-garden will live longer than will the teacher. Not only is a proper direction given to the interest of the pupil, not only does this work assimilate with the so-called necessary work of the school to the benefit of the latter, but it offers a whole some employment for child energy and tends to that thing so long neglected, the purification of the school life of the child.

It is well that the teacher should consider that the benefit is not all to the pupil. The work brings sunshine to our lives, and most of us need all we can get. As a concluding word of encouragement, I cite the following case: Without government aid, without short-course preparation, and without the proceeds of a small entertainment, I knew a young lady teacher to inaugurate and maintain a school-garden that was an education and an in

Birds the Farmers' Friends

BY W. E. SAUNDERS.

AT the present day, the fact that birds have a direct influence on the processes of agriculture is well recognized and the experiments and studies that are being made to demonstrate this influence and to calculate its value, are many and varied.

"Two Years With the Birds On a Farm," by Forbush, and an account of the interesting works accomplished by Baron Von Belepsch in Germany, published under the title of "How to Attract the Wild Birds," are two of the most recent and most interesting of them which have appeared on this subject, and the present writer's effort will be to deepen the impression, that *Real Results* may be attained at a minimum of effort or expense.

The influence of birds on agriculture has long been known and widely admitted, but the admission, as far as farmers are concerned, has been rather tacit than real, except when influences of an injurious nature come under consideration. Everyone is promptly ready to accede to the fact of influences of this character, as their effects are so promptly and easily demonstrated. But when the effect is beneficial, as it usually is, the difficulty lies here, that it is better entitled to the term "Prevention of Injury," rather than "Direct Benefit," but it cannot be claimed that the former is as readily and clearly recognizable as the latter nor is it so much appreciated. For instance, if a farmer had three trees half stripped by tent caterpillars and in the midst of

the raid came two pairs of cuckoos, who in a few days completely destroyed the injurious larvae, the owner of the trees would be loud in his praise of the cuckoos, and would be inclined to laud them as, perhaps, the only birds that had ever been of great benefit to him. But, if that same farmer had a single Chickadee or Nuthatch living in his orchard during the previous winter, the eggs, perhaps, 500 in number, from which all this destruction emanated would probably have formed but a scanty sustenance for a single day for his feathered visitor, and yet, from the fact that the chickadee prevented injury which might have happened, while the cuckoo checked the spread of destruction which had already accomplished a conspicuous amount of damage, the latter would receive the more credit while his service was really of less value.

It is manifestly too much to expect that every farmer will investigate such things for himself. Most of our knowledge is obtained from books, and when our minds are stored with this secondary knowledge so much more cheaply and easily acquired than that which we ourselves wrest from nature, we are in much better position to comprehend facts which come to our notice, whether new, or familiar.

So while the cuckoo is a valuable bird, worthy of consideration and protection, everywhere, still, if the work of the chickadee were thoroughly done each winter, the cuckoo might find it

necessary to move elsewhere on account of lack of sustenance.

The question then arises, how can we get chickadees to do our work? and what other birds are there whose assistance may be successfully invited? The answer to the second question is easy. Nearly every small bird is directly and almost entirely beneficial.

The first question, concerning the matter of the invitation to the birds as our assistants, is not so easily answered, but the way has been worked out by Baron Von Belepsch on his estate in Germany, and his experience may be repeated and amplified by others. His methods may be roughly summarized under two heads: First, Setting aside a prepared shrubbery for the breeders in that kind of land, and second, putting up breeding cavities for such birds as use them. In Canada the latter class includes some of our most useful birds—Chickadee, House Wren, Nut hatch, Bluebird, Swallow and the Woodpeckers, which latter, however, are usually so independent that they demand a new country each year.

In the trees and shrubs in the prepared shrubbery most of all the other birds will nest and will make short journeys from there, to the open, where insect life is more abundant.

By placing shrubby woods in strips throughout the farm, the whole acreage will be scoured for food by these insect eating birds, and the more open fields will be looked after moderately well by the Bobolink, Meadow Lark and other birds who prefer to nest and spend their lives in such places.

In his work of "Two Years on a Farm," Professor Forbush discovered that the crows and blue jays found protection so much to their liking that they became very abundant, and in

dulged largely in their favorite diet of young birds and eggs, so much so that in the second year hardly any of the small birds succeeded in raising their young.

Now, it is well known that young birds whose parents use a mixed diet are usually fed exclusively on insects, and it is during this period, when plants are in active growth, that most insect damage is done, and it is therefore highly important that the birds should be in every way encouraged to raise large families. It can hardly be necessary to call attention to the vast difference in the quantity of insects consumed by a song sparrow and his mate quietly incubating her eggs, and the same pair when they are scouring the country from early morn till dusk, endeavoring to appease the appetites of a hungry brood who are individually able to eat and digest their weight of insects in twenty-four hours. On this account it would seem that we are compelled to hold the jays in check with the gun, in order to permit the smaller birds to multiply as much as desired.

These birds, and the crows in particular, have increased wonderfully in the past hundred years. Old residents say that ravens were common and crows were scarce in the pioneer days of Ontario, and doubtless the killing of the birds of prey, notably the Great Horned Owl, has given the crows chances of life which they did not get when the owls were numerous.

Perhaps, the case of the large owls may be worthy of a little space just here. While these birds will eat every thing that lives, they have a marked preference, and it is for field mice. I have found five and a half of these animals stored in a nest, under the mother

bird, beside an unhatched egg and a young bird a day or so old. The late Robert Elliott once examined the stomach of one of these owls which contained the skulls of thirteen field mice, which had doubtless been all eaten during the previous night.

Now, when a bird shows what might almost be called an inordinate fondness for such a line of diet, and if it is possible for them to catch and eat as high as thirteen of these animals in a single night, it seems reasonable to suppose that an average of one per night, might be taken during the year.

Further, if the damage caused by a field mouse in its short life to the farm crops be estimated at one cent, and surely this is sufficiently low to be safe,

then the value of a Great Horned Owl to the farmer on whose land he is resident, amounts to 3.65 a year, or 7.30 for a pair.

How many farmers are there who are feeding animals worth less per annum, who will shoot at sight these useful birds, for the reason that a fowl or two have been taken from his flock at night?

It has been said that there are two sides to every question, but the debit side of the account with most birds is so small that it is completely overshadowed by the credit side, and almost the only cases where birds can be considered injurious are those in which they injure agriculture indirectly by destroying its active friends, the smaller birds.

IN THE CLOVER FIELD.

The air is sweet as sweet can be,
The azure sky spreads smoothly over,
And rest and joy keep company,
In this wide field of sun-kissed clover.

Among the heavy heads of pink
The avaricious bees are straying,
A glad full throated bobolink,
His highest note is now essaying.

The earth is holding on her breast
The sweetest flowers of all her growing;
The white clouds float from out the west
A soft delicious wind is blowing.

Oh, life is good on such a day,
The blue sky bending smoothly over,
For neither care nor cross will stay
In this wide field of sun-kissed clover.

—Jean Blewett.

The Codling Worm

BY L. CAESAR, B.A., B.S.A.

IF we except the few counties in South-western Ontario, where the San Jose scale is found, we may safely say that the Codling Worm is the cause of more loss to the apple growers of the province than any other insect, and, in fact, than all other insects combined. From numerous observations and inquiries made by the writer in different parts of the province the annual loss from this insect may be estimated at about 25 per cent.

mous loss cannot to a large extent at least be prevented. Our own observations and the experience of many of our best fruit growers show that this result can be brought about, and that, too, without any great expense of either time or money. During the last summer the writer visited a good many orchards where fully 90 per cent. of the apples were free from worms, some of the orchards being in the district where there are two broods in

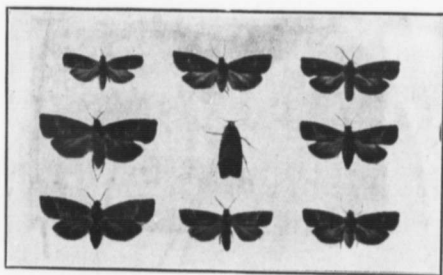


Fig. 1.—Codling Moth (natural size after Slingerland).

of the total crop; for while in a few districts not more than about 10 per cent. of the apples are wormy, in others as high as 75 per cent. are thus affected. If we change these figures into dollars we shall probably not be far astray in saying that at the prices which prevailed last autumn the farmers of the province lost the equivalent of about \$1,000,000 through the ravages of the Codling Worm.

Such a state of affairs naturally suggests the question whether this enor

the year. He also found by conversation with such well-known apple growers as Mr. Harold Jones of Maitland, Mr. Grierson of Oshawa, Mr. Jas. E. Johnson of Simcoe and Mr. D. Johnson of Forest, that all these men in these widely separated districts had had excellent results in their fight against the Codling Worm, and had all secured an average of 90 per cent. of clean apples, and in some cases as high as 98 per cent.

But if we are to discuss intelligently

the best methods of combating any pest we should first study the life history of that pest. We shall therefore try to give as simply as possible as much about the life and habits of the Codling Worm as is necessary to make plain the reasons for the methods of treatment that will be outlined later.

The Life History of the Insect.

Hibernation:—The Codling Worm passes the winter in the worm or caterpillar stage in a little nest, or cocoon under any sort of good shelter, such as a hole in any apple tree, the loose bark on the larger branches and trunk, rubbish around the base or on the ground beneath or near the tree, boards on the fence, or hiding places of any kind in storage buildings or packing houses.

When the Moths Appear:—When the warm weather of the spring is well under way the caterpillars in their cocoons pass through marvellous changes and about the first week in May some of them transform into pretty little gray moths or millers that fly about. (See Fig. 1.) All, however, do not become changed into moths at the same time, for almost two months elapse between the appearance of the earliest and the latest moths. The reason for this is that some cocoons are in warm locations where they receive the heat and light and so transform much more quickly than those situated in colder and darker places. It is important to keep this fact in mind when studying the Codling Worm as it will explain why we often find, say in July, full grown caterpillars in some apples, and very tiny, young ones in others on the same tree.

How Long the Moths Live; Number of Eggs, and Where Laid:—Each female moth lays an average of about

40 eggs. The eggs of these moths, that is those that come from the overwintering caterpillars, are laid for the most part on the leaves and not, as is commonly supposed, on the young fruit, though a small percentage is laid there. From a number of observations it is estimated that on the average a moth lives only about five days; so we may say that she lives merely to lay her eggs and then dies.

Appearance of Eggs and Length of Incubation:—The eggs look like tiny, circular, nearly flat, white specks. (See Fig. 2.) The length of time necessary for the eggs to hatch depends partly upon the weather, and averages about eleven days.

Habits of the Worms:—When the young caterpillar is hatched it some times feeds to a slight extent upon the leaves, but its main object now is to find its way to an apple. Many doubtless perish before reaching it, but those that succeed find it very difficult to work their way through the tough skin without some good prop, so about 80 per cent. of them crawl around to the blossom end or, as it is commonly called the calyx, and easily work their way down among the little leaflets there into the cavity at the base. Here they feed for some time before entering the apple proper. (This habit of the first brood of entering the calyx

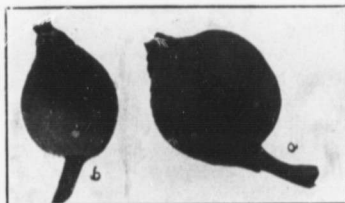


Fig. 2.—Eggs and Moth (after Slingerland).

end and feeding in the cavity should be carefully noted, as it is largely the secret to the success of the treatment recommended.) On entering the pulp the caterpillar makes its way to the core. After feeding from three to four weeks it is full grown and either makes its way out before the apple falls to the ground or does so soon afterwards. It then at once seeks a sheltering place where it can make its cocoon.

Number of Broods in the Year:—In most of the province there is practically only one brood in a year, but the fact that there are sometimes nearly

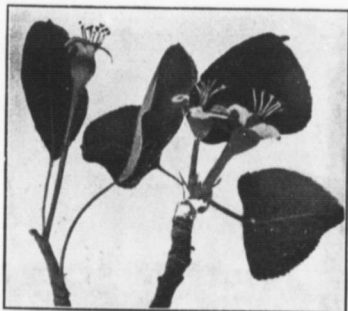


Fig. 3.—Just right to spray. A pear and two apples from which the petals have recently fallen. Note that the calyx lobes are widely spread (after Slingerland).

two months between the time when the first and last moths appear naturally results in our finding caterpillars in all stages as late as August, mislead ing many into the belief that this indicates a second brood. There is, however, a second brood in the south western part of the province, noticeably in the Niagara district. This brood is usually much more numerous and destructive than the first. Where the second brood occurs the caterpillars of the first instead of remaining in their cocoons over winter only remain about

from 15 to 20 days and then come out as moths. More of the eggs of this brood are laid on the fruit than of the previous one, apparently about 50 per cent. being placed here. The rest are laid on the leaves and twigs. Not so large a percentage of this brood enter the calyx end although from 20 per cent. to 50 per cent. usually do so. The rest enter the side of the apple especially where two apples touch, access at such a place being comparatively easy. Caterpillars of the second brood may be found entering apples from about the first week in August to the middle of September. When these become full grown they form their cocoons in the usual type of hiding place and remain there over winter.

By the following brief calculation it is easy to understand how this brood can be so destructive. One female in the early part of the season lays 40 eggs, about 20 of which may produce female moths. Each of these laying 40 eggs there would be at the end of the season, 20x40—800 caterpillars of the second brood. Of course, in reality there never would be this number for many eggs never hatch, and many caterpillars die from disease or are killed by parasites, birds or other foes before they can enter the apples.

Methods of Control.

Birds.—We have very valuable friends in the birds, especially the Woodpeckers, Chickadees and Nut hatches, which, if not molested, would frequent our orchards both summer and winter and destroy many Codling Worms as well as numerous other insects. The writer has counted as many as 20 Codling Worm cocoons on the trunk of an apple tree from which the caterpillars had been removed this winter by Woodpeckers.

Hogs or Sheep in the Orchard.—Whenever hogs or sheep are allowed to run in an orchard they do much to keep down the number of Codling Worms by eating the fallen fruit before the worms have escaped. They can not, however, completely control the pest, because as stated above, a large number of the worms leave the fruit before it falls to the ground. It is not advisable to allow old sows in an orchard as they sometimes injure young trees.

Use of Arsenical Poisons.—For the complete control of the Codling Worm we must rely chiefly upon the use of one of the arsenical poisons such as Arsenate of Lead, Paris Green or Arsenite of Lime. The preference should be given to Arsenate of Lead, principally because no matter how thoroughly we drench the trees there is no danger of burning the foliage. Very heavy sprayings with Paris Green or Arsenite of Lime are much more likely to injure the fruit or foliage. Arsenate of Lead may be used at the strength of 2 pounds to 40 gallons of water though some are getting excellent results by using it as weak as 1 pound. (This latter strength is, of course, too weak for other purposes.) For Paris Green, the strength should be 4 ounces to 40 gallons. (If Bordeaux Mixture is used at the same time, it would probably be safer to use it at half strength, viz., 2-2-40.)

