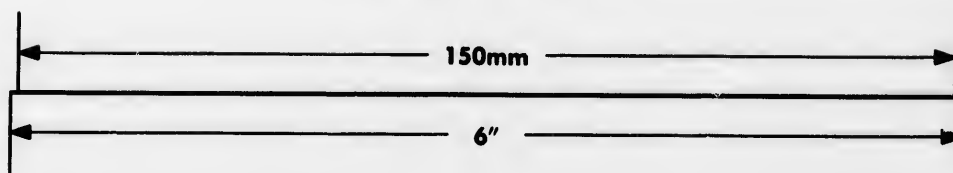
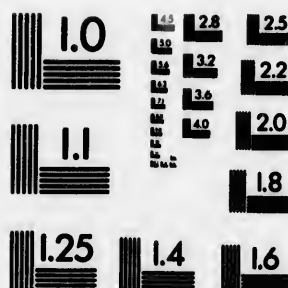
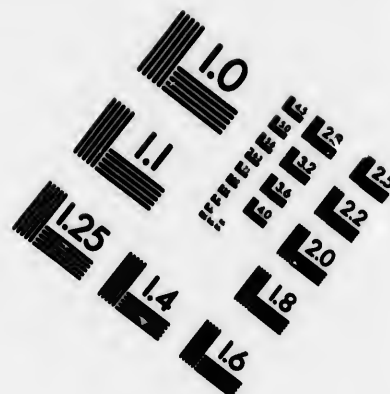
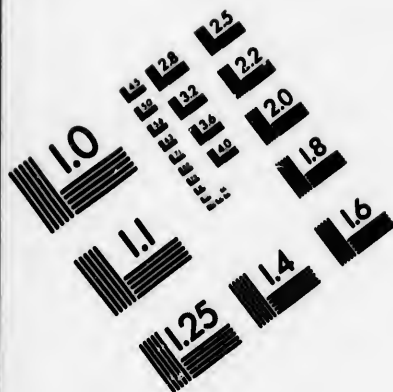


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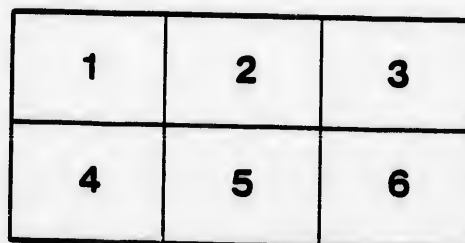
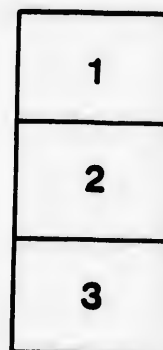
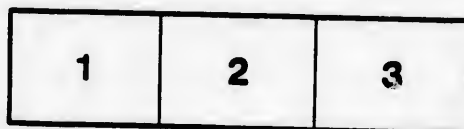
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(Reprinted from the Annual Report for 1887.)

INAUGURAL ADDRESS

OF

THE PRESIDENT

OF THE

ENTOMOLOGICAL SOCIETY OF ONTARIO.

1887.

LADIES AND GENTLEMEN,—Through the courtesy of the Mayor and Corporation of the city we are enabled this evening to make use of this commodious chamber.* The committee room put at our disposal for the other meetings would have been entirely inadequate to accommodate the large audience which I have the great gratification of now seeing before me. This pleasure, too, is considerably heightened, as I notice amongst you many of the class which our Society particularly strives to reach—to wit, farmers and gardeners—men who are daily brought face to face with the foes or friends, of which our members make it their special study to investigate the habits.

As there are many here this evening who are not members of the Entomological Society of Ontario, it is fitting that I should state briefly the nature and objects of that Society. Previous to 1863 there was no such society in Canada; but in that year a few naturalists, living in different parts of the Provinces, met together in Toronto and organized under the name of the Entomological Society of Canada. The membership at first was only sixteen, and this number included all those then known to be interested in insect life in Canada. From this small beginning the Society has steadily increased until its membership now reaches upwards of 500, and includes all the active workers in North America. The work done in the early years of the Society, notwithstanding the fact that the members were widely separated, was such that it soon became manifest that they must have some means of publishing the results of their observations for the benefit of each other and the scientific world in general. Accordingly in August, 1868, appeared the first number of the *Canadian Entomologist*, a monthly periodical, which from that time forward has been regularly published, and was for some years the only publication on the continent of America devoted solely to this important branch of natural history. It has now nearly completed its nineteenth volume. From the outset a noticeable characteristic of this magazine has been, that its pages have been entirely filled with the records of original work, and during its existence it has been the means of disseminating a vast amount of scientific knowledge, which has been of benefit not only to Canada but to the world at large. This organ of the Society is more particularly the scientific record of work done by the members, although it also contains many illustrated elementary and popular papers for the benefit of beginners. In addition to this, however, and what is an important part of our work, a popular report of some 75 or 100 pages is prepared annually upon injurious and beneficial insects, and the best measures for farmers and gardeners to adopt with regard to them. This is published every year as part of the report of the Minister of Agriculture and Arts for the Province of Ontario. Seventeen of these have already been issued, and have given to the farming community a large amount of useful information. Our Provincial Government recognizing the good work which was being

*The President's address was delivered in the council chamber of the Ottawa City Hall, on the evening of October 26th.

done by our Society, incorporated it in 1870, as the Entomological Society of Ontario, and gave at the same time material aid by allowing an annual grant from the public funds. By this assistance, the usefulness of the Society has been greatly widened, and the officers have become an advisory board to whom reference can be made whenever information concerning injurious insects is sought by farmers or others—an advantage of which the intelligent agriculturists of the Province have not been slow to avail themselves.

