to induce him to leave it, even for an hour; the boy whose evenings are spent at home, because he rather be there than anywhere else, and I will show you a boy who maketh a glad father, and rejoiceth the heart of his mother. A boy who will make a success whether he stay on the farm or where'er life takes him. I know intimately just such a home. The father has a large, well-stocked farm and two boys. As the boys were about to cross the bridge between childhood and youth, the father secured some fine, pure-blood fowls for one of the boys and a colony or two of bees for the other. He purchased two or three of the best books treating of poultry, and the same of bees. A good journal was subscribed for treating of fowls, another of bees. That winter the books and papers were thoroughly studied and discussed by father, mother and boys. Who shall say that this study and the interest it awakened were thrown away, even had they had no practical results? 'One of those boys is now eighteen, the other is fifteen, and either one will discuss bees or poultry as intelligently as any bee man or poultry fancier of the country. More, either boy is qualified to take charge of and manage successfully a large apiary. Granting that there had been no income from the bees, would any one say that the course of that father had been foolish? I tell you that father rarely thinks of his bees that he does not think of the boys, and methinks he often whispers “blessed bees.” But now as to the results: The bees increased without the loss of a colony until eighty colonies adorned the bee yard by the orchard. Until last winter not a colony was ever lost in wintering, and then only because the advice of a celebrated bee-keeper was followed, against the judgment of the owners, and the cellar was kept at too high a temperature. Even then the loss was not great. In 1884 and 1885 the proceeds of these bees exceeded the income of all the balance of the farm. And yet this is one of the best tilled and best managed farms in Wisconsin. The capital invested in the farm, stock, tools, etc., cannot be less than $10,000 or $12,000. The capital invested in the bees is not more than $1,000. And the bee business has grown up without a dollar’s outlay since the first purchase, except as the money came in from the bees. From the first the bees have far more than paid all expenses. The wise advice insisted upon in our best books, to go slow was strictly followed, and no bees have never been purchased since those first colonies, except the purchase of a few queens.

Others have interested daughters in a similar way, and at the same time have secured for the girls labor in the open air, and healthful exercise, which in itself has paid for all the expense and labor, even were it not richly paid in the money income. I know of a mother in Michigan—one of the best bee-keepers I ever knew—who commenced to keep bees solely for health’s sake. To quote her own words, she has found health, and secured a good profit on her investment and labor. Can any of you meet with the same success? Not one of you but what can. If you will fit yourselves with the same studious care and then exercise the same diligent pains-taking effort to meet every requirement of the bees with absolute punctuality.

It only remains to be said that honey is just as sweet, just as wholesome and just as valuable a food as it was in the olden time when the “Promised Land” was lauded as a “land flowing with milk and honey.” The bee-keeper, besides contributing to the value of farm, garden and orchard, besides engaging in a healthful, pleasant and remunerative vocation, is also adding to the wealth of the whole country in securing a valuable food, which, without his care, energy and business thrift, as expended in the apiary, would be lost to mankind, doubly lost, for as we have seen, it has a double mission: It blesses man through the bees and through the plants.

A. J. Cook.

Injurious Insects and How to Fight Them.

[Prof. A. J. Cook, Michigan Agricultural College.]

This subject of injurious insects, to which I have given much study, is one of tremendous magnitude, whose importance is rapidly growing as the years go by. We are taking the natural food plants from our native insects, as we clear away the forest’s brush wood, and the more humble herbs of fen and upland. And the insects, bent on getting
FARMERS' INSTITUTES.

even with us, are robbing us of our fruits, grains and vegetables. Each year sees some new insect enemy, which often comes as a devastating flood upon whatever of fruit, grain or vegetable it may attack.

New imported insects, of all these miserable pests the most to be dreaded, are coming year by year to our shores. So emphatically true is this, that were we not also, at the same time learning more of the ways and habits of these insect hordes, and discovering new and more valuable methods to combat their mischief. We might well stand appalled in hopeless despair, as we should see in prospect a re-visitation of the seventh of the old Egyptian plagues, when every green thing was swept by the devouring locust, from off the face of the whole earth.

