

larvæ, which are killed as they eat their way inside the apple.

The importance of applying this spray at the proper time cannot be overestimated since the known fact that this is the best time to control codling moth, is based upon study of the life-history of the insect. This life-history has shown that the moths emerge from their cocoons soon after the blossoms fall and a few days later begin to lay eggs on the young leaves and sometimes on the twigs and young fruit. In a week or so the eggs hatch and the young larvæ hurry away to the fruit so as to get something to eat.

Here we come to the point of greatest importance in the control of this insect. It has been determined by careful watching and investigation that about 75 per cent. of them or three out of every four, enter the young apples through the calyx end. Naturally, then, the best way to make sure of killing the greatest possible number is to waylay them with poison on their way into the apple and, since 75 per cent. of them all travel inside at one place, that place is where the poison ought to be put without fail. Hence it is, that it is very important to make absolutely sure that the calyx cavity of the young fruit is filled with poison before this cavity closes up, as it does in from five to ten days after the bloom has fallen.

To do this and to make sure that sufficient of the poison enters the calyx of the apple, considerable force or pressure is necessary in spraying; and it is here that many owners of orchards fall down oftenest. Many men seem to think that all that is necessary is to put the spray on the tree until the tree is dripping. Trees may be dripping with spray and not be well sprayed. Getting the spray well into the calyces may mean the difference between controlling 90 or 95 per cent. of the codling larvæ, if the orchard is not too bad, and only controlling 40 or 50 per cent. It is largely on account of the necessity for plenty of pressure therefore, that power sprayers do better work as a rule than barrel sprayers or sprayers where pressure is generated from hand pumps. This is quite aside from the fact that power machines with a pressure of from 175 to 300 pounds pressure can cover a much larger area of orchard in a given time. It is very difficult for one or even two men to maintain a steady pressure from a hand pump, day in and day out. It needs men who know how to spray and an outfit that is in good condition. Satisfactory work can be done with a small outfit but it is more difficult than with a larger one; even with the latter it is necessary to get as close to the individual blossom clusters as possible in order to make sure that the spray really enters the calyx cavity.

Angle Nozzles Advisable

What are called "angle" nozzles, and a tower on the sprayer, will aid very materially in spraying properly. The angle nozzles are always a convenience and make for more efficient work, while the tower is especially necessary where the trees to be sprayed are large. Where angle nozzles are not used the spray shoots out straight from the end of the rod and a lot of twisting and manipulating of the rod is necessary before the spray can be properly distributed. Even so it is practically impossible without a very high tower, to spray downward; and spraying downward is a necessity at this time since many of the young fruits are standing upright on their stems at the time the spray is put on. The tower gives the sprayer greater reach and when used in company with nozzles that force the spray out at an angle of about 45 degrees from the rod, makes it possible to reach every twig and fruit and, also, practically every side of them.

A word about the material used for this spray and its strength. Strength in lime sulphur sprays is determined by its specific gravity (weight of liquid as compared with the weight of an equal volume of water). The specific gravity of liquids is determined by what is called an hydrometer, an instrument much like a thermometer in appearance and which is graduated so that when it is floating vertically in a liquid the reading at the surface level of the liquid gives the specific gravity of the liquid.

As the leaves come out on the trees the strength of the lime and sulphur solution must be weakened because of a danger of burning, so that instead of applying the same spray that would be put on for scale or the dormant spray, it must be diluted until it is only about one-quarter as strong. Hence the specific gravity of lime sulphur for the third spray should only be 1.008 instead of 1.035. As a usual thing 35 gallons of water added to one gallon of commercial lime sulphur will give the proper degree of strength but where the sulphur is homemade, its strength varies and a hydrometer is necessary.

The lime sulphur, however, is not depended on to kill the larvæ, it is really a fungicide and put on to control apple and pear scab. Arsenate of lead is used as a poison for the codling moth larvæ and it requires about two pounds of the arsenate of lead in paste form, or one pound in the powder form (the former being in most common use) to every 40 gallons of the 1.008 lime sulphur to get sufficient poison into the mixture. No more is necessary and, since arsenate of lead is rather expensive, no more is desirable in order to do the most effective work if the spraying is carefully done.

Fruit growers would be troubled much less with codling moth if woodpeckers were more abundant, and chickadees also. A few meat bones hung out in the orchard during the winter will encourage them and any trouble will be more than repaid. Diseases attack the codling moth and very wet springs or summers will help in controlling them, while a complete crop failure will practically wipe out this pest from an orchard.