Of all the important events affecting agriculture in Canada which have happened during the past year, none can compare for importance with the establishment of the system of Experimental Farms throughout the Dominion, lately organized by the Federal Government. To no one more than to our members can it be a source of so great pleasure, that the person chosen for the important and responsible position of Director, should have been the present incumbent, Prof. William Saunders, who has been for so many years identified with the prosperity and progress of our Society; what he has been to us we all know; what others consider his value to have been, is well shown by Prof. A. R. Grote, one of the best American entomologists and a highly esteemed and regular contributor to the *Canadian Entomologist*.

When speaking of that journal in the preface to one of his works, he says:—

"The treatise of Dr. Harris which has become classical on its subject, did much towards creating a general interest in entomology; but the publication of the *Canadian Entomologist*, a journal aided pecuniarily by the Ontario Government, and owing its success chiefly to the unselfish labours of Mr. William Saunders, has assisted the progress of entomology in America probably more than any one other similar undertaking." This statement is not a bit overdrawn. Prof. Saunders—and I speak of him from an intimate acquaintance extending over a space of many years—is an exceptional man, remarkable not less for the diversity than for the thoroughness of his accomplishments, but above all for his tact and good judgment which have made him an object of respect and have endeared him to all who have had intercourse with him. Now, above all things, Prof. Saunders is an entomologist, and to it chiefly he owes his eminence. We congratulate him upon his appointment and also the Honourable Minister of Agriculture upon the wisdom of the choice he has made.

It may not be amiss here to say a few words with regard to the work it is proposed to carry out at these Government experimental stations. In the first place, the system will consist of a Central Experimental Farm at Ottawa and four other branch farms divided as follows: the Central farm for Ontario and Quebec, one for the Maritime Provinces, one for British Columbia, and one each for Manitoba and the North-West Territories. The officers at the Central Farm will be, the Director, an Entomologist and Botanist combined, a Chemist, a Horticulturist and an Agriculturist. At the Central Station there will be a museum for the preservation of objects of interest. These, of course, will include all the different kinds of grain and other crops, and as well, cabinets for entomological and botanical specimens. As most of you are aware, I have been appointed to fill the position of Entomologist and Botanist for the Dominion Experimental Farms. I trust that I may be able to show before long that this selection was not ill advised. At any rate, I can assure you that no efforts will be wanting on my part to render the office one of general utility and a benefit to the farming community. I purpose, as quickly as possible after the building is finished, to place in the museum a collection showing, under each of the principal crops, all the insects by which it is attacked, so that the farmer or gardener who finds any of his crops injured by insects can come to the museum and see for himself, under the head of each plant the injurious insects known to infest it, and at the same time learn the most approved methods of treating them.

In addition to the above, there will be a botanical garden on the farm, a plot of 65 acres having been appropriated for this purpose. Here native plants of economic value, as our forest trees, will be grown in large numbers for distribution and observation under varying conditions, so as to note their behaviour under different circumstances. Here, also, will be cultivated a large collection of plants of interest to the botanist from all parts of the world, including, of course, all the native species, of which I can obtain roots or seeds. It is thus hoped that many of the difficult problems will be cleared up which at present trouble the