Where the Worms are Poisoned.—It will be remembered that about 80 per cent. of the worms of the first brood and a considerable number of the second brood entered the apple at the calyx end and fed in the cavity at its base for some time before working farther into the apple. The main aim, therefore, in spraying it to get every

part of this cavity so thoroughly coated with poison that no matter at what time during the season the worm enters it will be certain to be killed. Unless this is done we cannot hope for thoroughly satisfactory results from spraying.

When to Spray.—It is found that the little leaves of the calyx remain open for one week after most of the blossoms have fallen, and after this period they close so tightly that it is almost impossible to force any spray in between them. (See Figs. 3 and 4.) It is the first blossoms of each cluster

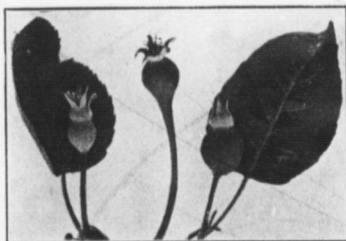


Fig. 4.—Almost too late to spray apples effectively. Note that calyx lobes are drawn nearly together on the two apples, while on the pear in the center the calyx cavity is open (after Slingerland).

to appear that regularly produce fruit, so the calyces of these are the ones that we must keep most in mind. If we waited until all the blossoms dropped it would be too late to get the poison into these most important ones. If there is much difference in the time of blossoming, earlier varieties may be sprayed first and later ones a few days afterwards.

How to Spray.—Use a coarse nozzle. (Many claim that no kind gives so good satisfaction as the Bordeaux nozzle.) Apply plenty of pressure, never

lower than 100 pounds and, if possible, as high as 150 pounds, or higher; spray directly into the calyx, and do not consider the tree properly sprayed until every calyx cup has been filled by the coarse driving spray. This will mean that the tree must practically be drenched. From time to time satisfy yourself that the calyx has been properly filled by examining a few. As the blossoms naturally point upwards toward the light it will be necessary, if one is to force the spray directly in to them, to have a tower on the spray wagon, and to use a nozzle set at an angle of about 30 degrees to the extension rod. A crook at the end of the rod may accomplish this purpose.

A nozzle thus placed enables one to direct the spray much better than would otherwise be possible.

This one spraying if done thoroughly and at the right time is all that is necessary to control the Codling Worm in any district where there is only one brood, and in most districts where there are two. Whether it can do so in our worst infested district, viz., Niagara, will, we hope, be thoroughly tested this year, but from the excellent success obtained by a number of entomologists and fruit growers in the United States in apparently as badly infested localities we have strong grounds for feeling confident of the result.

RESPONSIBILITY.

Man is not evil when he stands alone,
 'Tis in the aggregate he loses truth,
 And builds him up life's weakness by his ruth,
 No single conscience makes its brother moan,
 The slaving toiler withered to the bone,
 The wasting age ere life hath garnered youth;—
 No single soul hath done this; each and all,
 We add a pebble to a mighty wall
 That shuts this world from freedom and God's truth.
 —Wilfrid Campbell.

The Work of Stomates or Breathing Pores of Leaves

BY PROFESSOR LOCHHEAD.

WE talk freely sometimes about the "breathing" of plants, without knowing definitely how the "breathing" takes place. We are too apt to get the idea that "breathing" in plants is a similar process to the breathing of animals. As a matter of fact the process in plants is more comprehensive than that in animals, since it includes the exchange of gases both in carbohydrate formation and in respiration. When starches and sugars are formed in green leaves in sunlight, carbonic acid gas is "inhaled" and oxygen "exhaled," while in respiration the reverse exchange takes place.

Again, some of us have rather vague notions of the manner of this exchange. We talk of breathing-pores as if they were but pin-pricks in the leaf, and nothing more. However, a few minutes study of a strip of the epidermis from the under side of the leaf under a microscope, will reveal the true nature of these breathing pores or stomates. In the first place, it will be observed that they are very numerous, and so small that pin-pricks are large holes in comparison. In the case of the turnip, for example, there are about 450,000 of these stomates to every square inch, and about eleven millions on the entire under surface of an average-sized leaf. In the second place, it will be seen that the stomate is formed by the peculiar apposition of two epidermal cells called the *guard-cells*, which are more or less

crescent-shaped (Fig. 1). Moreover, these guard-cells differ also from the other neighboring epidermal cells in the possession of chlorophyll bodies.

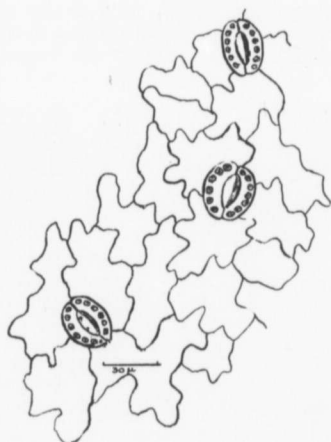


Fig. 1.—Epidermis of Potato Leaf, showing the guard cells, the stomates and the irregular-shaped epidermal cells, magnified about 500 times.

It is not so easy to get a side view of the guard-cells, for this would require a section through a leaf, but Fig. 2 shows clearly their general appearance. The upper, lower and inner walls of each guard-cell are greatly thickened, but the outer wall, the one farthest away from the opening, is quite thin. The stomate leads directly into a large air-space, which again communicates with other small air

spaces between the green cells of the leaf.

A physiological study of the work of a leaf shows us that the green cells are able by the energy supplied to them by sunlight to form sugars and starch from some of the water carried to these cells by the veins, and the carbonic acid obtained from the air by way of the stomates. As a result of this chemical action oxygen is liberated and escapes through the stomates. In these same cells and in others in other parts of the plant proteids are

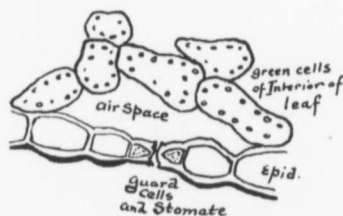


Fig. 2.—Epidermis and Stomate of the lower surface of leaf, showing guard cells, epidermal cells, green cells and large air space.

formed from carbohydrates and certain elements of mineral salts brought up by the water in solution, such as nitrogen, phosphorus and sulphur. A large quantity of water is required to bring up a sufficient amount of these mineral salts, and to keep the cells turgid for the proper performance of their functions; consequently, the leaf must have means of getting rid of the large surplus of water. This is affected by transpiration as water-vapor through the stomates.*

Here, then, are the two principal uses of these stomates; as a means of

exchange of carbonic acid gas for oxygen, and the transpiration of surplus water.

Recent investigations give us the interesting fact that diffusion of gases through a membrane pierced by as many openings as there are in ordinary leaves takes place as rapidly as if there were no membrane at all. Since the stomatal pores are more or less widely open in sunlight the means of access of carbon dioxide are therefore usually ample for carbohydrate formation.

The adjustment of a water-supply in the leaf is much more difficult to arrange than that for a supply of carbon dioxide. However, since the stomatal arrangement and mechanism serve admirably for the free diffusion of carbon dioxide into the leaf at the time this gas is required, it seems reasonable to suppose that the stomates are somehow special regulators of the water to be liberated by the leaf, and that they were elaborated primarily for this purpose. When once elaborated as organs of transpiration they served well for the admission of carbon dioxide. In any thorough discussion of stomates and stomatal action their two-fold function must ever be kept in mind.

Experiments reveal the fact that the stomatal apparatus is to some extent *automatic*; that is, in general the guard cells close when the escape of water vapor exceeds the amount of water supplied to the cells of the leaf, and at night when carbonic acid gas is not needed for carbohydrate formation; and they open in daylight to allow access of carbonic acid gas and free escape of water. This automatic action of the guard-cells is influenced by the increase or decrease of pressure with

*It has been computed that an acre of cabbages give off 500,000 gallons, or 12,500 barrels of water during the growing season of four months.

in them; by the presence of highly osmotic substances which have a great attraction for water; by the humidity of the atmosphere; by light and darkness; by changes of temperature; and by the pressure in neighbor cells.

When the guard-cells are turgid, the only walls that respond are the outer or convex ones which bulge outwards. In doing so the inner walls are carried outward a little also, leaving a slit-like opening between the guard-cells. But when the cells are flaccid through loss of water, the inner walls of the guard cells come into contact, and the stomate is then said to be closed. (Fig. 3.)

When we enquire carefully into the working of the stomates we at once meet with difficulties in giving an explanation that is satisfactory in every case. The usual explanation is about as follows: At night the stomates are ordinarily closed or nearly so. Soon after the sunlight strikes the leaf and the temperature of the air rises, carbohydrates such as sugars and starch, begin to form in the green cells, and in the guard-cells as well. Water is drawn into these cells so that they become turgid. They gradually open and allow the escape of water-vapor and oxygen, and the entrance of carbonic acid. With the opening wide of the stomates, however, so much water vapor sometimes escapes from the leaf that wilting ensues. Usually before this stage occurs the inner green cells, bereft of much water, draw on the neighbor epidermal cells, and these in their turn on the guard-cells, with the result that the stomates close, and rapid transpiration is prevented. And so a sort of rhythmic action takes place, the guard-cells opening and closing according to certain conditions of the leaf and its environment.

But this explanation does not always explain; there are many phenomena connected with the opening and closing of breathing-pores which are not explained in this way.

For example, "on the theory of stomatal regulation of water loss by the plant we should expect a close correlation between the daily periodicities of transpiration and of stomatal movement. The rate of transpiration, however, continues to increase for a considerable period of time after the maximum stomatal opening has been reached. The diminution in the rate of transpiration during the latter part of



Fig. 3.—Diagram of cross section of two guard cells, to show their action. The heavy walls are the outlines of the guard cells when turgid and the stomate open. The thin walls are the outlines of the guard cells when relaxed and the stomate closed, magnified 2,500 times.

the day may be interrupted by intervals of increase, without any interruption of the diminution of the stomatal dimensions." (Lloyd).

Again, Leitgeb showed that the stomates in the etiolated petiole of *Crambe cordifolia* opened though they possess no chlorophyll. Lloyd obtained similar results with *Brodiaea*. Further, F. Darwin states that in about thirteen per cent. of land plants the stomates do not close at night, and Lloyd can see no "adaptive closure of the stomates in anticipation of wilting." Other examples might be given, but these will suffice to show how un

satisfactory is the present theory as a general explanation of stomatal phenomena.

Recent experimental studies by Francis Darwin and F. E. Lloyd have shed some new light on the physiology of stomates. They maintain that the opening of stomates is not due to the formation of osmotic materials in the guard-cells due to photosynthesis or carbohydrate formation under the action of sunlight. Lloyd determined that starch is formed in the guard cells in darkness and in the absence of carbon dioxide, whereas in the other green cells of the leaf it is formed only in light, and when carbon dioxide is available. It is probable, therefore, that the guard-cells get their starch from the underlying green cells. Further, the opening of the stomates occurs in the absence of carbon dioxide and photosynthesis.

Moreover, Lloyd comes to the conclusion that "the movements of the stomates are not the causes of the recorded whole differences in the rate of transpiration," inasmuch as the rate of transpiration may vary widely with out the accompanying changes in the sizes of the pores; and that guard-cell

plastids containing chlorophyll are physiologically different from those in the ordinary green cells of the leaf. He says: "The function of the chlorophyll in the plastids within the stomates is probably complementary to the secretion of starch by the same plastids, and the ratio between the two functions may, and probably does, vary with the amount of chlorophyll present." It is also probable that the digestion of the starch in the guard-cells is accomplished by a different ferment from the ordinary diastase of the leaf.

It will be observed, therefore, that even with respect to the work of such simple things as stomates there is not unanimity of opinion. Many of the interpretations of phenomena observed by early workers are still taken as correct, but it is just probable that there may be other interpretations that will accord better with the facts.

With regard to the physiology of stomates it is evident from the discussion here presented that much is yet to be known. The same remark may be made with regard to hundreds of other simple matters which have too long been considered settled and outside of the field of controversy.



Training of Teachers in Agriculture

BY PROFESSOR McCREADIE.

IT becomes more evident each year that profound changes are occurring in education. A new duty is being put upon the schools by the state. Training for citizenship now implies more than instruction in the 3 R's. Good citizenship means up-to-date industrial capacity. Every citizen must be a producer; must be trained to help in the development of the natural resources of the state. And as the great majority of our people do not go into High Schools or Colleges to be educated, the public schools become largely responsible for the undertaking.

This new responsibility of the public schools means a new kind of preparation for the teacher. For the carrying out of any scheme of education, the prepared teacher is a prime necessity. In regard to the teaching of agriculture in the public schools this principle has been recognized practically in Ontario for a number of years. In 1893, thirty-four students attended a summer school at this College. In the following year, owing to the subject of agriculture being removed from the programme of public school studies, only seven teachers attended and the work was discontinued after that. With the introduction of Nature Study into the schools in 1904 the work was taken up again, and since then there have been six classes taking three months' courses and five classes taking a one month's course in July. In all, over four hundred teachers have been given

instruction in Nature Study or Elementary Agriculture.

Training of Teachers Elsewhere.

This movement to train teachers specially for rural schools is quite widespread in Canada and the United States. At Truro, Nova Scotia, the teachers in the Normal School receive their instruction in the science subjects at the Agricultural College. In Quebec the teachers of the Protestant schools receive their normal training at Macdonald College in direct association with the agricultural departments. In Manitoba courses in agriculture are to be arranged for teachers at the Agricultural College at Winnipeg. In the State of Wisconsin there are twenty local county normal schools, corresponding somewhat to our model schools, the sole purpose of which is to train teachers for rural communities. In Michigan agriculture is taught in similar county training classes. Normal departments for the special training of teachers in agriculture are established in the New York State College of Agriculture at Cornell University, in Teachers' College at the University of Missouri, in the College of Agriculture at the University of Maine, in the Massachusetts Agricultural College and in the College of Agriculture in Illinois. Special classes for teachers of Agriculture are held also in the agricultural colleges in Connecticut, North Carolina, Washington (State) and North Dakota. In many of the

States the Normal Schools are beginning to train in agricultural subjects. In Oklahoma teachers are obliged to qualify in agriculture; in Florida teachers are qualifying in the subject through reading courses conducted by the agricultural college. The movement is spreading rapidly. Every where there seems to be a desire to improve the rural schools and to raise the status of the rural school teacher. The Federal Government at Washington has been appealed to for financial

agricultural tendency naturally, but in this course, teachers were given instruction leading to a certificate in elementary agriculture and horticulture.