It is no slight embarrassment to stand before so great an evil, with but the one weapon of an hour's time, and know where best to strike. Yet in this practical age, before an audience of practical folk, I cannot go amiss in describing some of our worst enemies, each typical of a large group, and showing you just how you can best overcome the fearful ravages which they inflict.

In opening with the Codling Moth, I have the advantage of introducing an old acquaintance. You have seen him, I wont say tasted him, nor will I hint that he has enriched many a glass of cider, over which we have all smacked our lips. You know how the little gray moth with its front wings copper-tipped, is hardly more than one-half inch in diameter, how it wakes from its pupa slumber from early May even to July depending upon the temperature, how the female moth lays a single white egg in the calyx end of each fruit—apple, pear or quince; how the little larva or caterpillar eats about the core, filling its mine with its own filth; how in four or five weeks it crawls forth from its dark tunnels and under some bark scale, in some old bird's nest, or in a crevice it weaves its delicate cocoon of finest silk, and soon changes to a pupa or chrysalis. In about two weeks it bursts its somber garb, and again flits forth a gay and handsome moth—may not handsome of handsome is as handsome does—for now it again stocks the fruit with the baneful eggs. This second brood is like the first, only the wee white larva—the so-called "worms"—do not leave the fruit so quickly, but often remain domiciled in the luscious pulp, till long after the apple is domiciled in cellar or storehouse.

As the one first to demonstrate the wondrous efficiency of the Paris green remedy for this worst enemy of the apple orchard, I am specially happy to explain and commend it to you. The old band method was utterly impracticable. It required labor and attention just when the tension of the busy season was at its height, and so the remedy failed, for want of needed labor and attention.

The far better hay remedy is only complete when the "wormy apples" are all felled to the ground. This labor of thinning is often very richly rewarded, in the finer fruit secured because of thinning. Yet, as with the labor of removing the bands, it is apt to be neglected, and thus the remedy fails to give satisfaction. Again in seasons of scarcity, when fruit is money, and when from the very nature of the case, Codling larva will be the most destructive. This remedy is only locking the stable door after one horse is stolen in hopes to save the other horse. At such times, when both horses are so valuable, the mere saving of one is far from satisfactory.

The use of the arsenites Paris green or London purple, saves both horses and is a cheap and easy way to accomplish this important work. My experiments, which have been elaborate and have extended over several years, established several points: First and most important these arsenites kill the insects before they enter the apples and so the fruit is preserved sound and beautiful. Secondly it takes a surprisingly small amount of the poison to sound the death knell of the insects. The faintest trace of these arsenites always kills, and thus we should be thorough in our application; but use a very dilute admixture. Again the moth is even waiting for the blossoms to open, and so the fatal egg is often laid before the blossoms have fairly fallen from the trees; therefore we must apply the death dealing potion very early, before the young fruit is larger than a two-grain quinine pill. Here is where some have partially failed in the use of this remedy. They have waited till the larva has hidden within the green pulp, and is safely out of harm's
way. I would not make the mixture stronger than one pound to two gallons of water. Were I to modify this at all I would make it weaker. To sprays an orchard the barrels should be drawn in a wagon, and so fastened that they could not possibly be thrown out. The head of the barrel should be tight so as to prevent waste, with two holes one for the pipe from the force pump the other for a stirrer. The force pump should be fastened to the barrel, and may be worked by a crank attachment to the wheels of the wagon. The liquid should be distributed in a fine spray, so that while we use but little we are sure to touch every part of every apple and leaf. The Cyclone nozzle works well, though a new nozzle made and sold by A. H. Nixon, Dayton, Ohio, is by far the best arrangement I have ever seen. By the aid of this, in connection with a good force pump, we need have no fear of imperfect work or failure to effect our purpose. Here let me urge again that this remedy be not deferred too long. One application made before the apples are larger than peas, effects surprising results. Let me further urge that all make use of this remedy. If this lecture should induce you—or even the most of you to do so, how good it would be that I came among you.

But what of the danger of using such virulent poisons on our fruit? Let me say that I have considered that point most fully. I have called in the aid of the microscope and the chemist’s reagents, and both have said: No danger. I have used fruit thus treated now for seven years and have no fear of poison. When the chemist’s delicate tests can find no sign of arsenic, when the sharp eye of the microscope sees no trace of the poison, nor can find any trace for weeks before the fruit is to be used. I feel that we may safely use and recommend these arsenites in this warfare.