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scientific botanist, who has, perhaps, had to work at some of the least known or rare species with scanty and imperfect dried material. In this botanical garden and arboretum there is a remarkable diversity of habitat, from open water and an area of sphagnous bog to sandy upland with all the intervening varieties of soil—rock, shady ravine, heavy clay, light loam, sand, etc.—and I feel confident that a large proportion of our Canadian wild plants can be grown and examined at leisure. It will be noticed that the two posts of entomologist and botanist have been united. I consider this was a very wise arrangement, at any rate until the work in connection with these two posts increases so much as to make the appointment of two officers necessary. One of the most important things the entomologist will have to attend to will be the injuries to plants from insects. It sometimes happens, however, that it is difficult to tell at first the source of an injury to vegetation. The attacks of some of the low forms of vegetable life and of insects being, in their effects very similar, so much so that instances sometimes occur when even careful observers, unless specially informed, may make mistakes. Again, sometimes injuries due to other causes altogether are attributed to either insects or fungi. During the past summer, there was great consternation in the county of Prince Edward on account of a serious failure in the pea crop, the complaint being that no seeds were formed. In this county peas are largely cultivated, on some farms to the exclusion of all other crops, and the seed produced is of such high quality that the best dealers in the United States and in England find it advantageous to procure their seed from this district. Many suggestions were made to account for this failure which was of such importance to a large proportion of the community, and insects and parasitic fungi were at once accused. It seems probable, however, that the excessive drought which prevailed during the whole summer was the sole cause. It is true that mycelium of fungus was found upon the roots in some instances, but this was always where the plant had been killed and was dead at the collar, the fungus only accompanying the decay of the roots and their tubers. These tubers on the roots of the leguminosae are very interesting. Through the kindness of Prof. W. G. Farlow, of Harvard University, I have had my attention drawn to an excellent article by A. Tschirch, entitled "A Contribution to the Knowledge of the Root Tubers of the Leguminosae." It is published in the Transactions of the German Botanical Society of 2nd February, 1887. This, for the first time, explains the use of these bodies, the nature of which had for many years been misunderstood. It would appear that all leguminosae bear some kind of tubers on their roots. These vary in shape in the different genera; but they all have the same use, namely, to act as reservoirs where, during the time of active growth, nitrogenous materials are stored up until required to supply the large amount necessary to fill the seeds. These latter then draw off from the tubers the nitrogenous materials, leaving them empty. Now, on the plants in Prince Edward county which I had an opportunity of examining on several farms, through the courtesy of J. M. Platt, Esq., M.P., of Picton, the plants presented the characters of having (i.) a living stem above, (ii.) a vigorous tuber-bearing root, upon which, however, some of the tubers were in a state of decay, and (iii.) a short piece of dead stem at the surface of the ground effectually separating these two portions. I feel now pretty well assured that this state of affairs was brought about much in the following manner: Just about the time the pea-plants were coming into flower, a period of drought set in which caused the stems to fade and lie over at a time when there was not sufficient foliage to protect them; in this way their bases were exposed to the direct heat of the sun as well as that from the hot, parched, earth, and they were thus injured to such an extent that they could no longer act as channels for the interchange of materials from the root to the stem and *vice versa*. If this be the correct view, the exceptional drought of last year must be assigned as the cause for this shortage, and not any attack which is likely to give trouble in the future. One noticeable feature about the plants examined was the abundance and large size of the root tubers, and this might have been anticipated had their nature at the time been understood. It points to the fact, however, that although this year the crop in Prince Edward county is small it is from an exceptional cause, and there is every reason to believe that with an ordinary season this district, so justly celebrated, will still show that it is without an equal in Ontario as a pea-producing county.

There are other injuries the nature of which is apt not to be understood. Amongst these I would specially mention the "club root" in the cabbage, which is produced by a

fungus (*Plasmodiophora brassicae*, Wor.), although by many it is thought that it is caused by the attacks of a small beetle. Another injury caused by a fungus, but which has very much the appearance of an injury by insects is the Plum-leaf Fungus (*Septoria cerasina*, Pk.) which has the effect of making small holes in the leaves of plum trees as if they had been perforated by shots from a gun. This has been sent to me during the past summer for information as to the "insect" which was supposed to be the depredator. Again, the curious disease called "bumble-foot," to which some breeds of poultry are liable, is occasionally supposed to be due to the attacks of insects. It is probable, however, that the large swellings on the feet of chickens so named, are really abscesses, due to aggravated bruises caused by high perches and a hard floor to the poultry house.

These few instances, however, are sufficient to illustrate the advantage of any investigator being familiar with at any rate the first principles of other branches of study besides his own specialty, for he will frequently be applied to for information, and, indeed, will require for his own work knowledge of allied subjects.

Perhaps one of the greatest surprises to one who begins to devote a portion of his time to the study of Natural History, is the discovery, which soon forces itself upon him, that instead of there being a large number of different sciences, these are merely several branches, all of which are so intimately related, nay, even dependent upon each other, that they are merely component parts of one great whole. Nor does any one branch very much surpass the others in importance, for each one is necessary to the rest. And the special value of any one study over the others is only in the eyes of those students who devote to it their particular attention. All are links in one great chain of knowledge, engrossing to the highest degree to all who are happy and lucky enough to feel its charms, and of enormous importance to the world at large.