The work to be undertaken this spring marks a new advance. The Department of Education will send us two classes for a ten weeks' course. The teachers in these classes are chosen from those who have taught already on third class certificates and in consequence are eligible for gradua



FIRST TEACHERS' CLASS IN AGRICULTURE.

support in making the undertaking in the normal schools of the United States, a national movement. One bill in this behalf has been defeated, but hopes for success are still held by many interested in the betterment of rural conditions.

Teachers' Courses at the O. A. C.

The first teachers' course in formal agriculture was held last summer (1908). The work in Nature Study has always been marked by a strong

tion from their normal school training on the first of April. All the travelling expenses of the teachers-in-training will be met by the Government and board provided free at the College. For this the teachers pledge themselves to teach in Ontario schools for a period of three years along the lines of their special instruction here.

The classes will receive instruction in Elementary Industrial Arts and Elementary Agriculture and Horticulture. It is expected that about fifty

students will take the former work and about one hundred and fifty the latter. In both cases special certificates will be awarded and afterwards special grants paid for carrying on the work in the schools of the Province.

Elementary Industrial Arts.

Both towns as well as the country are considered in the scheme. The teachers training in Industrial Arts are expected to go into the graded schools of the villages and towns and introduce a form of elementary manual training. At the present time manual training, on account of expense, is largely limited to the schools in the cities and larger towns. These teachers will take part in the general work of the graded school and as opportunity offers direct the art work, constructive work, drawing and woodwork throughout the grades. The aim is to bring, in time, to every pupil in our urban schools a training in the elements underlying mechanical and manufacturing employments. In this connection great stress will be laid on drawing."

"Every workman should for the most part be able to conceive clearly and accurately in his own mind the shape of everything he may have to make or to work with. This makes it the first condition of skill that he should master shape in his own mind and that mastery requires him to be a geometer."

The instruction in this course will be carried on in the Manual Training Department under Professor Evans. Teachers who wish to advance in this line of work will have the work of this term accepted towards a specialist's certificate in Manual Training.

Elementary Agriculture and Horticulture

The needs of the country schools will be met in the course in Elementary

Agriculture and Horticulture. It aims to acquaint teachers with the outstanding principles and practices of successful modern agriculture and horticulture, such as they may use in their school work; it seeks to fit teachers for teaching in country schools as a special line of educational work, to the end that the country school may adequately sympathize with and direct the life interests of country boys and girls. In preparation for this instruction will be given in every department of the College, but special emphasis will be laid on Field Husbandry, Horticulture, Botany, School Gardening, Physics and Entomology.

The Teaching of Agriculture in Rural Schools.

The question of the practicability of teaching agriculture in the country schools is a somewhat complicated one. The solution lies much with the teacher. At the present time it must be acknowledged that there are only a few teachers gifted or equipped for the work, and in most cases it would be unwise to impose the undertaking upon the schools at large. Another factor in the problem is the nature of the agriculture to be taught.

It has been shown that the subject does not lend itself very well to instruction by means of a text book. It must be largely of an informal and experimental character, and always simple and fitted to the other school work. It may be very well taught in conjunction with the geography or arithmetic for example. And often good lessons may be given quite apart from formal class work in the teachers daily walk and talk with her pupils.

The testimony of some of the teachers who have been trained here may be of interest in this regard.

Through correspondence I have

learned something of the benefits of the course to the teachers themselves and their use of the instruction in the classes in their own schools. In reply to the question "Has your work as a teacher been changed in any way by your summer's work?" I have received replies from several such as the following:

"My summer's course has given me renewed interest and inspiration for this year's work. * * * Agriculture subjects seem to crop up everywhere, especially in geography."

early life to scorn the farm and all its connections. I formerly taught agriculture from a text book. I have ceased that, I hope, forever. * * * I formerly taught it because I was obliged to, now because the pupils are too enthusiastic to let me miss a single lesson."

In reply to the question "What instruction have you been able to give to your pupils in Elementary Agriculture and Horticulture this fall?" I have received several interesting replies. The possibility and desirability of introducing the work into the schools is clearly



SCHOOL GARDENING.

"Yes, I think my work has been changed; we now seem to look more for the **Agricultural** side. I find the instruction of use in all subjects."

"Although raised on a farm, I now look upon agriculture in a different light. I see that to-day it is not only necessary that farmers should know 'how' but that the 'why' is a very important factor in success. I am more fully convinced than ever that a great amount of the work taught in the average public rural school is of little use and that too often the boy is led in

indicated. One who teaches in a dairy district writes:

"Next week I am having a judging contest on a dairy cow with my scholars. We use the regular score card used at Guelph, and the boys take great interest in the work. This is followed by oral and written language lessons on '**An Ideal Dairy Cow.**'"

Another who teaches in a country where general farming obtains writes:

"I have given instruction this fall in preparing soil, drainage and the planting of bulbs. A number of pupils have

begun growing hyacinths and tulips of their own; have given illustrated lessons on budding; have had a series of very interesting lessons on the 'Care of Milk for Home Use and for Creamery Use.' The subject of Bacteriology was especially helpful here. Have had a number of collections of weed seeds made; have succeeded in making most of my pupils acquainted with many common weeds in this locality."

The Teachers' Limitations.

The intention of the course may be very easily misunderstood. It is not to be expected that the young women who will attend our classes for ten weeks will take their places in the farming communities as experts in agriculture. Their first school duties will still lie in teaching children the ordinary subjects of reading, writing and arithmetic, geography, history and English. But what may be expected of them, is that they will understand the meaning of all the common phases of farm life and work; that they will hold ideals before boys and girls and direct energies and interests that will make for better agriculture and better citizenship.

The outline of work in Field Husbandry and Dairy Husbandry will suggest the character of the instruction given throughout.

Field Husbandry (20 Lessons.)

Importance of field crops in the national economy; system of farming; rotation of crops; fertility of soil; cultivation of the land; classes of farm crops; uses of farm crops; varieties of farm crops; selection of plants; selection of seeds; improvements of crops by means of selection and hybridisation; practical tests in connection with

Experimental Union; study of work being done in experiments with farm crops in Canada and in the United States.

Examination of field crops on neighboring farms; the work on the experimental plots; farm crops in the school garden; the agricultural museum; laboratory study of the root development of farm crops; types of seeds of grains, grasses, clovers, roots and fodder crops.

Animal Husbandry (5 Lessons.)

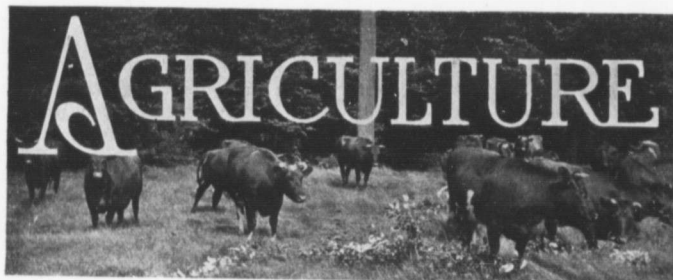
Development, importance, status of the industry in Ontario; histories and characteristics of principal breeds of live stock; types; stabling and care. Study of college stables and herds; exercises in judging with score cards.

The lessons will be given in ninety minute periods, and as far as possible accompanied by practical demonstrations. The teachers will leave us informed of the possibilities and best methods in farming.

In their exercises in School Garden they will have the opportunity of working out practically many of the things in which they receive instruction. The teachers will not be sent away with merely book knowledge. The work will, in all its branches, be based on observation, experiment and practice.

The movement is in its experimental stage. Mistakes will undoubtedly be made. But through the effort, it is hoped, to have in Ontario better schools and better teachers, and in consequence our boys and girls given better chances for happy, useful lives.

In this effort the Province of Ontario is a pioneer. This may be our consolation if success is not attained and our pride if it is.



Founding the Pure-bred Herd

BY ROBERT MILLER.

IT is now nearing the century mark, since the improvement of the cattle in Canada began, and in looking over the past, knowing something of the difficulties, the discouraging experiences and the many mistakes that have been made by the most successful, we do not wonder that there is still much to do.

The lessons learned by such experiences were necessary that we might know how to avoid errors in the future, but many have them to learn yet, so I am writing this to try to teach those that prove apt scholars in a way that will not cost them so dearly as has the education of many of us that have for years given our time and our ability to the work.

Perhaps, the chief mistake that has been made by those who would be cattle breeders or improvers, was that of wishing to found a herd and make from it a profit the first and each following year, regardless of the effect on the herd itself. More of us have been cattle dealers or speculators than real breeders as the term should be applied. Many herds have been well started, perhaps with intentions good

enough, to continue for a lifetime, but the desire to get some returns seized the man and there was no gainsaying that desire until it was satisfied. Many such herds have been weakened by the best being sold because they could be sold the easiest and for the most satisfactory prices; this policy started is difficult to stop. There can be but one result, the owner of the herd handicaps himself in such a way that he can never be in the race, and his herd becomes commonplace, he becomes discouraged, and the herd is dispersed without attracting the attention of breeders and with poor results to the owner.

Another experience that has been a common one in Canada, and, I presume, all countries where cattle are bred, is that of buying good females, paying for them with a liberal hand, but failing to get a head for the herd that is suitable. How often do we see this happen? Some of the best herds in the land have been literally spoiled in this way. Every man with a bit of necessary instinct to make a breeder knows that a good bull is half the herd, and it has been said more than once

with a lot of truth, that a bad bull is the whole herd. It is impossible to account for the failure in so many instances to provide the sire worthy of the dams with which he is to be mated. This mistake applies to the breeder of commercial cattle as well as to the breeder of a pure herd. I cannot account for it, nor have I seen a man that could. The first sire used should be as good as you can get, the following sires should be better than the first, for the more you improve your herd the more difficult it is to further improve it. The best herds in the land are hard to improve, they are even hard to keep up to their present standard, because of the difficulty in getting sires that are better than the herd. The two most successful breeders in Great Britain have the most trouble in finding sires for their herds. Price is no object with them, but the form must be there, and it must have been there for many generations in every branch or the defects will show up in the offspring, and a decline instead of improvement will take place in the quality of the herd. A herd of cattle long established, bred for many generations by the same man, with the same object, must, if good judgment is used become valuable and impressive when used on other herds. If bred with poor judgment, the longer time they are thus bred, the more dangerous they become, for they will have as much influence for bad as in the former case for good. The first way is what makes a good pedigree, the second is what makes a pedigree worse than none.

A third and costly mistake is often made in buying the foundation females. The usual way is to buy one from each of the different herds, or from some man that has collected them

from different herds. Each one has perhaps been bred by skilled men, but with different ideas and they may be of different types, though all of recognised good types, each would perhaps in such a case need a different sire to suit them. The man to succeed with such a herd would require supernatural ability, something that cannot be found and should not be expected in an ordinary mortal. In time he may get control to a certain extent, but a much better way would be to buy the females from one man, where they have been bred for many generations if possible, and at the same time try to get some of the ideas that have been used in breeding. When getting together your herd, do not hesitate to ask the opinion and the assistance of the most successful man you know, take the advantage of his life's work and experience, even if you have to pay for it, the investment may be the best you have ever made.

No poor man can afford to keep a poor cow, no man is rich enough that he can afford to keep a herd of them. Buy the best you can, keep them well, not all in show form, but give them plenty of good satisfying bulky food, be sure that it is clean and well saved. Study their wants and how they can be improved, and never rest until you have carried out your decisions, under such conditions, failure has never been known. A good herd of cattle will keep you, you will not have to keep them, they work while you sleep, every pound of product from them sold, leaves your farm richer. You should send your produce to market on foot, where brains count, and you do not have to sell your raw material, where you have to compete with the whole world.

Extensive Poultry Culture

BY M. C. HERNER.

WHILE the poultry industry is considered a very important asset of the Province of Ontario at the present time, yet it has not reached such a stage of development that entire farms are devoted exclusively to poultry raising. The demand for the various products of the poultry yard is entirely supplied by the fanciers, the small breeder and the farmer, the extensive commercial poultry plant being as yet a thing unknown in this province.

The industry depends entirely upon the actual value of poultry and eggs. Its future is identical with the human race, accumulation of wealth and increase of population means a corresponding increase in the production of these food products. The development of this industry in the United States is largely due to these conditions.

The foundation upon which the structure has been reared is egg-production—the tap-root of the industry and the chief source of profit. Broiler raising and roaster production have been its outgrowth, bringing with it the strong demand for pure-bred poultry. The various branches combined entered upon production on a more extensive scale. Poultry farms commenced operations in different parts of the country, some being the result of years of steady growth, adding stock, buildings and equipment as the business demanded it, until they became firmly established as poultry farms. Others again were launched in the very beginning as poultry farms. Some of the farms have made a very

marked success of the business while others have failed—the why of success and the reason for failure being apparent in most cases. A good location is one of the essentials of success, as eggs and poultry can be disposed of profitably at nearby markets with very little cost of transportation. Where a plant is engaged in all the special lines of production this is of great importance.

Generally speaking, poultry farms are not measured by their acreage, but by their capacity for hatching, raising and marketing the stock. The majority of plants are so located as to be in close proximity to the leading markets that they may have a ready sale for their various products. There is always an excellent demand for eggs, broilers, and roasters in the larger cities; and many of the larger plants are catering to private trade in those cities.

Rearing ducks and chickens on the same farm on an extensive scale is considered a very good combination. Ducks can be reared successfully on the same ground year after year, while chickens on the other hand, require a change from year to year. More ducks can be reared on one acre of ground than any other kind of poultry. They are comparatively easy to raise, and are remarkably free from disease. The demand for market ducks is not so strong as it is for market chickens, but a certain class of people once educated to eating ducks will become permanent customers. By this method different poultrymen have built up an extensive



NIAGARA FARM.

trade in market ducks amounting to thousands of dollars annually. The profit in growing ducks for market is larger than that derived from the production of broilers and roasters. The labor and the equipment required in rearing and fattening ducks is considerably less than that required to rear chickens, but the amount of feed required is far greater.

A general survey of the conditions existing on a poultry farm where both ducks and chickens are raised on an extensive scale will give some idea of the vastness of the enterprise. The main features of a poultry farm are the location, the housing and the equipment, the stock, the feed, and the labor. The first of these has already been touched upon and needs no further comment.

In taking up the question of housing and equipment, we find a wide difference of opinion as to what kind of buildings should be used, but on a purely commercial plant where poultry is raised for the profit derived from it, economy seems to be the chief aim. In other words this means simply, cheaper and durable construction, as

such buildings serve the purpose just as well as the more expensive ones. The incubator cellar and the brooder house for chickens can be located in one building, using the basement for an incubator cellar, and the upper story for a brooder. Pipe brooder systems are used on all large farms. Separate brooder houses are required for ducks, since their habits are entirely different from those of chickens. Open sheds provide shelter for the growing and breeding ducks during the summer, and the cold duck brooder houses form the winter quarters. Chickens can be housed on two systems—the colony house and the continuous house system—each having its advantages and disadvantages.