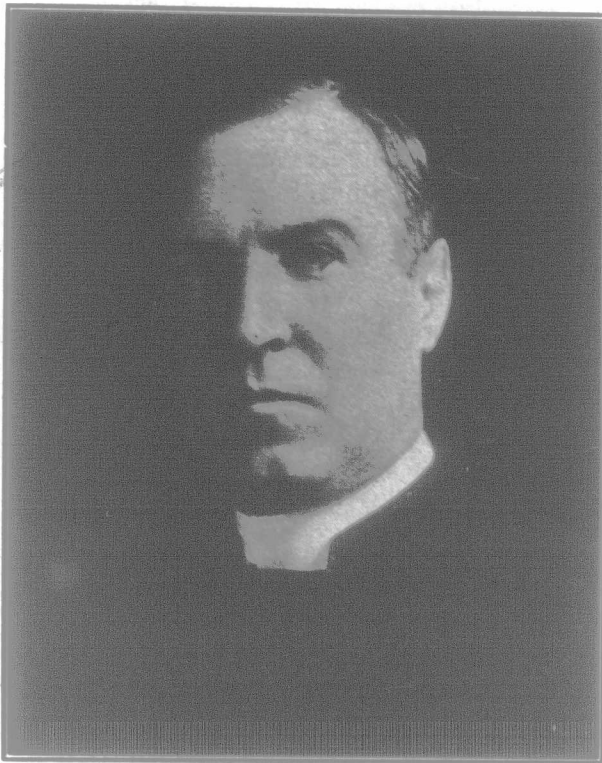
Life History.

In order to more completely explain the necessity

for careful spraying for this pest, its life-history is almost necessary and is, therefore, given here with the important points, some of which were mentioned previously, repeated again for emphasis:

The winter is passed in the full grown larval stage, in a little nest or cocoon under the shelter of the loose bark, or in crevices or holes on the trunks or main branches of the trees, or in any other dry, good hiding place near the apples from which the larvæ emerged. In spring the larvæ change to pupæ in their cocoons and the earliest moths begin to emerge soon after the blossoms fall. Emergence continues for a month or more, so that the earliest larvæ of this first brood may be more than a month older than the latest. A few days after their appearance the moths lay their eggs, placing most of them on the leaves and the rest on the fruit and twigs. The eggs hatch in a little over a week and the young larvæ almost at once seek the fruit.

On finding it, about 75 per cent. of them work their way into the interior through the calyx end, this being



Hon. Dr. H. J. Cody.

Who succeeds Dr. Pyne as Minister of Education for Ontario.



Hon. George Henry.

The newly appointed Minister of Agriculture in the Ontario cabinet.

the easiest place of entrance at this stage of the fruit. Here they feed for a few days and then proceed to the core and feed on the seeds and pulp. In about 25 days the larvæ are full grown and make their way out of the fruit either by the same place as they entered or at some other point. The apples usually, but not always, fall before the larvæ leave them. After emergence the larvæ seek the sort of places mentioned above and make their cocoons.

In the warmer parts of Ontario many of these earliest first brood larvæ soon pupate and transform into moths which lay eggs for a second brood. The larvæ of this brood do not all appear at the same time but continue to hatch out for several weeks. As a large percentage of the new brood enter the fruit by the side instead of by the calyx they often cause great loss. When these larvæ are full grown, they, along with the larvæ of the first brood that did not pupate, remain over winter in the larval stage in their cocoons.

FARM BULLETIN.

The 1918 Graduating Class at O.A.C.