In a consideration of this theme we can begin at any one of the links, and, perhaps, to-day it is more fitting to begin at our own special subject—Entomology. Most nearly related to Entomology is Botany, the branch of science which treats of the vegetable kingdom from which so large a proportion of the insect world derives its sustenance. An intimate knowledge of the different species and families of plants is of great importance to the Entomologist. It frequently occurs that in his studies he requires to breed through all its stages some insect which feeds naturally upon a plant not to be obtained in his neighborhood; with a knowledge of the different orders and classes of plants, he is able to make use of a nearly related species, sometimes even of a different, but closely allied genus. There are many instances on record where this has been done; but by far a larger number where, for want of this knowledge, valuable insects have been starved from only having improper food offered them. The economic entomologist is much helped in his investigations by this knowledge. Many of the injurious insects which attack our cultivated crops, especially those of which there are two or three annual broods, subsist during one or more of these on wild plants allied to those cultivated. By a removal of the wild plants many of these pests are naturally kept very much in check, for it must never be lost sight of that the great factor which influences the amount of insect-presence is the amount of food-supply. Then the important offices performed by insects in their relations with plants render them objects of very great interest to the botanist; he recognizes in them nature's pruners, which remove or prevent a too great exuberance of growth; and they perform such a conspicuous part in the fertilization of the seeds as to have been designated "the marriage priests of plants," ushering the young seedling into existence; they also remove it from the face of nature directly its usefulness and beauty are gone, so that its place may be taken by others. The fact that insects and seeds form the greater part of the food of so many birds, naturally connects the studies of the ornithologist with the two preceding. By the dissection and examination of the stomachs of birds, many useful assistants of the farmer and fruit grower have regained a good character of which ignorance had robbed them. How many thousand of woodpeckers and owls and hawks, which were nobly doing man's works for him, have fallen victims to this spirit of ignorance.

These remarks will apply equally to several other branches of Zoology.

The next step is to the laboratory of the chemist. Here the entomologist finds the materials for alluring and preserving the specimens for his cabinet, or is provided with

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means to wage war against those which increase in such undue numbers as to require to be treated as enemies. The botanist, too, must come to the chemist to discover the exact nature of soils and the different fertilizers, as well as the principles contained in the plants which he collects or cultivates, so as to know the comparative values of each species in a family of plants. Chemistry teaches us not only how, by special treatment, virulent poisons may be transformed into nutritious foods, as in the case of some "arrowroots" and other products derived from the Araceæ, but also how certain species in the same genus may be harmless and others noxious. This we find amongst the Sumachs—where we have the Stag's-horn Sumach (*Rhus typhina*), the seed coats of which provide the French Canadian with wholesome vinegar and a refreshing summer beverage, and also its near relative the Poison Ivy (*Rhus Toxicodendron*). Conversely, too, the obligations of the chemist are just as great for the exact information as to species, growth and habits of plants which he receives. The close relationship existing between chemistry and mineralogy is manifest, as is that of the latter with geology. In the last named science the Paleontologist finds frequently the necessity of a thorough knowledge of the different branches of Zoology and Botany, so that he may correctly identify the fossil remains brought before him, and refer the rocks bearing them to their proper ages.

By common consent the students in some of these branches work together with mutual benefit. The botanist delving in the earth in search of roots, or gathering mosses from the woods and swamps, finds many minute insects and shells. The conchologist, wading in the shallow waters or raising up the bark of dead trees when looking for shells, frequently discovers aquatic plants and insects of rarity. The entomologist, peering and prying everywhere to discover the active objects of his quest, is not less useful to the others, and so we find that each branch of science is an aid to the others, and must be developed to the highest degree, not only that as much knowledge as possible may be accumulated in its own domain, but also from the collateral value it may be to other sciences.

But I need not remind you the value and interest in the natural sciences is not for its devotees alone. It is not too much to say that the almost phenomenal strides which have been made in the progress of the world during the past century are due entirely to the developments of scientific knowledge. I will, however, refer briefly to one special line of progress in which this kind of study has been found of great use.

Educationalists in all parts of the world attest the value of the Natural Sciences as a part of the practical education of youth; and the fact that they enter so largely into the curriculum of our Ontario schools does much towards showing the high state of excellence of the methods here adopted towards preparing our young men and women for fighting the battle of life.

These studies, it must be remembered,—used educationally—are essentially not *ends*, but *means*; means for producing in the mind exact and careful methods of thought, of developing the faculties of accurate observation, and above all things are important as giving a power to express in a concise and definite manner what it is wished to relate. If these characters be not found in the Naturalist much of his work is but play, and his labour is lost; his studies are useless to himself and of little value to anyone else.

I cannot help thinking that the scientific outlook in Canada is far brighter at the present time than it has ever been before. The facilities of communication and travel which now exist put us at an enormous advantage over our predecessors. The result of these increased facilities has been, as a matter of course, a great spread of all kinds of knowledge, and entomology is perhaps one of the most benefited.

In all directions we hear of a higher appreciation amongst farmers and others of the value of this study. Addresses from specialists concerning insect life are asked for to be delivered at Teachers' Institutes, before our Normal Schools, at meetings of Farmers' Institutes and similar associations. Quite recently the Legislature of British Columbia has seen the advisability of appointing a Provincial Entomologist, and it is with pleasure that we learn the appointment has been given to one of our members, the Rev. G. W. Taylor, an excellent Naturalist and one who cannot but do good. Lectures explaining and popularizing Entomology are found to be always acceptable before Natural History Societies in all parts of the country, and in *The Educational Review*, a monthly magazine

published in St. John, N.B., a most excellent series of illustrated popular articles is appearing from the pen of Principal A. H. McKay, of Platon, N.S. These are in the shape of addresses to an imaginary class at "Ferndale School," and from their simplicity and accuracy will certainly be intelligible to all and give much instruction.