The breeds and varieties of poultry kept on a poultry farm depend largely on the market demands. White Leg horns, or a cross between these and the White Wyandottes produce excellent broilers. For the production of eggs alone the White Leghorn is doubtless one of the most profitable breeds. For roasters, a large, quick maturing bird is required, which will dress out a nice plump carcass. The larger and

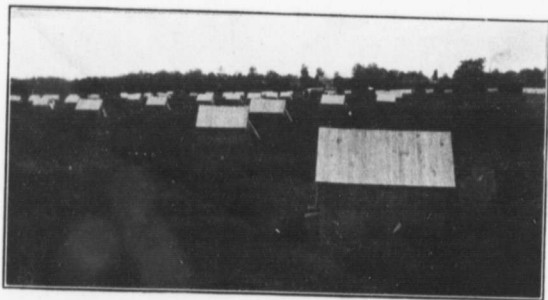
heavier breeds usually produce the best capons. As a market duck the Pekin stands in a class by itself. It is hardy, vigorous, and quick-maturing, making most economic gains and producing meat of excellent quality. Where the breeding stock is all pure-bred and of high-class quality, quite a number of birds can usually be sold for breeding purposes.

Another phase of the industry which is developing very rapidly, is the selling of chicks which are from a day to two weeks old. Such chicks can be safely shipped to any distance, and generally give good satisfaction to the purchasers.

A plant having an annual capacity of upwards of 50,000 ducks and 30,000 chickens, requires an enormous amount of feed. This is bought by the carload, and wholesale prices are paid for it. Corn meal, bran, low-grade flour, wheat screenings, and cracked corn are usually bought in this way as they form the greater part of the ration fed on any poultry plant. Among the prepared poultry foods are the various brands of chick feed, beef scrap, pork scrap, bone meal, oyster shell, and grit. Besides these a large quantity of green cut clover is fed, in fact one-half

of the bulk fed to the growing ducks is composed of green clover cut fine and mixed with the meal ration. Finely cut clover hay is usually fed to the laying hens to stimulate egg-production. The entire meal ration is fed to the ducks as a wet mash; while the meal fed to the laying hens is fed as dry mash with an occasional change to wet mash to increase the egg yield. A system of feeding, which is largely followed on poultry plants, is to hopper feed all grain and dry mash. This does away with a large amount of labor that would otherwise be required to perform the feeding operations.

The care and management of poultry on a poultry farm, form one endless chain of work. There is not a single day during the entire year when the business is at a standstill. The work divides itself naturally into different branches. There is the same division of labor as in any other business. The three most important divisions are the hatching, the rearing, and the fattening. Competent men have charge of each of the branches with such assistance as they may need to carry on the work properly. Marketing the stock is usually in the hands of the manager



NIAGARA FARM.

who, as a rule thoroughly understands the market conditions.

By far the most complicated part of any of the divisions is the incubation. Although artificial incubation is not so successful as it might be, yet this is the only resource for the men who must rear market poultry on an extensive scale. Since the demand for market poultry continues during the entire year, holiday and the early spring trade being usually the heaviest, it follows that the natural method of incubation falls far short of the requirements and the use of the incubator becomes an absolute necessity to produce

chickens that will supply the demand for market poultry at any time of the year.

The feeding and management of the young stock, until they reach market size, is not so complicated as the hatching, but nevertheless just as important. On this practically depends the success or failure of a plant. The poultryman who is able to keep the mortality at a low per cent. and can raise the birds economically and put them on the market in prime condition, has taken a long step towards making extensive poultry keeping pay.



VERITABLE "GOLDEN HOOF," AS PRODUCED BY SKILFUL BREEDING AND MANAGEMENT.

Experimental Spraying

Spraying is recognized by the fruit growers of Ontario as one of the essential operations in the production of high grade fruit. Since it is of economic importance, the aim of the fruit grower is to obtain the maximum returns at the minimum cost, and as a result a great deal of work has been carried out along practical and experimental lines, to demonstrate the value of this important operation. The object therefore of last season's work in connection with the horticultural department here, was to test the comparative value of various home-prepared and commercial insecticides and fungicides.

Of the increasing numbers of commercial spraying preparations now up on the market, the following, along with various home-prepared mixtures, were tested; Niagara brand lime and sulphur for winter use on dormant wood, Niagara brand lime and sulphur, for summer use, V1 and V2. The last two being carbolic preparations prepared by an English firm.

In the trials with the Niagara brand lime and sulphur washes, they gave excellent results, which go to show that under certain circumstances and conditions they may prove valuable preparations, especially for the small fruit grower, where he has not sufficient orchard to make it pay to put up a boiling plant. When applied as directed by the manufacturers, these washes cost, everything considered, about the same as the home-prepared lime and

sulphur washes; but according to chemical analysis, there is only from one half to two-thirds as much combined sulphur, as in the home-prepared washes. Hence to be of the same value they were applied one-third to one-half stronger than recommended, and thus increasing their cost. The wash for winter use when applied to dormant trees, with only two-thirds the dilution recommended, wiped out the oyster-shell scale wherever the wash came in contact with it. The summer wash when diluted to one-half the recommended strength gave equally as good results. This was applied in June when the young scale was running.

Self-boiled lime and sulphur wash is gaining more or less favor in some fruit sections, as a summer wash for fungus diseases. As it is only in the experimental stage, it is impossible to predict its range of usefulness; but in the tests here last season the results indicate that it may be a valuable preparation for the control of apple scab. By the use of self-boiled lime and sulphur wash, the russetting of apples due to the effects of Bordeaux mixture would be avoided.

The preparations V1 and V2, which were claimed to destroy all plant pests and even remove the loose bark, did not prove equal to the claim. The tests with these preparations were far from being effective, and in only one instance did they appear to give any appreciable results. They were the

only materials used on one row of apple trees, and the only result at all noticeable was in the case of the oyster shell scale, where a very small proportion appeared to have been destroyed, but on the other hand, they had no effect upon Codling Moth, Tussock Moth, Aphids, Tree Hoppers, etc. When V2 was tested upon green house tomatoes, and cucumbers, the results were equally valueless, even when applied at twice the recommended strength. Partial results have been obtained elsewhere with V1 on San Jose scale, when it was applied five times the recommended strength, a fact which prohibits its economic use.

Bordeaux mixture, in the experiments with Potato blight, Leaf spot, Scab, etc., gave its established good results. In one experiment with Bordeaux and a poison, the value of Lead Arsenate as compared with Paris Green was clearly shown. The Lead Arsenate is held in suspension longer, adheres to the foliage longer and forms a more even coating over the leaf with the Bordeaux than does the Paris Green. In a few days after applying with the

Bordeaux and Paris Green, minute specks of the latter could be detected here and there on the foliage, while the Lead Arsenate formed an even coating which remained on the foliage throughout the whole season. Resin Bordeaux which consists of a resin preparation added to the Bordeaux, was tested on onions and asparagus, for the purpose of noting its ability to adhere to smooth, glossy leaf surfaces, without collecting in large drops. Immediately after applying, the preparation was subjected to several heavy rains, which had little or no washing effect on it, thus demonstrating its value.

No special mention has been made of Bordeaux mixture, or home-prepared boiled lime and sulphur wash, owing to lack of space and to the fact that the importance of using, and value of these preparations are continually being impressed upon the minds of fruit growers, through the medium of all our horticultural publications. To spray with success requires a knowledge of the active principal of the remedy, as well as a knowledge of the pest which is being combatted.

W. D. Jackson.

Brief Notes on the Influence of Muriate and Sulphate of Potash on the Culinary Value of Potatoes

Before giving an account of certain experiments, performed for the purpose of determining the influence of Muriate and Sulphate of Potash on the cooking value of potato tubers it seems advisable to write some brief notes on the standards used, both in North America and France, to estimate

the culinary value of the tubers and on the different zones and cellular structures of the potato tuber, which doubtless regulate the estimate of quality.

In North America, people estimate the cooking quality of tubers upon considerations of starch. A potato which is white in color and which breaks

into a glistening flour when cooked, is the most desirable for table use; and with a potato, contains as a rule a high percentage of starch. On the other hand, the estimate of quality in France, is based upon the nitrogen content of the tubers. A potato which is yellowish in color, soggy and retains its shape when cooked, is one that is in great demand for the table; and such a potato is poor in starch and high in nitrogen.

These differences in taste arise mainly from the fact that potato tubers, both in Canada and the United States, are usually boiled for table use, while in France the tubers are usually fried in deep lard.

But, let not the above differences in taste mislead us when determining the culinary value of a tuber, because, if the percentage of starch is low, the probability is that the tuber did not develop properly and grew under adverse climatic or soil conditions.

The potato tuber, is made up of a large number of irregular microscopic cells, each of which is surrounded by a cellulose cell wall, and it is in these cells that starch granules are found.

Coudon and Bussard, two French scientists, name the four zones in which the potato tuber is divided, as the skin, the cortical layer, the external medullary and the internal medullary layers.

The skin is dry in appearance, and usually more or less greyish-brown in color.

The cortical layer is slightly colored, and when the tuber is exposed to sun light for a certain length of time, this layer turns green and the potato gets a rather unpleasant taste.

Both the external and the internal

medullary layers form the flesh of the tuber.

The irregular microscopic cells of which the potato tuber is made up, contain the starch granules, and when the potato is boiled these granules expand with the heat.

If the cells contain a large number of starch grains, when these latter ones expand, they cause a greater or less amount of pressure against the cell walls causing them to burst, which results in the exposure of the starch grains. This causes that mealiness so much desired in tubers by North American people. On the contrary, if the cells contain a very small amount of starch grains, the expansion of these latter ones fails to rupture the cell walls, and the tuber remains entire after being boiled.

During last year and part of this, certain experiments were performed with two varieties of potato, "Early Michigan" and "White Elephant," for the purpose of determining the relative degree of cooking quality produced in the tubers, by the use of Muriate and Sulphate of Potash.

The potatoes were grown in rows, some of which were fertilized with Muriate of Potash, others were fertilized with Sulphate of Potash, and a few of them were left unfertilized for the purpose of comparing results.

Four potatoes were selected from each row. One of the potatoes was tested, whole with skin on, a second one was peeled and tested whole, a third tuber was cut into halves and one of the halves rejected, a third one was peeled, cut into halves and one of the halves rejected.

The cooking tests took place at the Horticultural Department, three persons being present when the tests were

performed. The results obtained with one variety are given below, similar results having been obtained with the other variety:

From the results given below, it was concluded:

1st. That the culinary value of the tubers fertilized with Sulphate of Potash, was by far superior to that of those tubers unfertilized or fertilized with Muriate of Potash. The flavor and mealiness of the tubers fertilized

No. of Row	Fertilizer Used	Amount of Fertilizer	Variety	Mealiness 40	Flavor 40	Appearance 20	Total 100
1	Muriate of Potash.	145 lbs.	Early Michigan	35	34	18	87
2	Muriate of Potash.	290 lbs.	" "	36	34	18	89
3	Sulphate of Potash	145 lbs.	" "	39	38	19	96
4	Check row.....	0 lbs.	" "	36	35	18	89
5	Sulphate of Potash	290 lbs.	" "	39	39	19	97
6	Muriate of Potash.	145 lbs.	" "	39	33	17	89
7	Sulphate of Potash	145 lbs.	" "	38	37	18	93
8	Nothing... ..	0 lbs.	" "	37	35	18	90

with Sulphate of Potash were exceptionally better than the flavor and mealiness of those tubers unfertilized or fertilized with Muriate of Potash.

2nd. That potato fertilizers in which Potash is used as an ingredient, must contain Sulphate of Potash in preference to Muriate of Potash.

Ganzalo Diaz.

Experiments re. Whey Butter.

These experiments were conducted in the Kerwood Cheese and Butter Factory, the largest factory in Western Ontario. The total receipts of the factory for 1908 were \$60,126.46. The make during the year was 98,698 pounds of cheese; 186,080 pounds of creamery butter and 1,850 pounds of whey-butter.

The average price received for the whey butter was 21 cents per pound, or 3 cents less per pound than finest creamery butter. The whey butter, if made properly, is a marketable product. The best method of making whey butter is to cream the whey as soon as possible after drawing it off the curd. The development of acid in

injures the color and flavor of the whey butter. The whey should be warmed at a temperature over 100 F. The whey cream should be pasteurized, and then immediately cooled down to a low temperature, 40 or 50 F. and held at this temperature until churning time. The cream should be held at a low temperature at least five hours before churning in order to thoroughly firm the fat globules. Just before placing the cream into the churn from 15 to 25 per cent. of a pure lactic acid culture should be added. Better results were obtained by churning sweet cream with culture added just before churning than in cases where the cream was ripened. When making

white cheese the whey butter has to be colored. In making colored cheese no butter color is used.

The average loss of fat in the whey was .23 per cent. for the season of 1908. The loss of fat in the creamed whey was .02 per cent. In some cases only a trace of fat could be found. The experiments proved that a rich cream gives the best flavored butter. When a rich cream is taken the addition of cultures gives a cream which churns quite readily. Pasteurizing the whey cream improves the flavor of the butter.

The average loss of fat in the butter-milk for the season was 5 per cent. This is quite high, but it is accounted for by the fact that in some of the experimental work the loss was very great. Whey butter does not contain so high a water content as creamery butter. The average moisture content of the whey butter for the season was 13.11 per cent. The experiments show that on an average 2.5 pounds of butter can be made from 1,000 pounds of whey.

Whey butter will stand storing as well as creamery butter, but there is no advantage in storing such butter. It should be used when fresh for local trade, and in supplying cheese factory patrons. Many patrons prefer whey butter to creamery butter, especially when the price is 3 cents below creamery butter.

Before an individual or a company purchases a plant for the manufacture of whey butter, several things must be taken into consideration. The feeding value of the whey is reduced, and this must not be overlooked. According to

experiments conducted at the Ontario Agricultural College by Professor G. E. Day, the feeding value is reduced almost one-quarter or 25 per cent. The cost of a plant would range from \$600 to \$1,200, according to the machinery already in the factory. If a factory is equipped with winter butter making machinery then the cost would be quite small.

An ordinary small barrel churn will be sufficient to churn the butter made from 1,000 pounds of milk. The extra labor needed, the fuel required, the expense of marketing, salt, packages, etc., and the wear and tear on the machinery are points to be studied before deciding to manufacture whey butter.

From the experiments conducted it is safe to say that the manufacture of whey butter would not be profitable for a factory that was handling only 1,000 pounds of milk per day, assuming, of course, that a separator and necessary equipment would have to be purchased. Each individual concerned must estimate for himself the minimum supply from which it is profitable under his conditions to manufacture whey butter. The cost of manufacturing one pound of whey butter under Kerwood conditions is seven cents, which is lower than in most cases, as creamery butter is made throughout the year, and cheese is made for from six to eight months each year. At seven cents per pound there is no profit whatever for the manufacturer. The percentage which the maker will get for making whey butter will depend on his agreement with the patrons in question.

