THE CODLIN MOTH.

By His Honor Mr. Justice Dobson.

[*Read 12th May*, 1879.]

Some time ago I called the attention of the Society to the devastation created by the larvæ of the codlin moth in the orchards in the Northern parts of the Colony. It has appeared in the orchards in the vicinity of Hobart Town during the last year to an extent that must alarm all those concerned in apple growing, and this is an extensive industry representing an export trade of not less than £40,000 a year. On the former occasion I pointed out something of the history and habits of the moth and its larvæ, but the all important question now is, how it can best be destroyed? After the moth has deposited an egg in the eye of the young apple, and it seldom deposits more than one egg in an apple, the egg hatches and the young creature eats its way through the tender skin of the apple at its eye, into the substance. The orchardist is not aware of its presence till he sees a dark spot on his apple, and then a hole from which the creature expels small grains of excrementitious matter which cover the orifice of the hole. It feeds on the pulp and attacks the pips, the most vital part of the apple, which then falls and the creature escapes through the orifice which it has made. Its exit is rapid, and many apples may be examined in the morning, which have fallen during the night, before one is found in which a grub remains. The apples from which it has escaped, may be recognised by the orifice of the hole being cleared from the little brown grains which close it, the grub having cleared them away in coming out of the hole. The grub having thus passed through the luxurious period of its existence has now to consider the process of reproduction. It makes usually for the stem of the tree, and ascends till it finds a crevice in the bark; it there eats its way between the outer and inner bark, and makes a smooth and rounded resting-place for itself. There it spends its time in lining the hole with a web that it spins. It then become a chrysalis, and waits for the warmth of approaching summer, when the young moth comes forth, to repeat the process. The insect cannot be assailed when in the apple. Its destruction can, therefore, only be accomplished either in its moth state, or after it has left the apple. It is a night moth, and in England and America attacks the apples in June. Here we may assume that it does so probably in November, or early in December. The only known mode by which the moth can be destroyed is by lighting fires in the orchard, and in America the cuttings of the orchard are preserved to light fires for the purpose

on still midsummer evenings. Possibly lanthorns or lamps might be used with effect. But, under any circumstances, the moth is less assailable than the grub or chrysalis. Several modes have been adopted for this purpose. Bands of hay are tied round the trunk of the apple tree before the apples begin to fall, and when the grubs ascend the tree they are said to find these bands a congenial shelter in which to form their cocoons and hybernate. These bands are, during winter, carefully collected and burnt, thus destroying all larvæ which may have taken up their abode in them. Another mode is by folding a strip of paper six or eight inches wide round the trunk of the tree, and then tying it tightly round with string at the upper part of the paper. The grub ascends the trunk, gets under the paper, and when it reaches the upper part where the string is tied round, its ascent is arrested, but it has a hiding place formed between the paper and the bark, and there rests and spins, and on removing the paper can be destroyed. There remains one other mode which I believe to be the most effectual. The grub does not, as a rule, ascend higher than its necessities drive it. Most trees have the roughest bark, and consequently the best and least laboriously attained shelter for the grub near the ground. There most of the grubs are to be found on removing the rough pieces of bark. This is best done with a piece of iron hoop ; a knife is too sharp and is apt to cut the under bark of the tree. The trunk of the apple tree is their natural abode, and there in their chrysalis state they are most easily destroyed. The chrysalis will gradually fall with bark when rubbed off, and this should be burnt or dug deeply into the ground. The grub will, especially in crowded and overgrown gardens, occasionally go up other trees or even hybernate in crevices in the wood of fences, but if all those in their natural abodes in the apple trees were destroyed, much would be done, towards keeping under this scourge of the orchard. The grub is at present (May 10) spinning its web in its home in the apple bark, and it is much more likely to escape if it is disturbed now, than if it is left till, becoming a chrysalis, it loses its powers of locomotion, and then has its home broken into by the careful gardener. In America, it appears, that the grub is not dreaded in young orchards, presumably because the bark of the tree is smooth and affords no shelter for the grub. The grub so skilfully excavates its nest and surrounds itself with a web, that it appears to me that it would be impossible by means of any ordinary external application of lime water or other liquid to destroy it. Slacked lime or flower of sulphur applied by bellows could not reach it in its secure and cunningly devised abode. The fumes of burning sulphur, if this could be confined round the trunk of the tree by some form of petticoat, would, no doubt, be as destructive to these creatures as it is to all animal life, but I am not aware that this has ever been tried. Apples which fall should be picked up as soon as possible, as the grub rapidly escapes, and they should be put into water, or other means should be taken to destroy the grub when it makes its exit from the apple. The moth deposits its eggs in others of the pyrus family as well as in the apple. It is, however, of little use for any one person to attempt to destroy the insect, unless his neighbours are

also equally determined in their exertions to suppress this pest. One careless and slovenly gardener will afford a breeding ground for this creature, whence its progeny will carry devastation into the orchards of his neighbours.