From this it will be seen that anyone now-a-days who wishes to obtain knowledge concerning injurious and beneficial insects can do so with very little trouble.

The ease with which parcels of specimens and books may now be sent by mail and the low rates of postage, as well as the extensive development of systems of railways in all the Provinces of the Dominion, by which it is now possible to communicate in a few days with many localities previously inaccessible, bring it within the power of all to obtain almost any desired information. It is my duty, however, to remind you that these advantages also bring with them their responsibilities, and I take the liberty, therefore, of suggesting certain lines of study in which I believe more work should be done by our members.

Our monthly magazine still maintains its character as a high-class scientific magazine, and should be, as it doubtless is by most, carefully read by all our members. I should, however, be glad to see some new names amongst the contributors. There are also certain orders of insects which receive little attention at our hands, and the work, although good, is being done by too small a number of workers. Amongst the lines of investigation which demand our attention, I would mention, first of all, the clearing up of the missing links in the life-histories of our common and conspicuous injurious and beneficial insects. There is a great deal yet to be done with regard to the common injurious insects, as out worms, wire-worms, etc. Again the advantages of easy access to the North-West Territories and British Columbia by means of the Canadian Pacific Railway must not be neglected. By the completion of this great highway, connecting the Pacific with the Atlantic it is now possible for us to receive eggs of nearly all the unknown species of our diurnal lepidoptera. The ease with which these can be reared from the egg has been explained in the *Canadian Entomologist* by our highly esteemed contributor, Mr. W. H. Edwards. The keen pleasure to be derived from breeding insects and watching them through all their stages can only be appreciated by those who have tried it. All I can say is that I, for my part, have never derived more true pleasure from any occupation. The excitement of catching the female, the anxiety to know whether she will lay eggs and whether these will hatch, then watching the small larvæ through their successive moults till they are full grown, and the final emergence of the perfect insect, all are intensely interesting. Now the large number of Canadian lepidoptera of which the preparatory stages are unknown, but of which we could with comparative ease obtain eggs, should surely induce some of us to make a great effort to clear up some of these points. Let us, at any rate, try to have a few of them disposed of before the next annual meeting.

Another study of enormous importance which might well receive more attention is that of the dipterous and hymenopterous parasites of injurious insects. Mr. Harrington, of our Council, has done good work in this line. The Abbé Provancher, of Quebec, has also in his excellent little magazine, *La Naturaliste Canadien*, published lately much valuable information concerning both the hymenoptera and the hemiptera.

In this connection I would mention a curious discovery made during the past summer. In examining the seeds of the common Canada thistle with a view to finding out the extent of their fertility, I was surprised to find that in nearly every head most of the seeds had been destroyed by a white dipterous larva, which was generally placed head downwards, only showing a brown disk with two pores on the upper end. It had a peculiar habit of enveloping itself with the pappus of the thistle, which was wrapped tightly round it, as though the larva had twisted itself round and round and drawn the silky pappus with it until a thick wad was formed. This is probably as a protection during the winter, for most of these larvæ were mature, and some which I have in breeding jars remain quiet in these coverings. I was naturally much interested in this beneficial insect which had suddenly developed in such large numbers; but my surprise was great when I found that from upwards of 200 specimens collected, most of them produced a small parasitic hymenopterous fly of a kind unknown to me. We had then the somewhat paradoxical result of an insect parasitic upon another insect being noxious; but

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such it undoubtedly is. From all the thistle-heads mentioned, I only obtained one pair of the flies, the larvae of which were destroying the seed of this troublesome weed (they apparently belong to the Trypetaceae), all the rest produced the little black parasites. Later in the season, by examining a large number of plants, I secured a few specimens of the larvae which appear to be healthy, and these are all wrapped tightly in their coverings of thistle down. There were sometimes as many as three larvae in one head of seed, but as a rule only one. Through the kindness of my friend, Mr. Harrington, the small parasite has been sent to Mr. W. H. Ashmead for identification.*

During the past year several notable collections of insects have been made in unworked districts of Canada, amongst these I would make special mention of those by Prof. Macoun and Rev. G. W. Taylor, in Vancouver Island; Mr. J. M. Macoun, in Hudson Bay; Dr. G. M. Dawson, near the Alaskan boundary; Mr. J. D. Evans, at Sudbury, Ontario; Messrs. J. B. Tyrrell and Dowling, in Manitoba; and Mr. N. H. Cowdry, at Regina and near Fort McLeod, N.W.T.

Several publications worthy of a much longer notice than I have now time to give them, have appeared during the past season. First must be mentioned the resumption of publication of Mr. W. H. Edwards's "Butterflies of North America." From the Division of Entomology at Washington, several reports and bulletins have been issued. Prof. Cook, of Michigan, and Prof. Forbes, of Illinois, have both issued timely publications of great utility, particularly bearing upon the use of arsenical poisons as the best remedies for the codling worm and plum curculio. Prof. F. M. Webster, of Purdue University, has done good work amongst the insects injurious to wheat crops, and has brought his practical common sense to bear upon some of the troubled questions with good results. From the American Entomological Society, has come Mr. Cresson's much wanted Classification of the Hymenoptera, a work which will be found of the greatest use to students.