W. M. Waddell.

Horticulture

The Outlook for Apple Growing in the East

BY B. S. PICKETT, M.S., PROFESSOR OF HORTICULTURE, NEW HAMPSHIRE COLLEGE, U. S.

PART II.

IN Part I. of this article, I have endeavored to point out the fact that the factors which make for the profitable culture of apples in Ontario, the Maritime Provinces and New England are favorable. Yet, in spite of these favorable factors, and in spite of the fact that apple growing is an old industry in these regions, the business has not been so profitable in many instances as is desirable.

Two things are necessary for the success of the apple growing industry—favorable conditions and suitable methods. If, then, the conditions are favorable, as we believe them to be, the failure to meet with success must be attributed to improper methods. This brings us then to a consideration of the questions which were propounded at the beginning of this article.

Will intensive methods of apple culture replace the hap-hazard methods so long productive of but low average profits? To a very important extent intensive methods are in the writer's opinion going to be a rule in the regions under consideration. Already there are in every important apple growing section in the East, individuals or associations who are giving to their

apple orchards all the care and thought that would be put into any first-class commercial enterprise. Such individuals and associations are rapidly leaving their neighborhoods. A remarkable instance of the fact that example is better than precept in this respect is seen in the County of Norfolk, in the Province of Ontario. Six years ago there were but four men probably in that county who believed in intensive methods of orchard cultivation, and who had the faith to back their belief by their acts. These were Mr. Johnson, Mr. Kidd, and Mr. Fick of Simcoe, and Mr. Dwight Deming of Vittoria. At first the methods used by these men were more or less crude, but so striking was the success of at least three of them that their neighbors began to adopt the same methods. Through the efforts of Mr. Johnson, a fruit growers' association was organized. The members of this association were required to give certain prescribed attention to their orchards, and to pack and ship apples of good quality. To-day, probably one-half the orchards of that county are being given a very considerable degree of care, and many who are not members of the association have been obliged to adopt

the methods of the association, or lose the sale for their fruits.

In the East even where good methods of cultivation have been adopted, there is a notable lack of attention to the problem of fertility in apple orchards. As time goes on, more and more stress will be laid upon the fertilization of apple trees. Some of the results which have been obtained by the use of high grade chemical fertilizers, by the plowing under of cover crops and by the application of stable manure are very striking. The more this question of orchard fertility is studied and the more concentrated the efforts to produce high-class fruit, the more will the orchardists realize the importance of this matter.

Another matter of deep concern to Eastern orchardists is that relating to the age at which trees come into bearing. Apple trees in Colorado and in Washington and Oregon bear heavy crops when from eight to ten years old. The writer has seen 15 and 20 bushels of high-grade apples produced on nine year old trees in the State of Colorado, and as many as 40 bushels produced on trees 14 years of age. It may not be possible to duplicate these yields

in the East, and yet it seems highly probable that if the same intensive methods of cultivation which prevail in the West be applied to the East, we may at least approximate these splendid results. The yellow transparent tree shown in the illustration accompanying this article shows by no means an unusual instance of early and heavy bearing in an Eastern orchard. This tree was not given especial care, but only ordinary cultivation and fertilization. One of our illustrations shows a young apple orchard as it is commonly started in the East. This orchard was set eight years ago and not more than one-fourth of the original trees remain. The trees now planted upon it vary in age from seven to one year old, showing that it has been necessary to replant every year since the orchard was first set. Such methods are bound to pass out of vogue. They are a loss in time, money, patience and everything which goes to make for profitable apple growing.

Will spraying become the rule and not the exception in the East? This question has already to a considerable extent been answered. There is not an important apple growing territory



There is no reason why Eastern Orchards should not be as well cared for as Western Orchards.

in the region under discussion where spraying is not more or less practiced. So long as we have attacks of insects and fungus diseases, so long must we fight them, if we are to produce fancy grades of fruit. Spraying has proved to be the most important single means of control for the most important insects and fungi of the orchard. It is

development of their trade in compounds used for spraying. One year ago the writer recommended home made preparations of arsenate of lead rather than goods prepared by manufacturers. To-day, at least one very important and reliable firm is manufacturing arsenate of lead for a price which nullifies the recommendation of



Thorough cultivation, careful spraying, low heading of trees, a fertile soil, and confidence in the business result in crops like this in Oregon. Trees about ten years old.

an essential that orchardists no longer regard lightly even when they fail to use it. The enormous number of firms who manufacture and sell spraying machinery, and who send out larger and better catalogs from year to year is an indication of the importance which spraying is assuming in the orchard world. Several of the more important manufacturers of chemicals are devoting especial attention to the

a year ago. The reason for this is the simple fact that the manufacturers of insecticides and fungicides are finding sale for enormous quantities of their goods and have found it profitable to put the price within the reach of those who wish to use these preparations on a large scale.

Will the box package replace the barrel? This is a mooted question among growers, commission men and

all who are interested in the apple business. The commission men on our large city markets for the most part hold steadily out in favor of the barrel. In fact, so strongly do they advocate the barrel that the writer has come to believe that there is a special menace to the commercial men's business in the introduction of the box package. It is in the interest of the commission man to handle his goods in as large package as are readily salable, his commission being larger and his profit greater on the handling of large units than on small. Moreover, it has been found that the growers and shippers of high class box goods dictate their prices and thus leave comparatively little latitude for any methods of sale which bring large profits to the commission men.

Growers are of two minds regarding the box package. Those who are making a speciality of apple growing as a rule favor the plan. Better prices are obtained for first-class apples packed in boxes. The price of three boxes is approximately the same as that of one barrel. The greater skill required in packing the box is offset by the ease with which boxes are handled and by the larger prices obtained.

It is probable that the box will not drive the barrel from the Eastern apple trade. The West can afford to send only its best apples to the Eastern markets on account of the high cost of transportation. The East can afford to market not only its No. 1's for fancy trade, but its poorer grades for less fancy trade, and these poorer grades can be put up to better advantage in barrels than in boxes. Moreover, there is always a demand for first-class apples packed in barrels and the barrel has

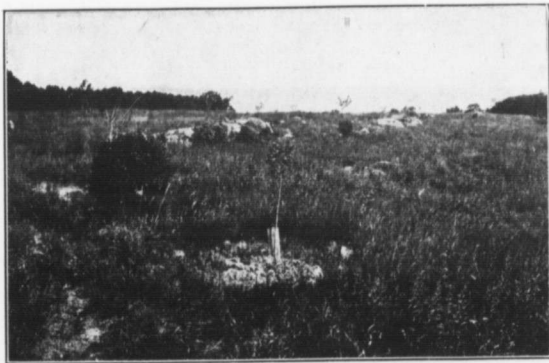
certain advantages for shipment by boat that the box does not possess. It permits better ventilation. Barrels can be rolled rapidly from place to place, whereas boxes must be carried on trucks or by hand. Fruit does not bruise so readily in barrels that are carelessly handled as in carelessly handled boxes. The barrel is a stronger package. For all of these reasons, therefore, it would seem that the box and barrel will probably work side by side, each to the advantage of the other. However, be it said that there is no question that the box has come to stay in Eastern apple orcharding, until such time as its excessive cost renders it prohibitive, and when this time comes, the barrel, too, will have passed from the trade.

Must we find cheaper packages than barrels or boxes, or must some method of rating or disposing of such packages be devised? This question is thrown out with the idea of being suggestive, rather than with the intention of attempting to answer it. The price of barrels and boxes is slowly but steadily increasing. Wasteful methods of using lumber have largely reduced our resources for box and barrel material. While there is no immediate famine in these materials in sight, it seems likely that some substitute for wood must sooner or later be devised, or that barrels and boxes must be handled some what as egg cases are and returned to the shippers after the contents have been used.

Will the East ever supply as fancy fruit as the far West or must Eastern apples become merely a standard for cooking, evaporating and cider stock, while the far West grows our dessert fruit? Provided the East fails to produce so fancy an apple as the far West,

will the advantage of proximity to market and export points more than compensate for the difference in quality of the fruit? There has been much said regarding the superiority of the flavor of the Eastern grown apples to those grown in the far West. That Eastern apples are superior in flavor is pretty generally admitted, but unquestionably this superiority has been very much overrated. When we in the East found that our customers were buying Oregon Spitzenburgs in pre

apples. Let it be remembered that much of the reputation of the apples grown in the West is dependent not on the apples themselves, but on the advertising ability of land companies, Western promoters, railroads and steam lines in that region, and Eastern apple growers are only helping these "boomers" when they acknowledge any marked superiority in beauty of Western over Eastern fruits. The West does not produce and has never produced an apple more beautiful in color



Why Young Orchards in the East come into bearing so slowly. This Orchard was set eight years ago and contains trees from one to eight years of age. Very few of the original trees remain.

ference to our own apples, we said that it was on account of their greater beauty that people purchased them, and that in a short time their sale would fall off. But the buyers are re-buying. Competition for Western products is keen and the Western apple trade looms up brightly. The quality of the Western apple is sufficiently good to insure their sale.

In the writer's opinion the Eastern apple growers have made, and are making, a serious mistake in admitting the superior beauty of Western grown

ing than the McIntosh as grown in the East. The Eastern Baldwin is richer in color than the Baldwin grown in the West. Sutton beauty, Northern Spy, Red Canada, Johnathan, Grimes and many others take on as rich and handsome colorings and grow to as large a size under favorable conditions in the East as under favorable conditions in the West.

When the East gives the attention to cultivation, fertilizing and spraying that the business of commercial apple growing warrants, it will produce a

large proportion of apples, as beautiful as those produced in the West, and of a quality which will be at least somewhat superior to that of the West.

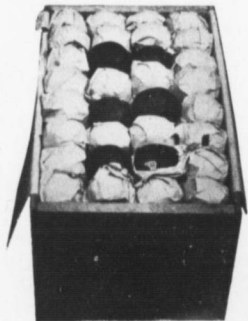
But while it can unquestionably be fairly and truly held that the East can and will produce apples of the highest grade and quality, it must be said that it will also produce very many apples of mediocre character. So long as the apple business is confined at all generally to the average farmer, this must be true. The time will never come when all the farmers over any area so large as that to which this article has reference can be induced to adopt intensive methods of cultivation and spraying. Those who do not adopt such methods will continue to supply our cooking and evaporating fruit.

Will apple growing in the East pass out of the hands of the farmers into those of specialists, who will rent farm orchards, plant and grow large commercial orchards, establish cold storage houses and generally take over the business of apple production and marketing? The production of first-class apples seems very likely to become a business enterprise for specialists. There is no reason why farmers should not become apple specialists and many of them are devoting their attention to the business of apple growing to such an extent that they have much of the knowledge and the same opportunity to apply it as has the specialist. If this class of farmers be included with the specialists, we can answer the question in this manner. More and more the supply of high grade fruit will come from the orchards of specialists. A careful study of the situation reveals the fact that there is an increasing number of men who are taking up apple growing as a commercial venture.

The wonderful revival of country sentiment among the urban population, especially of the United States, is resulting in the starting of commercial orchard enterprises at numerous points throughout New York and the New England States. Many wealthy business men are retiring from city vocations to country estates, and are taking up orchard ventures as a pastime, or as a means of support during old age. Other men like Mr. Hale, of Connecticut, and Mr. Powell, of New York State, have developed the business along money making lines and have made enormous commercial successes of it. Large companies are being organized in many instances to plant and develop orchard lands and these companies are employing specialists to manage their business for them. Many instances might be quoted from the Province of Ontario, where men have rented farm orchards on leases of from five to ten years and have then handled these orchards in accordance with intensive methods. In the middle west, this system of renting has been developed to such an extent that from 1,500 to 2,000 acres of orchard are sometimes found under the control of one man, as in the cases of Senator Dunlop, of Champaign, Illinois, and Mr. C. H. Williamson, of Quincy, Illinois.

Will co-operative apple growers' and shippers' associations save the situation, or help solve the problem of successful apple growing in the East? In concluding this discussion of the outlook for apple growing in the East, a brief consideration of this question will be in order. Much has been said in favor of co-operation and much against it. The success of a co-operative enterprise depends very largely upon the character of the two or three

men or the single individual who may be responsible for its management. In union there is strength. If the interests of the growers or shippers be closely allied and the organization be founded on wise principles and does not undertake to cover too large a field, co-operative associations will probably be a success. The West has made a success of apple growing almost entirely because of the wise organization of growers and shippers. Organizations are rapidly becoming a success in the Province of Ontario.



Packed by Students at the New Hampshire College. The East is learning the lesson of the boxed fruit from the West.

There are some successful organizations in New York. The writer knows of none immediately connected with apple growing or fruit growing in the New England States that are in successful operation, and it may as well be stated that the business of apple growing in the New England States is less profitable than in any of the other regions mentioned. While it is not fair

to attribute this fact to the lack of organization, it is at least fair to assume that organizations will do much to improve the conditions.

It is not the province of this article to enumerate or expand upon the advantages of co-operation. One phase, however, of the subject that has during the past two years strongly appealed to the writer should be touched upon here. There is an altogether unreasonable variation in the price paid for apples from year to year. The law of supply and demand does not account to any considerable extent for this great variation. Three or four things largely determine the price. First the element of speculation among the rich buyers. Second the character of the crop reports circulated from government and commercial sources. Third, storage and shipping facilities at shipping points. Fourth, the character of the season and the keeping quality of the crop at the time of maturing. Factors of less importance in determining the price, are cost of storage, cost of transportation, local labor problems, etc. The one factor which has almost nothing to do with the selling price is the grower's own opinion as to the value of his crop. In large commercial enterprises outside of agriculture, the determination of the selling price of commodities is never left to the dealers or the consumers. It is at this point that co-operation must step in, to study the market, to determine reasonable prices for commodities of fered and to provide in many cases suitable storage and shipping facilities.

THE O. A. C. REVIEW

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Editorial

By an Alumni Association we mean an association to which any graduate or ex-student would be eligible for membership. How to begin or how to organize would perhaps be the next question raised. The present graduating year after graduation or the graduates and ex-students at the Experimental Union could start the ball rolling.

A reunion could be held annually either in Guelph at the time of the Winter Fair, or at Toronto during the Exhibition. The success of the undertaking would depend largely upon the secretary and the other officers which would be appointed. Good live men would be necessary to make it go.

The Review could be used as the official organ and the Alumni Editor could keep in close touch with the organization and its work, and make announcements and spread information

for it generally. There are in the Province of Ontario about 2,000 graduates and ex-students; enough to form a strong association.

The objects of the association would be many and varied. It may seem to many who are now here that most people know much of the College, its work and its advantages, but very many indeed know little or nothing of the benefits to be derived from a course here. An Alumni Association could do very much indeed in talking up the College and in interesting others.