Mr. F. Abbott, Superintendent of the Botanic Gardens, said :— With reference to this moth I would offer a few remarks, with a view to disseminating information not readily accessible to many readers. The moth has been so long known that the details of its operations may be found in any work on gardening or horticulture, and it will not be necessary for me to repeat them here, but there are some points on which a difference of opinion exists, that it would be well to call attention to, with a view to having them cleared up. The first and most important is the belief held by many that there are more than one generation of the moth during the season ; the basis of any operations conducted for the suppression of this pest will be materially affected by the truth or otherwise of this statement. The following extract from Mackintosh's Book of the Garden, Vol. II., p. 345, may assist in throwing some light on the subject. After describing the moth, he goes on to state that it 'invariably selects the finest apple in which to lay its eggs, knowing instinctively that these will be most palatable to its future progeny. (In Tasmania the Golden Harvey is most affected). In favourable weather the little grubs are hatched in a few days, so that in May apples and pears may be found infested by them. At first the grub is white, with a black head and collar, and black slanting double dots which run in four rows from the head to the abdomen, it afterwards becomes more of a flesh colour, the head and collar turning brown, the dots grey and indistinct. It is fully grown in 3 or 4 weeks as its food never fails. It now leaves the fruit, whether it is hanging on the tree or has fallen off, and selects for itself a secure place on the stem of the tree to spin its cocoon and become a pupa. It usually chooses the rents and seams of the loose bark, hollows itself out a chamber, and spins a white web over itself, intermixing some of the loose bark with it. The little grub becomes a pupa immediately in the web, and in a few days the moth comes out, which shortly afterwards pairs and deposits eggs on the fruit. In this way in July and August and partly in September, much sound fruit will again be pierced and infested with the caterpillar of this moth, which are then numerous in proportion to the number of eggs of the first generation which were laid and hatched in May. In the year 1822 which was warm and dry, more than the half, particularly of the choice fruit was grub eaten, and moths were still seen laying their eggs till the end of September. Fortunately the caterpillars which are so late in laying their eggs seldom arrive at maturity, as the fruit is taken off the tree at that time." If the above extract states the case correctly it unquestionably shows that there is more than one generation of the moth during the season. The following from Johnson's Gardener, Vol. III., p. 103, Book II.—"Apples"—in part bears out the statement as it shows that in some cases if not in all the larvæ remains in the pupa state for a short time only. After

describing the moth, its transformation and ravages, and declaring an experiment where the larvæ had gone through its various transformations while confined in a box. The author goes on to state, that, 'Our specimens did not appear in the winged state until July of the following year; but Reaumus says that they assumed the perfect state on the 15th of August, having been only a month from the time of their quitting the apples.' With a view of setting this point at rest it is very desirable that all having an interest in the matter should conduct experiments and make observation on it during the coming season, as it is only by united action that any definite conclusion can be arrived at. Although the presence of this Moth in the southern parts of the Island is of recent date, it has been in the northern for more than 20 years. Its prevalence in Hobart Town is attributed by many to some infected plums which were received from the North a few years ago. If this is really a fact it is a curious one, for I am not aware that the codlin moth is known to attack plums in England or America; there is, in both countries, a special moth, Tortrex or Carpocapsa nigricana which attacks plums to a serious extent, eating nearly into the stones, and causing the plums to fall prematurely. Whether it is possible that the two are present in Tasmania, and are confounded together in our orchards I am not prepared to say. It is a point that can only be satisfactorily determined by securing some of the infected plums next season, and confining the larvæ till the moth appears, when it would be easy to determine to what species it belongs. Perhaps the information that would be most acceptable just now, to the majority of readers would be such as would enable them to subdue or check the spread of the moth. I am conscious of being unable to suggest anything new on this head, and can only repeat such as are well known to most cultivators. Perhaps the most effectual is that of attacking the larvæ in their homes; this may be done in the winter months, by thoroughly scraping (with some blunt instrument, such as a ship's deck scraper) all the loose bark and *effete* matter from the trees; this should be thoroughly done, using actual force in some cases to tear off the old bark, when this has been done the loose bark should be collected and burnt to make sure of destroying the larvæ. The tree should then be dressed, on such parts of it having cracks or fissures, with some mixture that will set sufficiently hard to prevent any larvæ that may have escaped from obtaining an exit. There are many mixtures that may suggest themselves, but perhaps the following is as good as any:—Mix powdered dry clay with sufficient coal tar to form a thick paint, and work this mixture well into all cracks or crevices with a painters' brush. If this operation is properly performed there will be very few larvæ on the trees that will escape. A method commonly adopted in the spring or early summer months for destroying the moths is that of suspending lanterns in various parts of the garden with a view of decoying the moths. The lanterns should be smeared with some glutinous substance such as linseed oil, or have a saucer of the same suspended beneath them. In England and Wales lanterns for this purpose are often constructed by tying a few willow or other twigs into a frame

resembling in shape a Chinese lantern, placing a piece of clay in the angle of the willows just above the bottom ties in which to stick a piece of candle ; the frame is then surrounded by a sheet of cartridge paper which is kept smeared with oil during the season the lanterns are in use ; the moths attracted by the glare become immersed in the oil, and are thus destroyed. A third well-known method is that of gathering up without delay the fallen apples and scalding or otherwise destroying any larvæ they may contain. This method to be of any use, should be persevered in at very short intervals, as the grub, if indeed he has not already done so, quits the apple almost simultaneously with its fall, and if any delay takes place the operation will be futile. Although it is generally supposed that the larvæ select the stem of the tree on which to secrete itself and become a pupæ, yet this is by no means essential, they will crawl into any crevices affording the requisite amount of shelter, and thus old fences and pools are often thickly studded with them. I have with me a portion of an old post cut recently from the fence of a garden in town, in which several larvæ may be plainly seen and such places should not be lost sight of when steps are being taken to destroy and lessen the evil. In America various kinds of collar are placed round the base of the trees with the view of intercepting the caterpillar when in search of a safe resting place, sometimes a simple hay band is used, the object in every case being to encourage the larvæ to locate itself within the collar where it can easily be destroyed.