(No. 94.)

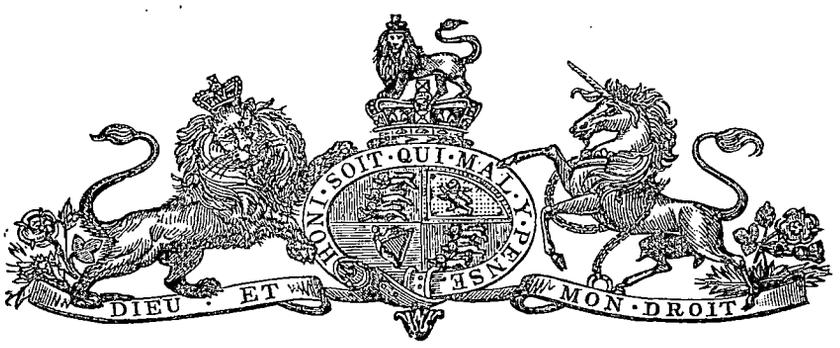
1890.

PARLIAMENT OF TASMANIA.

ORCHARD INSECT PESTS AND BLIGHT:

CORRESPONDENCE.

Presented to both Houses of Parliament by His Excellency's Command.



Kentfield, Franklin, 29th July, 1890.

SIR,

I HAVE the honor to submit to you the following answers to the schedule of questions which, with your approval, I distributed throughout the Colony. Although the proportion of replies is very small in comparison with the number of papers circulated, I nevertheless think that the result is satisfactory, and fully justifies the trouble and time which has been expended.

I have, as far as was possible, tabulated the replies in the exact words and as fully as the originals, and you will find in the Appendices such matters as could not be conveniently arranged under the various questions.

The replies to my queries seem to me clearly to point to one or two things,—

1st. That, with the exception of the Codlin Moth (and with regard even to that the opinions of observers are divided), there is very little attention paid to other pests, and, in fact, very little is known about them by the generality of fruitgrowers; and

2nd. That insect pests are greatly on the increase.

I will not now enter into the various questions which have been raised by the different gentlemen who have honoured me with replies; but I would briefly draw your attention to the following facts which are particularly noticeable:—

(*a.*) That the majority of the observers are agreed that the insect pests are on the increase.

(*b.*) That several pests are mentioned about which no definite information has hitherto been obtained. Among others there are—

Curculio in cherries.
Rust, attacking plants and cereals.
Oïdium.
Woodlice.
Spider attacking stalk of apple.
Several varieties of caterpillars.
Green grub, changing into cream-coloured moth.
Potato moth (most probably *Lita solanella*).
Garden-bug or soldier.
Cherry-tree borer.

We have no means of identifying these, and therefore of advising the proper remedies, until further and more definite information has been supplied.

There are other replies yet to come in: when I have received them I will then forward to you a more detailed analysis of the results of this enquiry. In the meanwhile I would urge upon the Government the absolute necessity of taking prompt measures to obtain and circulate such information as will lead to the proper identification of insect and other pests, and also their destruction. I would point out that this matter has just been taken up in both Victoria and New South Wales, and works are now being prepared for distribution. Any further help I can supply I shall be happy to give.

I have the honor to remain,
Sir,
Your obedient Servant,

EDWD. H. THOMPSON.

The Hon. the Treasurer.

NAMES OF CORRESPONDENTS.

(1.) C. Marshall.
(2.) H. Benjafield (Glenorchy)
(3.) H. Benjafield (Tasman's Penin.)
(4.) Robt. Smith.
(5.) Jas. M. Norman.
(6.) B. W. Thomas.
(7.) —
(8.) Wm. Newton.
(9.) Alfred Mornington.
(10.) Louis A. Peers.
(11.) Tasman Morrisby.
(12.) Henry Hall.
(13.) A. T. W. Downie.
(14.) F. H. Ward.
(15.) Wm. Walsh.

1. What is the name of your District?

(1) Sorell. (2) Glenorchy. (3) Tasman's Peninsula. (4) Tasman's Peninsula. (5) Cressy, in the Fruit District of Longford. (6) Mersey. (7) Mersey Fruit District. (8) Longford Fruit District, comprising Cressy, Longford, and Evandale. (9) Emu Bay. (10) Circular Head. (11) Glenorchy. (12) Hobart. (13) New Norfolk, Municipality of. (14) Gordon. (15) Port Cygnet.

2. Are there many orchards in your locality? About what acreage.

(1) No. (2) Yes, several hundred. (3) Yes, many young ones. (4) Yes; uncertain. (5) 1200 acres. (6) No; chiefly gardens. (7) The district contains about 616 orchards, giving an aggregate area of 476½ acres. (8) Nominal acreage, 1188. (9) But few large ones; area unknown to me. (10) About 140 large and small; 100 acres in all. (11) 200 or 300 acres. (12) No. From one to four acres each. (13) 600. (14) About 280. (15) About 700 acres, orcharding general.

3. Are you troubled by Insect Pests or Blights?

(1) In a few places. (2) Yes. (3) Yes. (5) Yes. (6) Blight on pear trees and on the fruit. (7) Yes. (8) Yes. (9) Yes, in many ways. (10) Yes. (11) Yes. (12) Yes. (13) Yes. (14) Yes. (15) Yes.