Again, many graduates are not in close touch at all with other graduates, and to come together occasionally to talk over things of common interest would result in much mutual benefit. Another way in which an association of this kind could make itself felt and could do much good would be in taking up the needs of the students here and making an organized endeavor to

have those needs supplied. Our stock judging team is seriously handicapped by not having the breeds here to judge and become acquainted with that they meet when they go to Chicago. There they are competing with men who are familiar with every class of animal met with.

Again, we are strongly in need of a covered rink. The miserable failure this past winter of an open air rink to meet the demand for ice ought to be sufficient evidence in itself to demonstrate this fact beyond a doubt. If an association could be formed now with wide awake officers who would look after getting a large membership enrolled—the fee need not be large—and if every member could be made acquainted with our needs, then he in turn could discuss the matter with the member from his constituency at the Legislature. If the Legislators of our Province could be made to know in this way the needs of the students here we believe that they would act more willingly, more quickly and more often.

Personal contact will do more to influence men in the right direction than the writing of catalogues and circulars. We trust that steps will immediately be taken which will lead to the organization of a strong Alumni Association.

If you can convince a business man or a company that advertising pays,

Patronize Advertisers

you will experience very little difficulty in getting him or them to advertise. If, on the other hand, those who do advertise do not see any results from it you will be up against a hard proposition if you approach them to take an advertisement in whatever medium you have to offer. We believe that the students

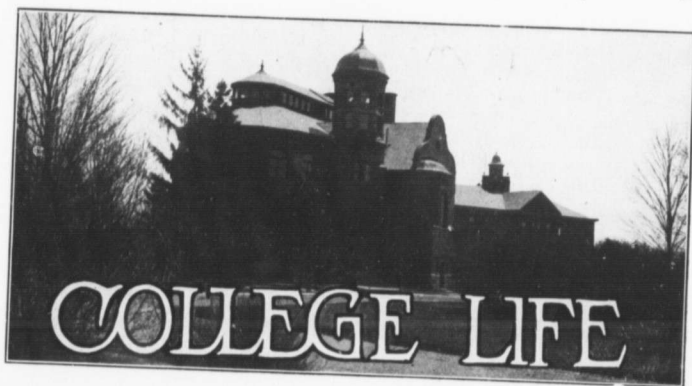
who return to their homes to take up the work again on the farm can do great things for The Review if they will, where possible, patronize our advertisers. They can mention the fact that they saw an advertisement in The Review.

Another way in which the students, who will be scattered, can assist us is to write to the firms represented between the covers of The Review for catalogues, circulars and price lists. This may seem a trivial matter but those who have had experience in soliciting advertising for us know how much easier it is to talk to a man who has just received a few inquiries from those "who noticed his advertisement in The O. A. C. Review." As stated before it may seem a small matter, but if every reader of The Review would act in this matter it would work wonders and immensely assist the Business Managers when starting on their rounds next fall to solicit advertising.

There has come to our hands a copy of the "Report on the Reforestation of

Waste Lands of Southern Ontario." This report is splendidly illustrated and deals with the forest problem of Southern Ontario in a clear, concise and interesting manner.

The question of reforestation is of prime importance to the Ontario farmer and it is high time that a united effort be made to solve this forest problem. In this report a policy is outlined for the solution of the problem. We would strongly advise all who are interested to send for a copy to the Department of Agriculture, Toronto. It is prepared and submitted by E. J. Zavitz, Professor of Forestry, Ontario Agricultural College.



SPRING is here again; Nature has awakened and again growth develops with relentless vigor. The cheer of May brightens even the most pessimistic, and diffuses a feeling of optimistic comfort for the future, even for a college graduate or under graduate.

The Seniors are on the home stretch—a path strewn with midnight lucubrations and treasured remembrances. May success attend their four years' endeavor to obtain the scarlet scarf—the most cherished reward to be won by a college graduate.

The Juniors, Sophomores and Freshmen have gone to their respective homes, or some are engaged in other fields of labor. Wherever ye be forget not that you have been a student at the Ontario Agricultural College, and now you should be fitted for better work. Help those who are in the dark, assist all those whom you may come in contact with and endeavor to show all the light of education.

If you have caught the true college spirit you will do this unconsciously—a second nature will have seized you,

which will influence others. If you remain at home next year keep in close touch with the College and strive at all possible times to do credit to your Alma Mater. Even though you are often confronted by the rather abrupt and awkward question, "What did you learn at the Agricultural College?" remember that the dignity of a calling is its utility.

A Presentation.

An estimation of the esteem for a fellow-companion is usually indicated by a manifestation of brotherly feeling when such a person is about to leave. We have been very unfortunate indeed in losing our popular physical director, Mr. W. R. Reeds, who enters medicine at 'Varsity next fall. While here, Mr. Reeds made many friends but no enemies. He developed athletics wonderfully at this College during his sojourn of two years with us, and by his untiring labors and willingness to help others he has secured a warm place in the friendship of every student. A champion athlete himself and always in the game for the pure love of the

sport, he had a refining influence morally as well as physically.

Just before Mr. Reeds left he was presented with a pair of military brushes, as a slight token of our appreciation of his services, and we feel satisfied that in any sphere of work Mr. Reeds will ever be the wholehearted, honest, conscientious man and an outstanding example of a true athlete.

Visitors.

On Friday, March 19th, we were visited by the graduating class of the Toronto Veterinary College, under the guidance of their President, Dr. E. A. Grange. The Vets. were formally received in Massey Hall by the student body, President Creelman acting as chairman.

Our President threw open the doors of the College to our visitors and assured them that we were always glad to have with us men who belonged to Toronto University. President Creelman outlined briefly the work being done at this College, showed its gradual development and pictured optimistically the future of the Veterinary College.

Dr. E. A. Grange, President of the Veterinary College, replied on behalf of the visitors, and said that he had looked forward to this visit and from his own experience with our institution he was certain that they would not be disappointed. He spoke of the work being carried on at Toronto, and held bright views regarding the future of veterinary work.

Mr. C. C. James, Deputy Minister of Agriculture, made a very impressive speech. Mr. James begged everyone to make the best out of their college course and leave here with the true spirit of progress instilled in every

mind. He also referred to the growth of our College, from the time since he was connected with us until the present, and expressed the hope for a similar advancement for the Veterinary College.

The students spent Saturday visiting the various departments, and all seemed to make themselves thoroughly at home while here.

Literary Society Notes.

A meeting was held on April 3rd for the purpose of electing the officers—honorary president, president, secretary and treasurer—for the fall term. The Union Literary Society is an invaluable organization and it is necessary that the best available men be appointed to the positions.

Mr. D. H. Jones was elected honorary president, and Mr. O. C. White was elected president. These men are capable of handling the society in a most efficient manner.

Mr. P. O. Vansickle was chosen secretary, after a close run, and Mr. W. Toole was appointed treasurer.

A vote of thanks was tendered the retiring executive, which was expressed by a hearty applause.

Remember—Your co-operation is absolutely essential for the obtaining of best results. Every college organization is just what you make it. Think, have you done your best while here. Come back prepared to offer suggestions. Don't have to be coaxed to do your share. We are in an Inter-College Debating League next term, and we must make a good showing. Don't let it be said that college spirit will be on the wane at the Ontario Agricultural College, but rather have it said that college spirit is a prominent feature in our College.

A New Appointment.

Since the departure of Mr. C. C. Thom, B.S.A., the position of Demonstrator in Physics has been vacant. An appointment has been made filling this position. Mr. R. R. Graham, B.A., has commenced his duties on the department, and judging from his past work and record, no doubt Mr. Graham will continue to be a painstaking, affable man, capable of filling this position, efficiently. Mr. Graham is thoroughly acquainted with the College, understands student life, having been Dean of Residence for some time, and possesses the required qualities of a successful teacher. We wish him every success in his new field of work.

Y. M. C. A.

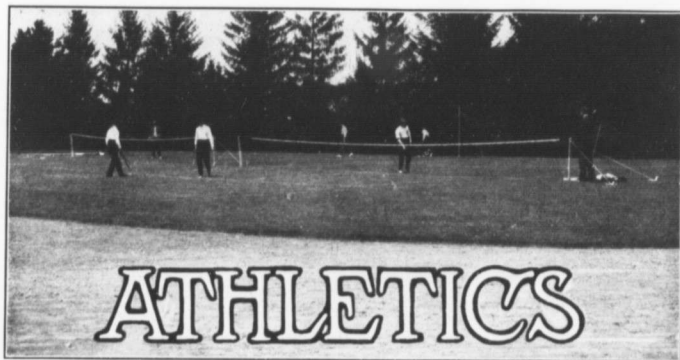
That the study of the Bible is part of our education is a truth requiring no discussion. This is the era of Higher Criticism, when all eyes are turned to watch the development of the new school of thought.

On March 11th, Professor Reynolds

favoured us with a paper entitled "Modern Interpretation of the Old Testament," and he discussed, in a scholarly manner, the Bible as a work of literature, explaining forcibly and clearly what we should consider the underlying principles, essential to a correct interpretation of the Scriptures. This splendid address, with some additions, will be published in booklet form and will be ready for distribution next fall.

At the last meeting of the term, Professor W. H. Day delivered an address on "Attitude." He discussed the various attitudes of students from the standpoint of the faculty, pointing out the importance of industry, thoroughness, honesty and interest in all college matters. Careless, loose, lazy habits were denounced, forcibly. The relation between our present college life and our future life was tactfully pointed out, impressing upon us the importance of always possessing an unwavering attitude.





The Athletic Concert.

IT is saying not a little when we assert that our annual athletic concert is one of the best entertainments provided by the students of this institution. That the programme furnished is of a very high standard is attested by the fact that on such occasions the large gymnasium is always packed to the doors by audiences whose criticisms have never been anything but favorable.

Our last entertainment held on Saturday, March 20th, was generally conceded to be even an improvement on former occasions. Credit for this is due Mr. Reeds, the physical director, and the members of the athletic executive whose capable management of the affair, in a great measure, decided its success.

The exhibitions on the mat, German horse, parallel bars, and horizontal bar by the various members of the gym team, gave evidence of much preparation, and the pyramids in which the whole team took part, were exceedingly well carried out. The collapsing pyramid was especially good, and it

won the hearty applause of the large audience.

The Swedish drill by the Macdonald girls was a pretty feature of the evening's entertainment and reflects a great deal of credit on Miss Davidson, the leader. Every movement of the girls was in perfect harmony with the music, and the grace and ease with which they carried out their parts was truly characteristic of the Macdonald girls.

The fencing, boxing and jui-jitsu exhibitions pleased the audience greatly, and to judge by the eager way in which they watched the contestants, one would think they were witnessing real professional bouts, for the deciding of world's champions.

Fain gave an exceedingly clever demonstration of bag punching. His work was quite out of the ordinary, and the rapidity with which he made the inflated bag bounce to and fro in every direction was a revelation to many.

A pleasing event of the evening was the presentation of the Pringle Cup by Professor R. Harcourt to Mr. A. M.

Shaw, winner of the indoor sports meet.

The rendering of two selections by the college orchestra made a pleasant variation of the programme, and the country dance given by the boys, for which a number of them assumed the dress, habits and manners of bewitching country damsels, brought a close to the entertainment, and sent the crowd home in that joyful, satisfied frame of

The champion of the day was A. M. Shaw, whose all-round work was a feature. He therefore becomes the guardian of the new Pringle Cup, and it only remains for him to continue his good work next year in order to become its permanent possessor.

A. A. Toole was a close second to Shaw, and his making of two new records was no mean accomplishment.



FOURTH YEAR BASKETBALL TEAM—WINNERS OF THE INTER-YEAR SERIES.

mind that comes of having received for once at least full value for their money.

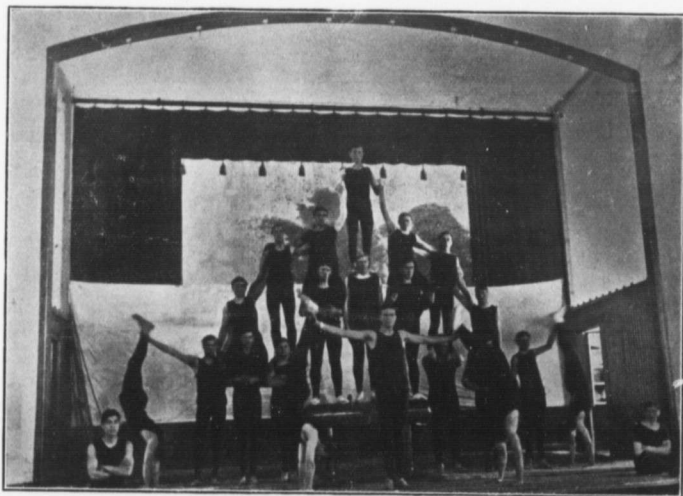
Indoor Meet.

Our annual indoor meet, held on the afternoon of March 17th, was in every particular a success. There were many entries especially from the first and second years, and there was a keen fight for first place in nearly every event. Six records were broken, and many of the newly established ones look good enough to stand for many years to come.

The aquatic events were the first to be run off. Harries and Ryan were the winners, the latter making the first new record of the day, when he won the "50 yards swim" in 36 seconds. Harries also set a new mark in the "long plunge," and his performance will be a difficult one to excel. In the "relay race" the freshmen showed their heels to the other fellows, and won handily. The remainder of the programme brought out some exceptionally good work. Moore, after two close contests, won the "potato race" and the

"shot put" (under 140 lbs.). Fay captured the "rope climb," Manton the "broad jump," and Harley the "chinning contest," the last named being a record. Cooper just managed to beat out McKillican in the "high kick," and Black added another victory to his credit in "putting the shot" (over 140 lbs.). Shaw took the "fence vault" and the "standing high jump," both championship events, and Coglan es

The winning of the various events had a double enchantment for the contestants this year. Miss James, president of the Macdonald Institute Senior Normals honored the Athletic Association by consenting to make the presentation of the prizes, and the applause that greeted each competitor as he stepped forward to receive from her hands the recognition of his victory, was only too plainly due in a great



THE GYM. TEAM.

established a new "running high jump" record. In the last two events, namely, the "pole vault" and "rope vault" A. A. Toole showed great form. His performance in both these events was unquestionably superior to anything of the kind ever seen in our gymnasium before, and it goes without saying that the old records were quite out of date, by the time he had finished his exhibition.

measure to an appreciation of the charming way with which the presenter of the ribbons performed her by no means easy task.

Following are the events and the winners:

Long Plunge—Harries, Marryat, Cleverly.

Relay Swim—1912, 1911, 1910.

Under Water Swim—Harries, Kelso, Ryan.

Fancy Dive—Ryan, Bell-Irving,
Powell.

50 yards Swim—Ryan, Rebsch, Tre
herne.

Rescue Contest—Harries, Bell-Irv
ing, Ryan.

Potato Race—Moore, E. W. White,
Kinnear.

Shot Put (under 140)—Moore,
Toole, Hoffman.

Relay Race—1911, 1910, 1912.