I would not use or recommend white arsenic. In all cases that I have heard of where persons have been poisoned by use of these poisonous insecticides it has been the result of gross carelessness. Many people are born careless and never recover from it. To use white arsenic, which looks so much like many culinary articles, makes the danger from carelessness for greater. Paris green and London purple are so distinctive in their color that this alone forms the skull and cross bones that will effectively set danger aside. The danger from pasturing under trees charged with these poisons is not great, owing to the very dilute mixture and the fine spray. Yet it is always wise to keep stock from such an orchard till a heavy rain has washed off the little poison that may have fallen on the grass.

I would never use Paris green on fruit that is to be used within a few days from the time the poison is applied. Thus I would never use it to fence out the currant slug. The usable fruit and the insect in this case are often upon us at one and the same time. Neither would I use these arsenites on cabbages. Certainly not after the head has formed, for the very conformation of the vegetable makes such use dangerous. Again, no one should ever use or handle these substances with the bare, unprotected hand—especially this caution necessary in case of any abrasion of the skin. Neglect of this caution resulted in the death of a very talented young horticulturist of Indiana some years since. I am free to say, and I have probably handled these poisons as much as any one in the country, that reasonable caution makes their use perfectly safe.

In using these arsenites to destroy the Codling moth larva, we at the same time kill the Conker worms, the several species of leaf rollers that often fairly dig out the buds in early spring, and are very destructive; the old American tent caterpillar that flouts its tent in the orchardist’s face, just as the leaves are putting out in May, and thus in using this remedy we are killing not simply two but several birds with one stone. I would also use three insecticides, to protect against all leaf eating insects, where there is no danger. Thus on shade and ornamental trees that are being defoliated, on fruit vines and trees early in the season, and on such vegetables as potatoes, melons, etc., where the foliage is not used to swell our larders.

It remains to be said that as this poison must be eaten to destroy, it is impotent against the plum curculio, as here the egg is pushed by the mother weevil through the poison beyond the reach of harm. The same is true of all lice and bugs. They do not munch and chew, but insert their sharp beaks and suck the rich juices of the plant. Hence, they can pump the very life out of the
plants, though the latter be thoroughly coated with Paris green, and not even receive the first grip of stomach-ache.

Imported cabbage butterfly (Pieris rapae). This beautiful butterfly that has so recently invaded our fair country, needs no introduction to any of you. How well it illustrates the truth discovered by the great Charles Darwin, and to which I have already referred, that the newly imported species do most mischief and are most to be dreaded. "It is the new broom that sweeps clean" would be paraphrased thus: It is the new insect that makes a clean sweep. As you all know, the fine white butterflies, with their neat black buttons come sailing leisurely into the cabbage garden early in the year when the plants are just well started, and again in midsummer when the heads are niceley formed. And how well protected are the green eggs which are scattered about the cabbage leaves. Their green hues are so like that of the cabbage, that it requires a bird with very sharp eyes to secure those eggs for breakfast. Soon the green caterpillars the so-called "cabbage worms," come crawling forth from the eggs. Nature has also dressed these caterpillars in a mimicking robe, as in their green dress they escape detection except from the sharpest ken. These fat, slick, larva grow very rapidly, as we should expect from the way the cabbage leaves melt away. The ragged leaves, and the abundant droppings of the larva make it not difficult to find even these insects which owe so much to color protection. The second brood tunnel far into the cabbage, and are not infrequently sliced in exquisite manner by the same knife that prepares the kront or slaw for the table. In three or four weeks the little acrobat lies its tail end to some barrel, ledge or to the cabbage, spins another rope which it swings under its shoulders, and then presto, it just gets out of its own trousers in a marvelously way, and we have the queerest, greenish-gray chrysalid. After a few days of quiet in summer or the lapse of the long winter this pupal skin bursts, and the clean handsome butterfly flits forth once more, to repeat the same round of mischief.