Prof. Grote's "Hawk Moths of North America," which, although complete in itself, is a part of a series of essays on North America Lepidoptera, will be found a useful work for collectors. It is to be hoped that this talented author will soon issue a further part of his work. Mr. Souder's great work on the Butterflies of New England, is announced for next spring. From the well known excellence of this author's work, it is needless to say that it is anxiously looked for by Lepidopterists.

I must now pass on to a brief sketch of the most noticeable injuries by insects during the past season. The crops in Canada, notwithstanding the excessive drought, have not suffered from any very severe attack of insects. The wheat-midge continues to levy heavy tribute from the farmers' wheat wherever this cereal is cultivated, but only amongst the best farmers in the Province of Nova Scotia has it become sufficiently abundant to induce them to burn the screenings. Throughout Canada, from the Atlantic to the Pacific, the tent caterpillars (*Glisiocampa*) have been most injuriously abundant. I received, during the month of June, most doleful accounts of their ravages; whole groves were stripped bare, and few trees seemed to come amiss to them. Along our streets here, hardly a tree could be found without its nest of caterpillars. The advocates for the English sparrow received a rude shock in observing their neglect of this large supply of, what they supposed would be, such acceptable food. I must, however, in all fairness to these little usurpers, record that on the 26th May last, I did actually see a little cock sparrow worry to death and afterwards devour with apparent pride and great gusto, a full grown larva of *Glisiocampa Americana*, which was endeavouring in a great hurry to cross a path unobserved.

The wheat crop of the Dominion for the past season has been enormous and of very fine quality. This, however, is chiefly owing to the vast quantities of this staple grain produced in Manitoba and the North-West Territories. Throughout Ontario the excessive drought has prevented the maturing of the seed to a large extent. Complaints of the operations of the wheat-midge and Hessian fly have been reported from some localities, and the former of these has made itself too apparent in Nova Scotia and New Brunswick. The wire-worm has done its share of destruction, but on the whole the injury to wheat

* It has since been named *Solenotus Fletcheri* by Mr. Ashmead, and is the first representative of the genus as yet discovered in America.

has been inconsiderable. Perhaps the insect of most interest is the "Wheat-stem Maggot," the larva of a small fly known to science under the name of *Meromyza Americana*. This insect has been observed during the past three years, but nowhere in very large numbers, and only a few complaints have been received of its operations; but, on the other hand, it is found upon enquiry, that it has been seen in a great many localities, and, moreover, it appears to be steadily increasing in numbers. In some localities in the Ottawa district where, however, it must be stated most enquiry has been made, it is reported to have been present for years. Dr. Ferguson, M.P. for North Leeds, states that it is always most prevalent in good seasons, and when there is great drought and a small crop the insects do not appear in such large numbers, but when the growth is vigorous and there is a good deal of moisture, they appear almost invariably. As this was an exceptionally dry year, should this theory be correct, I fear we may, in an ordinarily moist season, anticipate a severe attack from this insect. There are two distinct kinds of injury committed by this insect. The presence of the larva of the second or summer brood is indicated by the top joint of the wheat turning white just about the time the wheat is in blossom. This character is very noticeable and has gained for it the name of "Silver-top" in some localities. The other kind of attack is that by which the larva destroys the young central shoot of the autumn grown plants of fall wheat.

Dr. Ferguson states that the usual course amongst farmers in his constituency, has been, where they are general, to put the mower in and cut the crop. This, however, is a severe remedy to which it has not often been necessary to have recourse.

Mr. D. James, of Thornhill, in the County of York, states that it works particularly in the variety known as "Goose spring wheat," and says, "It is three or four times worse in my fields this year than last. At a rough estimate about every thirtieth head is affected, and it may prove more than this."

This information is sufficient to show that it is an object requiring special study.

The life history of this insect is briefly as follows:—The eggs are laid on fall wheat in the autumn—in September and October, these hatch and pass the winter in the larval state, and in the following spring produce the first two broods, in May and June and in July, the perfect insects. It is supposed by Prof. F. M. Webster, of Purdue University, Ill., that the latter lay their eggs in volunteer wheat, and that these again produce the injurious brood which attacks the autumn fall wheat. Another supposition is that the perfect insects remain alive until the fall wheat appears above ground. This, however, seems hardly likely, and if Mr. Webster's theory be not correct, it is probable that the gap is bridged over by the existence of a brood in some of the wild grasses.

Timothy hay has for the last few years suffered severely from a similar injury, by which the top shoot is also destroyed, and the records of the two attacks are much mixed up.

I have failed in my efforts to breed this latter insect to maturity. I am, however, at present of the opinion that it is not the *Meromyza*. The remedies which suggest themselves for *Meromyza* at the present stage of the investigation are late sowing of fall wheat and clean cultivation, by which all volunteer wheat is destroyed.