Rope Climb—Fay, Henderson,
Wright.

Broad Jump—Manton, Monk, Web
ster.

Shot Put (over 140)—Black, Hoy,
McRostie.

Chinning Contest—Harley, Wright,
O. C. White.

Hitch and Kick—Cooper, McKilli
can, Monk.

Fence Vault—Shaw, Austin, Cle
ment.

Standing High Jump—Shaw, Pal
mer, Middleton.

Running High Jump—Coglan,
Wright, Shaw.

Spring Board Jump—Coglan, Toole,
McRostie.

Pole Vault—Toole, Culp, Shaw.

Rope Vault—Toole, Fay, Palmer.

The New Executive.

On Monday, March 29th, the elec
tion of officers for next year's Athletic
Executive took place. As the success
of the association depends to a great
extent on the ability and progressive
ness of its officers, considerable dis
cretion should be used in their selec
tion. The following list of representa
tives for the coming year are assur
ance enough that such care was exer
cised, and we may feel certain that not
a thing will be left undone that makes
for prosperity and improvement in the
field of athletics.

Hon. President—Prof. W. H. Day.

Hon. Vice-President—H. H. Le
Drew.

President—A. M. Shaw.

Vice-President—H. A. McAleer.

Secretary—E. W. White.

Treasurer—A. A. Toole.

Football Manager—J. B. Fairbairn.

Hockey Manager—F. M. Clement.

Basketball Manager—W. H. Smith.

Baseball Manager—J. E. Smith.

Aquatic Manager—H. L. Keegan.

Fourth Year Representatives—
Knauss, Kennedy.

Second Year Representatives—Kin
near, McRostie.



Our Old Boys

F. W. Goble, B.S.A., is farming near Woodstock, and is doing all that is in his power to advance the cause of better farming in his locality. He is Secretary of the Farmers' Institute in his county and has recently held a short course in stock and seed judging at Hickson in Oxford County.

Clayton Pettingill, who attended College in 1884, is farming near Wellington in Prince Edward County.

In our last issue we noted that R. M. Winslow was about to leave Prince Edward County to take up horticultural work in British Columbia. For the year previous he had been holding an agricultural course in the Collegiate Institute at Picton and doing organization throughout the county. The esteem in which he was held and the success that he had attained in the short time in which he was at the work was evinced, when, on the eve of his departure a banquet was tendered him at which he was presented with a gold watch.

Winslow is an enthusiast in what ever work he undertakes and we wish him equal success in the work that he is now undertaking.

Chas. Murray, who is Superintendent of the Experimental Farm at St. John's, Newfoundland, reports preparation for experimental work with farm crops. The Experimental Department of the College is furnishing him with different varieties of grains

that are expected to prove of value, to be tested as to suitability for that climate and soil.

The farm is located one mile from the centre of the city of St. John's, and has already two residences, a good horse barn and a suitable cattle barn. There is as yet no main building, but one will soon be erected.

Up to the present time no extensively organized effort for the promotion of better agriculture in the island colony has been made, but we hope that the establishment of this experimental farm is but the commencement of an educational campaign that will prove extremely beneficial to the farming interests of the colony. When, however, we take into consideration the ruggedness of the country, the severity of the climate and the sea going propensities of the people we cannot but think that it will be some time before agriculture will be the leading industry of Newfoundland.

H. G. Bell, B.S.A., who was for some time connected with the Experimental Department at the College, is now Associate Professor of Farm Crops at the Iowa Agricultural College. He has recently taken a two weeks tour throughout the State with a special seed train giving lectures on the cultivation and selection of small grains.

A. H. MacLennan, B.S.A., '08, is in the employ of the Fuller and Rico Lumber Company. He is stationed at

Grand Rapids, and enjoys his work very much.

MacKenzie Robertson, an associate of 1898, better known as "Mac," upon the completion of his two year course, worked in the St. Marys Creamery and was manager for some four or five years. He retired from this to take up instruction work, being one of the Dairy Instructors in Western Ontario. He was one of the instructors in this year's Dairy Short Course.

"Fatty" Wilson, of the same class, began to farm near Hamilton. He retired and is now reading law in Alberta.

R. Wilson, in renewing his subscription to the Review, writes from Tugaska, Sask., and tells us that he is homesteading a quarter section and has bought another 160 acres.

H. Sirett has been appointed to succeed Munro as District Representative of the Department of Agriculture at Morrisburg, Dundas County.

At Mhow, in Central India, on Wednesday, the 24th of March, the Rev. J. Taylor, assisted by the Rev. J. S. McKay, united in marriage Kenneth George McKay and Anna M. Nairn.

K. G. McKay is a graduate of the class of '06, and formerly came from Galt, as did also Miss Nairn.

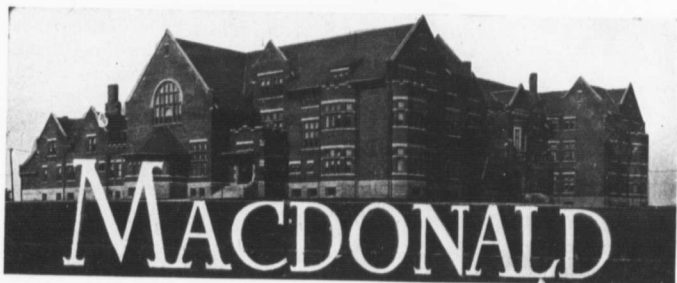
On a Sunday afternoon in the autumn of '99, when nature had gaily painted the verdure golden and red, a

white steed was seen roaming over the College campus taking in the grandeur. Some of the good little boys of '00 who were likewise feasting on nature raided the paintshop and, in glowing colors, labelled the steed "Chumpy" and sent him home. Being warm agriculturists (and possibly, for a change) instead of "painting the town," they painted the horse.

Among those who graduated from this College and received the degree of Bachelor of Scientific Agriculture, in 1896, was N. F. Wilson. On February 27th, Wilson received the degree of Benedict, when he promised to "cherish and protect" Miss McKay till death did part them.

Wilson was the first of our graduates to enter the Dominion House of Commons as a member of that body. In 1905 he was elected by a substantial majority to represent Russell County at Ottawa in support of Sir Wilfred Laurier. On "Pewland Farm," near Cumberland, Mr. Wilson is a successful breeder of Shorthorn cattle and Shropshire sheep, and presents a good example of the value of a College training to a farmer. The Review extends its best wishes to Mr. and Mrs. Wilson for a happy and prosperous life journey.

G. G. White, B.S.A., has resigned his position as Lecturer in Physics and Chemistry at the Manitoba Agricultural College to take up his duties as Secretary-Treasurer of the Carson Hygienic Dairy Company of Winnipeg, of which Professor W. J. Carson is manager.



Ancestral Homes for Canada

BY LAURA ROSE.

DURING the early years of settling and developing a new country, our people could not, and had not the means to plan for homes that would be the pride of future generations. The time has come when we would like to see established homes equipped with modern conveniences and surrounded with well laid out and carefully kept grounds—a home such as the eldest son covets for his own and feels the honor of being its rightful heir.

There is something which appeals to one in the thought that a property has been in the family for generations back. Age and ownership breed into the very bone and marrow of the descendants, a reverence and love, which never can be bought with money, no matter how stately and grand the estate purchased may be.

The establishing of a fine home would counteract the modern tendency to restlessness and a desire for change. In this connection I would like to urge all farmers to give their farms a name. There is something pleasing in the

sound of "The McGregors have lived at 'Bracken Burn' for over one hundred years."

In planning and building let our minds reach into the future, and have some thought for those who are to occupy our lands after us.

In laying out the grounds try to imagine the effect when the trees are forty feet high. May it not be that they will shut off the prettiest view to be obtained. I always feel it takes a stout heart to fell a tree—to slay in half an hour that which has taken so long to reach its present size and beauty. This pain and trouble might be spared by having wisdom in planting. Plant for the future rather than the present. Nothing gives such pleasure as a beautiful, well-planted lawn surrounding the house. Every passer-by enjoys it, and to the visitor from afar it speaks the thrift and culture of the people.

In building let it not be all on the outside for show, but build for the future as well as the present comfort of the family. A well-equipped bathroom

does not cost as much as a large veranda. Better do without the veranda, if both cannot be afforded and let the next generation build it, but by all means put in the bath at the proper time—the time the house is being erected.

Each successive owner should leave behind him something which has added to the convenience or beauty of the place. And so the ancestral home grows and so is the wealth and magnificence of our country residences in

Let the same idea of futurity be carried out in the furnishing of these homes. Let there not be an accumulation of fancy, flimsy things, but rather a few good pieces. A gentleman, an ex student of the O. A. College, and his wife, spent several months not long ago on the continent. Shortly after their return I visited in their home. They talked charmingly of their trip, and in a free and gracious manner showed me the souvenirs they had collected.



AN ANCESTRAL HOME.

creased. One must feel a pride greater than the desire to hoard up thousands in order to do this, but it is a pride which has much to commend it, and one but in its infancy in Canada. This pride should be nourished with care and no envious thought find expression to dampen it.

We may have no direct interest in such an estate, but we share the pleasure and none can deprive us of the delight and a certain local pride we feel in having in our midst such an estate.

Considering their means and appreciation for pretty things, I wondered at the time they had not a great collection, but the more I reflect on their choice, the more I am convinced of their good taste and forethought. Their idea was to have something good, be it useful or ornamental and strictly typical of the place visited—something which could remain in the family and be handed down as an heirloom, from generation to generation. From Florence they have a beautiful marble

statue on a revolving pedestal, the whole about six feet high. In Rome they purchased a couple of fine pictures; in Venice some choice lace; in Naples a handsome coral necklace, and from the Emerald Isle brought home the finest of real Irish table and bed linen.

I have in mind two other homes where the parents, with equal means, took a similar trip. Their parlors, as a result, are cluttered with innumerable, indescribable bric-a-brac gathered from every city and hamlet visited. The collections have very little of real value or lasting interest connected with them, and yet they represent the expenditure of a considerable sum of money.

The prevailing idea of life to-day is to live and labor for the present. The dominant purpose of this article is a plea for an effort which shall give a broader outlook and more lasting result to our work. We are surrounded with things transitory. Our bookstalls are flooded with literature written to catch only the fancy of the public, and to augment the income of the author—not with the same purpose and intent as wrote Milton, Dickens, Shakespeare, or Scott. The old masters labored with out ceasing that they might put on canvas and wall and dome the lasting conceptions of their imaginative minds,

and their paintings are now sought for, and are only obtained at fabulous prices. These artists worked for the future and their reward has come. In the present art-world, as in every sphere of labor, has crept the desire for riches at a sacrifice of the best and most painstaking effort of the artist.

Our houses are often mere shells, our furniture veneer and our clothes shoddy. And yet it is the things which last which gather to themselves value and around which cluster fond and historic memories. Fickle Dame Fashion is responsible to a great extent for the unstable state of affairs, and yet she is but a myth, and the people, her reality. Our strength of character should be such that the things that are good and beautiful and useful shall remain no matter what the decree of fashion may be.

Burke says, "The power of perpetuating our property in our families is one of the most valuable and interesting circumstances belonging to it, and that which tends the most to the perpetuation of society itself. It makes our weakness subservient to our virtue; it grafts benevolence even upon avarice. The possession of family wealth, and of distinction which attends hereditary possessions are the natural securities for this transmission."





Among Ourselves

We are pleased to welcome the new Short Course students among us this term as such an unusually attractive number of girls, and we feel sure that they will prove as agreeable on closer acquaintance as their predecessors. We hope that they will enjoy this pleasant term, and that they will carry away many enjoyable recollections of Macdonald.

Owing to a considerable number of amusements on the other side of the campus, in which the Macdonald girls participated, the Literary Society's meetings were dropped during the latter part of the past term. We regret to state that the progress shown during the last term was not what it might have been. It is the intention to continue the meetings during a part, at least, of this term, and it is to be hoped that more interest will be manifested by the students.

The Last Reception.

'Twas all upon a Friday night
When three men came who felt all
right—
For they had planned to stop in the
Hall,
But if you'll notice—these three were
all.

"What! Only three men!" I hear you
cry.

Yes, listen! I'll tell you why,
Some men who had nothing else to do
Laid plans to stop all, save a few.

Who were bold, and decidedly smart,
For oh! They had longings at heart,
Stepped in and though in a terrible
fright—

Sat down with the greatest delight.

But, as out they were hauled by the
dripping boys,

One was heard to cry in a joyful voice,
That was heard above the awful din—
"Well, anyway, boys, I got in!"

Much Ado About Nothing

Uneasy Lies the Head that Wears a Crown (?)

I.

You may think that it's great to be
head of the Locals,

And put in The Review what you
please,

Without paying cash, you each month
get a copy,

And can get back at your friends,
with great ease.

II.

Some jokes you put in, and you think
they're quite clever,

Some roar and say, "They're all
right—"

But the ones who they're on, are your
enemies now,

And immediately there starts a fight.

III.

Next month you've a new plan, in or
der to please,

You leave out the jokes altogether,
But the Editor's mad as he thinks in
disgust,

She's got no more brains than a
feather.

IV.

Hopeless and weary you try once
again,

Some jokes with no point you put in,
Then the school's in a rage and they
say, "Kick her out."

Such humor is really a sin.

V.

The exams. come along but the jokes
cannot suffer,

You say, "Where are those sleepy
folk,"

As between twelve and one you dash
into their room,

And cry madly, "Kid, give me that
joke."

VI.

The dear kid gives a yell, as she
screams, "Leave my room,"

And you feel a great book strike
your knees;

With head hanging down, you just
reach the door

When the matron says, "Fifty cents,
please."

VII.

Next morn you are limping, and feel
half asleep,

And you face your exam. with great
dread,

You know not a thing and you say
with a sigh,

"I wish I were not Local Ed."

VIII.

Sad and disheartened you slink from
the room,

In the hall with deep feeling you say,
"It's nice to be Ed. of the Locals some
times,"

But I question again, "Does it pay?"



Miss F.—If I had let the horse go
by itself it would have gone right into
the wall.

Miss Y.—It must have been wall
eyed, then.



The conductor of the orchestra has
recently captured a new recruit who

is filled with love for his dear——
drum. ◊ ◊

Mr. — (looking at sheath gowns in
a fashion book).—So these are what
they call 'shield' gowns, are they?
 ◊ ◊

**For We Are In The Midst of 'Foods,'
Watch and Pray.**

I.

Hushed was the room and quiet
Save for the Proctor's stealthy tread,
As nearer she came and nearer,
Our hearts sank down like lead.

II.

And when at last before us
The fateful paper lay,
How well did we remember
The hymn that began the day.

III.

Some tore their hair in blank despair,
Some chewed their pens in rage,
Some looked as if the end had come,
And none in all looked sage.

IV.

Compositions by the score,
Oh! What was our dismay,
As each one thought on what she'd
plugged,
She questioned, "Does it pay?"