For this insect California Pyrethrum or Bupach is a most efficient and satisfactory cure. This insecticide consists of the powdered stems and flowers of a composite plant, the Pyrethrum Cinereafolium. This powder is now cheap and entirely non-poisonous to the higher animals. It has two objectionable features, it loses its virtue upon exposure, and so the first article is the best. Again, it is not always efficient, as some insects are not destroyed by its use. The California Bupach Co., Stockton, California, are engaged extensively in the growth and manufacture of this article and so we should expect, they are not likely to send out a worthless article. I have used this Bupach with marked success both as a powder and mixed with water. In water I use a table spoonful to the gallon of the liquid.

Prof. Tracy and Mr. Alwood, of Ohio, both say they have succeeded perfectly with the powders, but very indifferently with the liquid mixture. My experience is quite the reverse. I have succeeded better by use of the liquid, only, as I think, because I applied it with a force pump, and the application has been more thorough. I presume the reason why our friends have failed, is that they have been too gentle in making the application. We must remember that the Bupach has to touch every insect, and so we must dash it onto the plants, and not sprinkle it on in the gentle way that it would fall from a sprinkler, would we do good execution.

Pyrethrum is excellent to kill house flies, poultry vermin, and even lice on cattle.

For lice on cattle, etc., however, I prefer to wash the animals in a strong decoction of tobacco. And I have no hesitation in saying that it is far more rational to kill these annoying lice by aid of tobacco poison, than to use the dirty weed to kill off our boys. I can endure the foul stuff while I am scrubbing a steer or heifer for a brief five minutes, but to have the stench and filth ever about, polluting air, car, audience room, and worst of all that blessed sanctuary, the home dwelling, is surely asking quite too much. To treat cattle place a half pound of the tobacco, the very cheapest will do as well as any, in aail, and turn on to it a gallon of hot water. As soon as it is cold enough, so that we can wring out clothes in it with the bare hand, the animal is to be scrubbed thoroughly with the decoction. I have gone over a fine, large Short-horn in five minutes. If the day is cold the animal should be kept in a warm
stable and covered with a warm blanket. In a short time it will dry off, and it will never feel any inconvenience. If done on a warm day it will not be necessary to blanket the animal. The next morning the animal can be groomed, and will look as smooth as ever. Pyrethrum will kill the lice, but it often requires to be applied two or three times in quick succession to make the work thorough, while one thorough application of the tobacco decoction usually is sufficient. I say usually, for as all stockmen know some individuals among our cattle are just bound to be lousy. In such cases even the tobacco decoction may be required two or three times in a winter. Of course sweet, whitewashed stables will be an aid in this work of extermination. Crude kerosene, or some mixed in lard, will also kill lice very effectively if thoroughly applied. But it is very disagreeable to handle, owing to its oily nature, and the animal is altogether too much stuck up to suit us, at our house. We don't believe in being "stuck up."

Plant Lice Aphides.—You are all familiar with the small, flask-shaped aphides, which so often fairly cover the stems and foliage of our trees and vegetables, and are especially free and at home on our house plants. I am said to have a weakness. I call it a strongness, in that I am specially interested in what interests the ladies, and when the object is a thing of such rare beauty, and the giver of such wholesome, lasting cheer, as those window bouquets which loving hands so patiently, carefully and thoughtfully train and care for. I should be doubly ashamed not to be interested.

These plant lice are green, or as seen on the cherry and dock, black, or occasionally when they work on the twigs they are gray. These are of the bug tribe and so of course have long piercing peaks with which they puncture the leaves or stems, that they may pump up the rich sap. They are good pumpers, rapid growers and increase beyond all computation. How often we notice that a few lice on a plant one day will in a few days be succeeded by a multitude. Indeed, were it not for other insects—our great but little friends—that feed upon and destroy these lice, I doubt if the farmer and horticulturist could succeed at all. The peculiar mode of propagation among these lice is strongly interesting and anomalous. Both, male and female lice, appear in late autumn. After pairing the female lays her many eggs about the twigs, among the buds of the plants. In the spring only females develop from these eggs. And these females continue to give birth to other females the summer through, so that there are no males at all till autumn comes again. The fecundity of these agamic females is something wonderful. It is estimated that a single pair might be, under the most favorable circumstances, the ancestors of over a billion lice in a single summer. In green houses and on house plants they are specially harmful, for in such cases there is no check by cold, and the agamic reproduction may go on indefinitely. And in case of plants thus protected the predeceous and parasitic insects are fenced out, and the lice go on with no let or hindrance, except that artificial means are employed. The past season, owing to the wide spread and almost universal drouth, was especially favorable to the rapid increase of these pernicious sappers. Many a plant was utterly devitalized because of these myriad sap suckers.