From the similarity of the attack by the autumn brood to that of the Hessian fly, I feel confident that the two are sometimes confounded by farmers. The larva and pupa cases of the two are, however, very different in appearance. The Hessian fly, I am thankful to say, is not very injurious in Canada at the present time; but in parts of Illinois it has lately committed great depredations. The outbreak of this pest, which occurred in England last year, has drawn much attention to entomology in that conservative country, and the name of one of our honorary members, Miss Eleanor A. Ormerod, is now more than ever a household word amongst the grateful farmers, whom, by her prompt action and safe advice, she has put in a position to protect themselves against this scourge. I am still however of the opinion, notwithstanding the present state of affairs, that the Hessian fly will never become a "first-class pest" in England. As well as Miss Ormerod, Mr. Whitehead continues to write and publish valuable advice to the farmers on injurious insects. It is to be hoped that they may be awakened to see the value of his words and follow the instructions he so plainly gives.

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unexplained "silver-top" injury to hay, this crop in Ontario has not suffered. The clover seed midge is now by early cutting comparatively well kept in hand by growers.

The root crops have been poor for want of rain, turnips suffered severely and late in the season all growth was stopped in some districts by enormous quantities of a grey aphid. When treated in time these were easily destroyed by spraying with kerosene emulsion. Few, however, could be induced to take this trouble so late in the season; preferring to take their chance they did nothing, and as a consequence lost their crop of turnips.

Carrots last year were badly attacked by the carrot fly (*Pila rosea*), but this year very few complaints were received. Radishes and cabbages were badly attacked by Anthomyian flies, so well known to gardeners as root maggots. I have, however, during the past summer had such success with Prof. Cook's carbolic acid treatment, that I had no trouble in growing radishes entirely free from attack, right through the summer. This remedy is as follows:—Take one gallon of water in which two quarts of soft soap have been dissolved; into this when boiling hot one pint of crude carbolic acid is put, and after being boiled and stirred for a short time, is put by in bottles. When required for use I put one cupful in a watering can with fifty cupfuls of soft water. This when stirred up a little is ready for use, and is watered by means of a rose all over the beds, beginning three days after the seed is sown and continuing once a week until the radishes are ready for the table. It can be watered all over the foliage and will have no effect, either on the vegetation or in giving any offensive taste to the vegetable. For cabbages the most successful treatment was as follows:—At the time of planting out gas-lime was sprinkled lightly all round each plant. About first July the earth was well hoed up round the stems and another light application was made. This substance was also found very beneficial by Mr. E. Bell, of Archville, in preventing to a large extent the attacks of the onion maggot. In this case it was sown very lightly broadcast over the whole bed—once a fortnight,—from the beginning of the season until the middle of August.

Potatoes suffered in some localities from the Colorado potato beetle. This pest, however, is so easily and cheaply kept down with Paris green that it is not necessary to speak of it at greater length.

The Imported White Cabbage-butterfly (*Pieris Rapæ*), committed serious injury throughout the Province, notwithstanding the fact that myriads of the larvae were destroyed by the fungous disease known as *flacherie*. This disease has been noticed for the last seven or eight years from the virulence of its attacks upon the larvae of this insect; but this year the caterpillars having appeared in undue numbers, its presence seemed to force itself upon everyone's notice. Great injury was done by these caterpillars before the epidemic developed and it was necessary to have recourse to active remedies. Of these, without doubt, insect powder (*Pyrethrum*) is the best. This material can be mixed with four or five times its weight of common flour. With one of the many insect-guns and a very little practice, a large number of plants can be dusted in a short time. Treatment with a tea of this poison was not so successful as the dry application.

Orchards have in some districts fared worse than other crops. In the first place the leafing out of the trees was retarded in early spring by the want of rains. The enormous numbers of *Clisiocampa* and a goodly host of other caterpillars, at one time threatened to entirely strip the foliage from the apple trees. In Nova Scotia the apples were from various causes reduced to one-quarter of the average crop. Two particular insects were most complained of, "the canker worm" and the pear-blight beetle *Xyleborus dispar*, Fab., (*Xyleborus pyri*). This latter was called, locally, "the shot-borer," from the resemblance of its tunnels to small shot holes. It has done much injury. Many specimens have been sent to me from the Annapolis Valley, and by the kind assistance of Mr. T. E. Smith, of the Nova Scotia nursery at Cornwallis, N.S., a close and careful observer, I have been put in possession of much useful knowledge with regard to this insect. Mr. Smith is under the impression that they do attack healthy trees. He writes: "One of my neighbours has lost about forty fine healthy apple trees, mostly Gravensteins and King of Tompkins. They attack the butt, and in some cases well into the limbs of young and bearing trees a foot