V.

And when at last we finished,
And hastened to the fray,
After making threats galore,
Miss Watson was away.

—G. F.

THE GOAL OF LIFE.

There is a beauty at the goal of life,
A beauty growing since the world began,
Through every age and race, through lapse and strife,
Till the great human soul complete her span.
Beneath the waves of storm that lash and burn,
The currents of blind passion that appal,
To listen and keep watch till we discern
The tide of sovereign truth that guides it all;
So to address our spirits to the height,
And so attune them to the valiant whole,
That the great light be clearer for our light,
And the great soul the stronger for our soul:
To have done this is to have lived, though fame
Remember us with no familiar name.

—Archibald Lampman.



The Parable of the Hairs

The Juniors and Soph's went forth to grow—moustaches. And as they grew:—the moustaches—some grew upon sandy soil, and behold a crop of ginger threads sprang slowly up; and the name of that grower was Mr. Smith.

Others beheld the light through alkali soil, and, behold, there was nothing to behold or to hold, for the growth was weak, though desire was strong; and lo, the name of that grower is the name of the man whom we stoop to behold.

Yet other fuzzy matter struggled for existence in close proximity, and just above, a gasometer, and the continuous outpour smothered them in their weakness, and there were Shawly none to be seen.

But others sprouted in good black muck upon the face of a worthy Sophomore, and behold a mighty crop of twenty-four hairs sprang up, and lo,

the darkness was as the night of Egypt.

Some brought forth twenty, some eighteen and others four and one-half hairs, and withal there was a mighty yield. But there came a day when the harvest was finished and the hairs had found a resting place in the soil.

Nevertheless it was shown that the labor of the Juniors and Sophomores was not in vain, and even greater crops lie hidden on their faces.

◇ ◇

English Exam.

H. (quoting from Julius Caesar)—Pindarus! Hold thou thy breath whilst I do run upon it.

◇ ◇

Moorhouse—Ah! Would that I might stay this summer, with all those ladies coming to our Alma Mater.

◇ ◇

Fair Agriculturist (contemplating the water tower)—My! What a large henhouse!

HA! HA! HA!

"Well, I'm blest! So this is one of those so-called metal roofing guarantees I've read about," laughs the Wise Man of Metal Town.

"It certainly is a good joke, for it doesn't really guarantee anything to anybody, and isn't legally binding. Ask your own lawyer and you'll find I'm right."

"Stripped of all its exceptions and provisions I don't see how anyone could be serious about it."

"I go by what I know has been done, not by what is promised. For instance, I know that 'Eastlake' Metallic Shingles have been in use for twenty-five years right here in Toronto, where they're made, and that those same shingles are in perfect condition now."

"Just listen here a minute, I'm getting serious now. The Metallic Roofing Company began to make metallic shingles years before anyone else in Canada. They were made right when they were first made. The Metallic Roofing Company have been continually making new designs for ceilings and walls, fronts and cornices, but as for shingles they have never seen an improvement on the 'Eastlake' steel shingles which have been made, laid and proven for twenty-five years."

"I've noticed that most metal shingle manufacturers change their pattern so frequently that I'm led to believe they, themselves, haven't much confidence in their own goods. Yes, they even change the name to cover up some weakness in a previous product."

"I'm prejudiced, you say? Of course I'm prejudiced, but it's a prejudice found-



ed on years of active use of the metallic goods made by The Metallic Roofing Co. It's an old man's prejudice based on a long experience."

"Write for booklet which tells more about 'Eastlake' Metallic Shingles. They are sure proof against fire, lightning, rust or weather in all climates. They are the easiest and quickest to put in place and the most durable when laid. If you send the measurement of any roof, an accurate estimate of cost will be sent free."

—The Philosopher of Metal Town.

"TWO OTHER PERSONS' SAY-SO'S"

The Metallic Roofing Co., Limited, Toronto, Simcoe, Ont., April 9th, 1908.

Dear Sirs:—"We have handled your 'Eastlake' Shingles for nearly a quarter of a century. They have been on the Court House, Free Library and other public buildings in this town for 18 years. We have used very large quantities during the past 25 years, and they have always given first-class satisfaction, and have never required any repairs."

(Signed) MADDEN BROS.,
Tinsmith and Hardware Merchants.

The Metallic Roofing Co., Limited, Toronto, Lucknow, Ont., April 9th, 1908.

Dear Sirs:—"I take great pleasure in testifying to the good qualities of your 'Eastlake' Shingles. We put your painted shingles on our Town Hall here in 1885, 23 years ago, and although they have only been painted twice since that time they are in good condition yet. I consider the lock on the 'Eastlake' the very best, and believe that a roof covered with the galvanized 'Eastlake' will last forever."

(Signed) THOS. LAWRENCE,
Hardware Merchant.

The Metallic Roofing Co. Limited
Toronto Winnipeg
Agents wanted in some sections
Write for details, mentioning this paper.

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



Farmers and Feeders Listen



The following are the analysis of our feeds, as given by the Ontario Agricultural College, Guelph, Ont.:

Sample.	Moisture.	Protein.	Fat	Nit. Free Ex.	Fibre.	Ash.
Schumacker	12.75	12.31	2.64	59.55	9.76	3.08
Victor	13.10	9.91	1.78	61.92	10.71	3.48
Banner	11.54	11.38	2.11	65.37	7.23	2.37
Molac Dairy	7.37	14.87	4.68	56.65	11.01	5.36
Compare these with the common feeds fed on the farm:						
Bran	11.95	15.69	4.14	53.13	9.24	5.85
Corn	10.30	7.47	5.26	74.10	1.26	1.51
Oats	11.00	11.80	5.00	59.7	9.5	3.00

After giving a careful and exhaustive study of feeds for the production of beef and milk for a number of years we are able to put upon the market feeds that give a maximum profit at a minimum cost to the feeder.

The Ontario Agricultural College has been using Molac Dairy feed for the past year and their herdsman recommends it very highly.

When buying feeds for either beef or milk ask your dealer for our brands and accept no substitute.

QUAKER OATS CO.,

Peterboro, Ont.

Note.—Digestive experiments were made at the Ontario Agricultural College this winter, the results of which were given in the April number.



Farmers and Feeders Listen



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

The Gallant Eight.

We love them, we love them, and who shall dare

To keep us from loving their golden hair.

Not even the menace of basement rears
Shall keep us from loving Macdonald dears.



Professor W.—Mr. Present, what made you place this animal first?

J. E. P.—He's so small, I felt sorry for him.



Stafford (at dinner table)—Why does Frier remind a person of an old familiar hymn?

Fellows—We don't know! Why?

Stafford—He's always "Looking this way."

**DUNLOP THRESHER
BELTS**

also Garden Hose, Rubber Tubing and every variety of rubber supplies used in agricultural and dairy machinery.

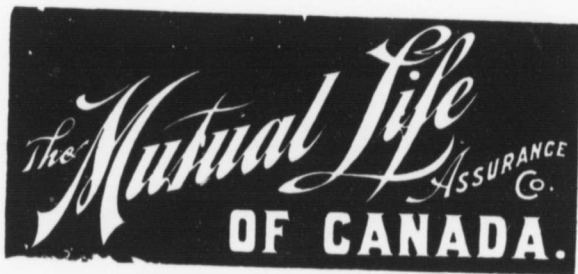
The Dunlop Trade Mark,
the two hands is the seal
of quality in rubber. £ 2



**The Dunlop Tire and Rubber
Goods Company, Limited**

Agents and Dealers throughout Canada

CANADA'S BIG MUTUAL!



A Sound Company for Sound Policyholders

Insurance in Force	- - - - -	\$51,000,000
Assets, all first class	- - - - -	12,000,000

GEORGE CHAPMAN, General Agent

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

a \$3,000 Stock Book Free

Contains 183 Large Engravings

This book cost us over \$3,000 to produce. The cover is a beautiful live stock picture, lithographed in colors. The book contains 160 pages, size 6½x9½, gives history, description and illustration of the various breeds of horses, cattle, sheep, hogs, and poultry. Many stockmen say they would not take five dollars for their copy if they could not get another. The finely illustrated veterinary department will save you hundreds of dollars, as it treats of all the ordinary diseases to which stock are subject and tells you how to cure them.

MAILED FREE. POSTAGE PREPAID.

Write for it at once and answer the following questions:

- 1st—Name the paper you saw this offer in.
2nd—How many head of stock do you own?

ADDRESS AT ONCE.

International Stock Food Co.
TORONTO, CANADA,

Sole Manufacturers of

INTERNATIONAL STOCK FOOD THREE FEEDS FOR ONE CENT

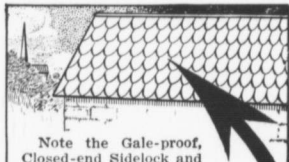
INTERNATIONAL STOCK FOOD, 3 FEEDS FOR ONE CENT, is a purely vegetable **MEDICINAL** preparation composed of roots, herbs, seeds, barks, etc. It is equally good and very profitable to use with horses, colts, cattle, cows, calves, hogs, pigs, sheep or lambs, because it purifies the blood, tones up and permanently strengthens the entire system, keeps them healthy and generally aids digestion and assimilation, so that each animal obtains more nutrition from the grain eaten. In this way it will save you grain and **MAKE YOU LARGE CASH PROFITS**. You don't spend money when you feed **International Stock Food**. You save money because the **GRAIN SAVED** will pay much more than the cost of the **International Stock Food**. Refuse all substitutes and get paying results by using only the genuine **International Stock Food**.

THREE FEEDS FOR ONE CENT

Dan Patch Mailed Free

When you write for Stock Book mentioned above ask for a picture of Dan Patch 1:55, and it will be included free of charge.

International Stock Food Co.
TORONTO, CANADA.



Note the Gale-proof, Closed-end Sidelock and the continuous overlapping and interlocking bottom lock which are found only in the new

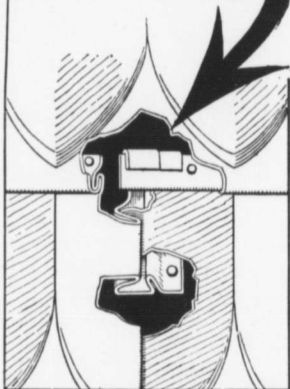
"GALT" SHINGLES

This ingenious and yet simple and easy-fitting construction makes a "Galt" Shingle roof absolutely weather-tight. It prevents wind from driving rain or snow up and out of the top end of side lock, as so often happens with ordinary metal shingles. There is not even the smallest opening—this cannot be truthfully claimed for any other steel shingle.

The material is the Best British Galvanized Steel embossed in a bold Gothic Tile pattern—"a thing of beauty and of joy forever." Catalog "B-3" gives complete details of this newest and best shingle.

THIS IS THE SHEET METAL AGE

The Galt Art Metal Co., Ltd.,
Galt, Ont.
Sales and Distributing Agents:
Dunn Bros., Winnipeg and Regina.



FENCE TALK No. 4

Before you buy any fence—even Page Fence—make it prove up its value. Then you'll know what you're getting. Test it two ways, thus;

Have the dealer cut for you, before your eyes, a piece of horizontal wire from the roll of Page fence and any other fence. Now for the fire-test. Heat both pieces cherry-red; cool them in cold water, and start to bend them.

The Page wire will have taken such a temper that after breaking off a piece the fresh end will cut glass—because it is "high-carbon" steel that takes a temper. That proves its toughness, its hardness, its power to stretch farther, stay tighter, and sag never.

The other wire will bend like copper wire—because it is only hard drawn steel, that won't take a temper. That shows it up as soft, weak—breaks at 1,800 lbs. compared with Page wire that stands 2,400 lbs. tensile strain. Shows it up, too, as sure to sag, hard to make tight, certain to give out sooner by far.

And then the eye-test—look at the locks of the other fence. Have the man give you one to cut apart. Study it where the wires cross; look for marred surface where the cross comes—that means weakness. Then look at the cut-apart Page lock—positive, cannot slip a little bit, shows no sign of squeezing or pinching.

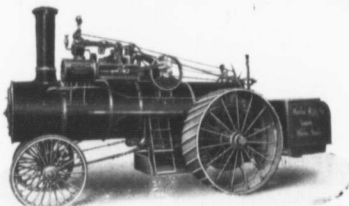
Look, too, that the running wires are wavy enough to allow amply for expansion and contraction—as the Page does.

Last, the third test—the cost-test. A Page Fence stands up and stands tight on two posts to any other fence's three. Figure the fence-posts saved, digging labor saved, and the time saved in putting up the fence.

Apply every test—and you will choose Page Fence every time. Send now for valuable free book that teaches how to make sure of fence value before you buy. Write for it to the Page Wire Fence Co., Ltd., Walkerville, Toronto, Montreal, St. John, Vancouver, Victoria, and find out why.

"PAGE FENCES WEAR BEST"

WATERLOO ENGINES AND THRESHING MACHINERY



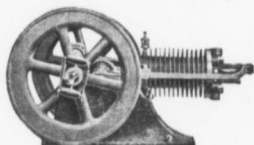
The most popular line in the Dominion and used by all progressive farmers and threshermen. We always have on hand **REBUILT ENGINES**, either portable or traction, in which we can offer you exceptional values.

Shall we send you our new Catalogue?

The Waterloo Manufacturing Co. Ltd.
WATERLOO, ONTARIO.

A Feeling of Security

of absolute *Reliability* and *Power* is enjoyed by every owner
of a



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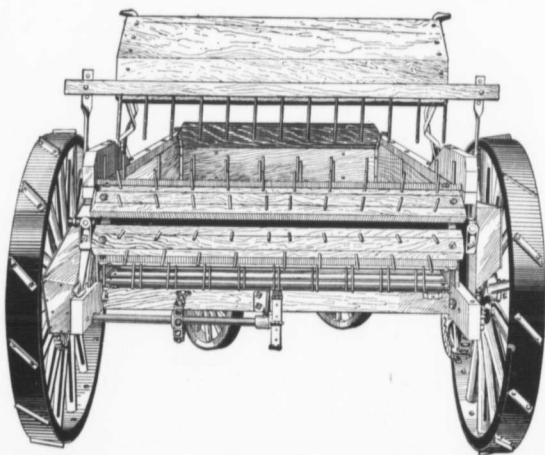
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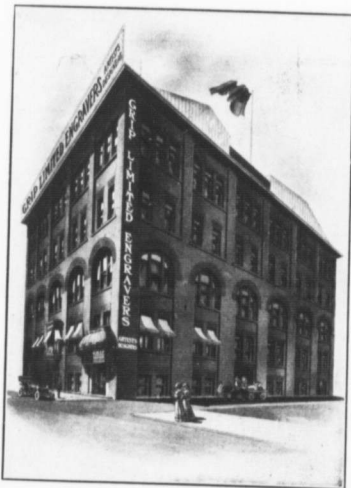
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