In all my extended experiments I have found nothing equal to the kerosene and soap mixture as a specific against these pestiferous lice. I make it thus: Mix one quart of soft soap and one pint of kerosene oil thoroughly together, then add one gallon of water. If thoroughly mixed this liquid will not injure even the most tender foliage, and if dashed onto the plants by use of a force pump, or a Woodason spray bellows, I will vouch that no guilty louse will escape. I have used this now for years and with the most perfect satisfaction. By use of the atomizers sold in the drug stores this kerosene and soap mixture can be readily applied to our house plants, and if the latter are set in a sink, or on an oil cloth, the application can be made with ease, and as the odor soon escapes, the remedy is not an unpleasant one.

It only remains to be said that this same kerosene mixture is very deadly to almost all insects, and if thoroughly applied to them is very effective. Wherever the arsenites are ineffective, or forbidden by the possibility of danger, and where there is no objection to the use of kerosene from its odor and taste, then I would recommend its use.
Bark or scale lice will succumb to this same substance, and are especially susceptible to it if the application is made just as the young lice hatch. Again, we have found that those terrible pests of the gardener, the raddish, onion and cabbage maggots are vanquished, surely vanquished, by the use of this liquid. True, many will use it and not succeed; only, however, because they will not be sufficiently thorough. We all know that these maggots tunnel far into the stem of the plants, and are thus safely out of harm's way. The only surety of success lies in making the application very three or four days. This is not very expensive and pays well. We turn a half gill about each cabbage plant, or in the case of radishes and onions turn quite a stream along each row. We have thoroughly proved the efficacy of this remedy both in the garden and in the laboratory.

The Currant Slug.—The currant saw fly is another enemy which has come to us from over the sea. As you all know it is a bad one.

These flies are about the size of the common house flies, and to the casual glance look not unlike them. The female, as is generally the case with insects, is the larger. She is yellow with black markings while the male is black with yellow lines. The female in May and June, by use of her wondrous saw, prepares a place on the underside of the currant and goose berry leaves along the veins, for her white eggs. When these are laid, they look not unlike strings of beads. The larva are first pale green, and though very small, can be quickly found by the perforations in the leaves. Little circular holes—often several—will show in each infested leaf. The slugs grow rapidly, and soon get too big for their skins.

Then the skin bursts and the slug relieved, again stuffs himself till he feels ready to burst again. These moltings, as the casting of the skin is called, occur five times. After the first molt the color is dark green with black spots, till the last molt, when the light green again appears. Soon after this the larva goes under some leaf and forms a cocoon of firmly woven silk in which it soon pupates. In a few days the flies again appear and soon we have the second brood of larva. These remain as pupa through the winter.

I need not say that the presence of these insects in any currant vineyard means death to the currants unless prompt measures are taken to eradicate the slugs. White hellebore is a safe and effective remedy. While it is a vegetable poison, it is in no way so severe a poison as the arsenites, though it destroys quickly the voracious slugs. It has been used for many years in both Europe and America, and I have never heard of any harm from its use. It can be applied in the same way as directed for pyrethrum, and I have found it more satisfactory than Bupach in this warfare. This hellebore may be used for all slugs where the arsenites or kerosene and soap mixture are not permissible. On shade trees I prefer the arsenites, on rose bushes, the kerosene, on raspberry vines, white hellebore.

The Wheat-bulb Worm.—This is an old insect, which was noticed in Michigan more than forty years ago. Dr. Fitch described it in part in 1856, and Dr. Riley gave an account of it in 1869, and referred to injuries to wheat about St. Louis. Ten years later, 1879, Prof. Lentner refers to this insect as a serious enemy to the wheat in New York.

More recently still. Prof. Forbes, the very able state entomologist, of Illinois, has given a very full and complete description and life-history of this pest. During the past season I have discovered one new peculiarity not mentioned, I think, elsewhere, that this insect also attacks the oat crop.