The seniors of the Ontario Agricultural College to the number of thirty-five have completed their course and have qualified for the degree of Bachelor of Scientific Agriculture. This is a somewhat smaller graduating class than what usually goes out from the Ontario Agricultural College. The call for men at the front has reduced the attendance at the Guelph College, as it has that of every college in the country. Nine of this year's graduating class contemplate returning to the farm where they will have an opportunity of putting into practice the scientific knowledge which they have gained in the four years spent at Guelph. Several of the boys have enlisted, a few have not yet decided as to what work they will undertake, but a large percentage of the class have accepted important positions as lecturers and instructors at the colleges, or as supervisors of drainage work. Following are the names of those graduating, together with their home addresses and present positions: W. F. Geddes, of Kinburn, Ont., who took the Chemistry and Physics option, has secured a position as chemist with The British Chemical Co., of Trenton, Ont.; L. A. Flock, of Burlington, will have charge of investigation work in economic entomology with the Fruit Branch, of the Ontario Department of Agriculture; A. V. Mitchener, Port Rowan, is going to the Agricultural College, in Winnipeg, as lecturer in horticulture and entomology; W. Robinson, 984 Ossington Ave., Toronto, and H. L. Davis, of Forbes Ave., Guelph, had not at time of writing decided on what work they would follow; N. James, of Dublin, will be lecturer in dairying at the Manitoba Agricultural College; E. H. Parfitt, Brooklyn, N. Y., has accepted the position of demonstrator in dairying at the O. A. C. There were two who took in the bacteriology option: Lieut. S. M. Lord, Toronto, who is on leave of absence, and J. B. McCurry, of Hurdman's Bridge, who has joined the Botanical Department of the Experimental Farm, Ottawa. In the horticultural option, the graduates are: Lieut. W. M. Jones, of London, who is on leave of absence; C. F. Patterson, of Watford, who purposes returning to the farm; A. H. Tomlinson, of Guelph, who has accepted the position of lecturer on landscape gardening at the O. A. C.; A. J. Mann, Colquitz, B. C., has enlisted, and H. H. Selwyn, of Ottawa, purposes managing his own apiary. A large percentage of the students took the Agricultural option, there being twenty-one out of thirty-five. T. Cooper, of Wallenstein; F. L. Ferguson, of Parkhill, and L. G. Heimel, of Guelph, have been engaged as district supervisors of drainage for different sections of the Province. G. E. DeLong, of Rossmore; R. C. Elder, of Canfield; H. W. Graham, of Britannia Bay; G. W. Michael, of Sherston; A. D. Munro, of North Lancaster; O. D. McCulloch, of Port Perry; R. G. Newton, of Tavistock; P. M. Overholt, of Marshville, and A. A. Scales, of P. E. I., purpose returning to their farms. R. W. Maxwell, of Watford; J. M. Timms, Chatham; and C. R. Wilson, Merrickville, have enlisted. J. C. McBeath, Woodstock and E. S. Snyder, of Kitchener, purpose working on the Poultry Department at the O. A. C. L. E. O'Neill, of Bradford, goes with the Live Stock Branch of the Ontario Department of Agriculture; J. M. Waterman, of Fraserville, becomes Associate Editor of the "Canadian Countryman;" G. J. Arnold, of England, and E. W. Westman, of Sarnia, had not secured positions at time of writing.

Changes in the Ontario Cabinet.

Two important changes in the Ontario Cabinet have been announced by the Prime Minister, Sir Wm. Hearst. Hon. Dr. R. A. Pyne is to be succeeded by Ven. Archdeacon H. J. Cody, D.D., Rector of St. Paul's Anglican Church, as Minister of Education, while George Henry, M.P.P. for East York, is given charge of the Department of Agriculture. The latter portfolio has been held by Sir Wm. Hearst since the death of the former Minister, the late Hon. James Duff. Dr. Pyne has been appointed to succeed the late John Shaw as Clerk of the County Court of York.

Dr. H. J. Cody is well known as a prominent churchman and a forceful speaker. He was born at Embro, Ont., in 1868, and received his High School training at the Galt Collegiate Institute. After graduating from Toronto University he taught theology for a time, and then as a member of the Royal Commission on the reorganization of the University of Toronto he gained a knowledge of the higher educational problems in the State Universities of the Middle West, as well as in the East. He has always followed closely the Ontario Educational Association's work. Since 1894, Dr. Cody has been connected with St. Paul's Church, Toronto, first as curate, then as acting rector, and finally as rector. From time to time he has held responsible positions in the Church.

Outside of his duties in the Legislature, George Henry has been known as a dairy farmer in the Don Valley, York Township, and for his efforts on highway commissions for the acquisition of better roads. Mr. Henry was educated at the University of Toronto, graduating with the degrees of B.A. and LL.D. Subsequent to this he spent one year at the Ontario Agricultural College and returned to his 300-acre farm in the Don Valley. For fifteen years he was a member of the municipal councils of York County, and was finally Warden in 1909. He is a member of the York Highway Commission, and an officer of the Ontario Good Roads' Association. Mr. Henry has announced that he believes the future of Ontario farming will be closely allied with the live-stock industry.