in diameter, mostly on the north side of the trees." One specimen of apple wood cut from a branch two inches in diameter and apparently in a living condition, produced, as well as the pear-blight beetle, several specimens of *Monarthrum mali*, another injurious species somewhat resembling the above, but even smaller. A noticeable feature of every specimen of injured wood submitted to me was that the trees from which they were cut were very badly attacked by the "Oyster-shell bark louse." Opinions seem to differ as to whether these beetles will attack vigorous, healthy trees. Efforts will be made to induce the Nova Scotia fruit growers to treat their trees for the "Oyster-shell bark louse," which alone, without the assistance of these borers, are sufficient to rob the trees of much power for bearing fruit. Last spring I was much pleased at receiving from Mr. A. J. Hill, of New Westminster, B.C., some twigs of apple covered with this bark louse, which, when enclosed in a breeding jar, produced hundreds of the useful little parasite *Aphelinus aspidiotidia*. Every scale seemed to be destroyed. After saving a few specimens for the cabinet I turned the others loose in an infested apple tree, and hope next year to find that they are established here. In our own Province by far the worst enemy the orchardist has had to contend with is the codling worm (*Carpocapsa pomonella*.) There is now no doubt that the use of arsenical poisons is the only practicable remedy for this pest. I refer to it now for a special reason. In the *Canadian Horticulturist* for August appeared what I cannot but consider a most injurious and ill-advised article. In it the writer, who, by the way, does not give his name, writers of such articles seldom do, makes several bare statements without giving any proof, warning fruit growers against using arsenic in any form, and draws a vivid picture of the ills which may come from neglecting his advice. This article will be answered in full elsewhere; but I wish to draw attention to two of his statements, viz.:

"That although the mineral arsenic is insoluble in water it is freely soluble in the acids resulting from decomposition of vegetable matter—and is then readily taken up by the roots of plants, especially by those of the coarser vegetables, as the potato, etc."

"Similarly also, in applying solutions of Paris Green to the apple blossom, it is not only that the petals are destroyed, but the poison may be absorbed by the fruit—"

Now the injury of this article is this: In the first place the statements are inaccurate and secondly being published where it is, it will be read by a large class of people who will not be able to detect the inaccuracy, and who sooner than run any risk will let their crops be destroyed so as to be on the safe side, and besides this there is no doubt that it is less trouble not to make this application, and we all know how easy it is to take a ready-made excuse for not doing a thing which we know ought to be done; but if there is the slightest doubt about the propriety of an action we seldom even need an excuse to be prepared for us. Now, Entomologists have been for years trying to persuade fruit growers to save their apples and plums by using these arsenical poisons, and Prof. Forbes has shown by most careful experiments, that at least 75% more of a crop can be preserved by their use than by leaving the trees alone. Fruit growers were just beginning to be awakened to the value of these remedies when "O." (of Durham, Ont.), comes out with his injurious article. In answer to it I say—if care be taken to apply this remedy as directed by Entomologists no danger can result from its use. As to its being absorbed into the potato tubers, "O." seems to forget that these bodies are not roots, nor are they filled from the roots. They are merely swellings at the ends of underground stems, such as are known to botanists as "winter-buds," and are reservoirs for the storing up of reserve material chiefly taken in by the foliage for the use of the next year's growth. Even then were it possible for any appreciable amount of the arsenic to get to the roots and be absorbed by them, which I very much doubt, it would be impossible for it to get into the tubers. Prof. Cook, of the Michigan Agricultural College, had some very careful analyses made of plants specially treated with arsenic. Paris green was put on the foliage as strong as possible without killing the plants, and it was also put on the ground where it would be worked to the roots. Both vines and

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tubers were analysed by a very careful chemist, but not a trace of arsenic could be found. Again, with regard to the injury to apples, the poison should not be applied until after the petals have fallen, and when consequently the ovaries are fertilised and the stigmatic disk is incapable of absorbing anything, much less a caustic solution of arsenic.

Here the general broad principles upon which insect remedies are applied was explained and listened to with interest.

Before closing the President said,—It is with feelings of the deepest regret that I have to refer to a severe loss our Society has sustained since the last meeting in the removal by death of one of its most active and esteemed members, Mr. George J. Bowles, of Montreal. This gentleman was for several years a member of the Council, and was also, at the time of his death, the President of the Montreal Branch, in which he always took a keen interest, and in the foundation of which he took an active part. His quiet, modest manner made him a favourite with all his associates, while his ability as a naturalist was acknowledged by every one who had intercourse with him. He was a regular contributor to the publications of the Society, and also prepared many valuable papers for the Montreal Branch.

He paid particular attention to the lepidoptera, of which he had extensive and choice collections both of Canadian and exotic species.

Mr. Bowles was a native of Quebec, where he was born in 1837; he leaves a wife and three children, for whom, in their bereavement, our deepest sympathy is called forth.

Another of our members who has passed away is Mr. Charles Chapman, of London. Mr. Chapman as well as taking an active interest in our Society, was also a patron of art, and has been styled the Father of the Western Ontario Art School.

In closing, I wish to draw special attention to the beautiful collection of Coleoptera exhibited by Mr. Harrington this evening, and this collection, I think, will illustrate some of the points upon which I have spoken to-night. The method and care with which they are arranged, and the neatness with which all are named and mounted, point out far better than I can explain the educational value of the study of Entomology.

JAMES FLETCHER.