In its results the work of this insect is not unlike that of the Hessian fly, and doubtless has often been mistaken for Hessian-fly ravages. The wheat-bulb worm, Meromyza Americana, works as does the Hessian fly; first, in autumn in the young plant, and again the following summer in the nearly mature stock. The maggot or larva is slimmer than that of the Hessian fly, and has the two black longitudinal hooks, so common in Dipterus larva, but which are absent in the Hessian-fly larva. Again, in the stock which ripens prematurely the slim, greenish maggot is always found above the upper joint, and inside the straw, and not on the lower joints inside the sheath. The pupa is also easily distinguished from the puparium of the Hessian fly. This has none of the seed-like appearance, which gives rise to the common name, flax-seed state, applied to the puparium.
The fly is also quite different. It is more the form of the house fly, not slim like the mosquito, as is the Hessian fly. Its antennae are short, not long and slim. Its body is conspicuously striped with three dark, longitudinal bands, and its wings are straightened by four longitudinal veins, with three cross veins. So we see a little observation will quickly distinguish this insect from the other. I have no doubt but that in many of our Northern States this pest does very serious damage.

Prof. Forbes recommends late sowing, the same that is usually urged to defend against the Hessian fly, as the best remedy against this bulb worm. He also says that quite likely sowing spring wheat for a year might exterminate this pest in any particular region where its ravages are serious.

I am inclined, from my observations, to recommend the exact opposite for both these enemies. Early sowing, with the best culture, and strongest growing varieties of grain. In both cases it is the fall brood that does most injury, and as all may observe, if the wheat is early and vigorous, it will tiller out and often wholly recover from quite serious attack. Again, we cannot tell of a certainty that either insect will ever come in numbers sufficiently large to do damage. Though if the flies are abundant on the volunteer wheat in late August, we may expect them. If we knew the insects would certainly come, the late sowing might be wise. As the chances are that they will not, the parasites and untoward fortune are usually too much for them. I feel safest to work just as I should to get the best crop irrespective of the insects, and in the large majority of cases I win. So I urge you all to take hint from these wheat enemies, as from low prices, and by better tillage, more ample fertilization, more than make up for the evils that confront the wheat grower.

As I do not wish to extend this lecture so long that there will not be time for discussion and questions, I will only refer to two new enemies which I know to have camped down upon the Wisconsin apple growers. I refer to the plum gougler, which so gougles your apples that they look so gnarled and deformed that one would hardly recognize them as our king of fruits. The other is the apple maggot, which attacks fall apples, and upon such fruit is far worse than the codling moth, as the latter does not entirely ruin the fruit which it attacks, as it confines its filthy work close about the core. Several of these maggots may be found in a single fruit, and they tunnel the apples through and through. Hence, to eat such fruit means to devour a score or less of maggots, which, unless one is on the lookout, he is quite likely to do. The apples do not show the condition of things as do those attacked by the codling moth larva, and so one, unless warned by a previous victim or a less pleasant previous experience, is almost certain to destroy more or less of these insects by a very sure if not a perfectly agreeable method.

For both these enemies there is no remedy like that of swine in the orchard. Apples attacked by the maggot will almost surely fall, and so, with no pains on the part of the orchardist, the fruit and insects are converted into pork. In case of the gougler I presume the fruit might need to be shaken off. I have not been able to study the insect in the field. If so it would pay well to do it. I am greatly in favor of turning hogs in an orchard. If rings are in their noses they do no harm; while they enrich the soil, and become insect-destroyers on a grand scale.

My Experience and Success in the Dairy Business.

[Mrs. A. M. Bragg, Viola, Wis.]

In the little Farm Journal it says, take pen and paper, and sit down by the winter fireside and do part of your summers' work. Or in other words, get ready.

So in April 1, I got me a large book and wrote on it, "Cow Book." Then at the top of each page I wrote, 1st, "Butter churned in 1886." 2nd, "Butter sold and money received for same." 3rd, "Butter shipped to Merrill & Eldridge, number of pounds, cost, sold for, net proceeds, date of shipment. And other firms the same way: 4th, named each cow, and placed her name and age at the top of page.

Do you ask why I did this? I wanted to know by test and not by guess, what each individual cow was worth, and how much she would bring me in a year. As I had no oil test churn or any other appliance for testing, as each cow came in, I set her milk for one day by itself, and churned it by