4. Do any of the following affect you?—if so, which.

(*a.*) Codlin Moth—*Carpocapsa pomonella.*

(1) Codlin moth. (2) Yes. (3) Stamped out probably. (4) No. (5) Yes. (6) Yes. (7) Yes; one-third of the district being infected. (8) Badly. (9) Not observed. (10) Yes. (11) Yes. (12) Yes. (13) Yes. (14) Orchard to extent of 35 acres, slightly. (15) Yes.

(*b.*) Mussel or Scale Blight—*Mytelaspis pomorum.*

(2) Yes. (3) Yes, badly in old gardens. (4) Yes. (5) Yes. (Observer states that the scale is the same as that found upon *acacia decurrens*, only slightly modified by change of habitat). (6) Yes. (7) Yes, to a very serious extent. (8) In some places. (9) Yes. (10) Yes. (11) Yes. (13) Yes. (14) Yes, general. (15) Yes.

(*c.*) Pear Slug—*Selandria cerasi.*

(2) Yes. (4) I have not heard of any. (7) Cannot say. (9) Not observed; I have no fears at present. (10) No. (11) Yes. (12) Yes. (14) Not that I am aware of.

(*d.*) Green Aphis—*Aphis mali.*

(6) Do not know them. (7) Yes. (9) Yes. (10) No. (13) Yes.

(*e.*) Canker Moth—*Anisopteryx pometaria.*

(7) Cannot say. (8) Yes; see reply to No. 5. (9) Yes. (10) No. (14) Not that I am aware of.

(*f.*) Apple-leaf Roller—*Cacœcia rosaceana.*

(2) Yes, I think so. (4) Yes. (9) Yes, in caterpillar stage from early spring to present date. (10) Yes. (12) Yes. (14) Not that I am aware of.

(*g.*) American Blight—*Schizoneura lanigera.*

(1) American blight. (2) Yes. (3) Badly. (4) Yes. (5) Yes. (6) Yes. (7) Yes, very much. (8) Badly in old orchards and in some young ones. (9) Yes. (10) Yes. (12) Yes. (13) Yes. (14) Yes.

(*h.*) Root Fungus or Warted Puff-ball—*Lycoperdon gemmatum.*

(4) Not heard of any. (6) Not known. (7) Not to my knowledge. (9) Not observed. (10) No. (11) I am not quite sure. (14) No.

(*i.*) Black-blight or Smut—*Capnodium (Australe?).*

(5) Yes, on holly only. (6) Not known. (7) Yes, slightly. (9) Do not know it. (11) Yes. (14) No.

(*j.*) Grass Grub—*Odontria (Zealandia?).*

(1) In some seasons. (2) Yes. (5) Yes. (6) For this I use salt, and have used gas-lime with great success. (7) Yes. (8) Yes. (9) Not observed. (10) Yes. (14) No.

(*k.*) Fire-blight—*Rœstelia cancellata.*

(1) Fire-blight. (5) Yes. (6) Yes. (7) Yes. (8) Yes, particularly pear and peach. (9) Do not know it. (10) Yes. (12) Yes. (13) Yes. (14) Yes, moderately severe. (15) Yes.

(*l.*) Earwigs—*Forficula auricularia.*

(5) Yes, in one garden only. (7) Yes, slightly. (9) Not observed. (10) No. (12) Yes. (13) Yes. (14) Yes, in a few instances.

5. Are there any other Pests which you can mention?

(1) No. (2) A sort of curculio in cherries. (5) Rust, attacking plants and cereals (oïdium). (6) Wood-lice; also a kind of spider which forms a nest at the stalk of the apple. (7) Yes, a variety of caterpillars, &c. (8) The "looper" was very bad last season; also a green grub, the moth of which is a creamish colour and shaped like a harvest-bug. (10) Small moth; larvæ attack potatoes; bad this season. (12) Yes, the garden-bug or soldier. This pest is very destructive to apples in autumn, as they suck the moisture from the fruit, giving it a diseased appearance when cut open, and also injures the flavour. Cherry-tree borer.—I have seen several fine cherry-trees destroyed by this pest. Have often explained to growers how it may be detected and destroyed. (14) No. (15) No.

6. In the case of "(*a*)," when does the Moth first show itself?

(1) Cannot say. (5) Depends on season. (6) Cannot say. (7) About the first week in November. (8) End of November; but it varies with the localities and season. Last season they did not show till Christmas. (10) End of November. (See Appendix E. 1). (11) It is difficult to say. I killed one on the 17th August, 1889. (12) The earliest moth on 30th October, the latest on 20th January. (13) About the first week in December. (14) March. (15) Cannot say.

7. What is the result of your experience with regard to the "second brood" theory?

(5) Simply impossible.* (6) I believe in it, but think it depends much on the season—wet and mild. (See Appendix A). (7) My experience tends to make me a believer in the theory, but my observations are not quite conclusive. (8) See Appendix C.) (10) Am of opinion one brood. (11) We have but one brood in our climate. (12) After several years of close observation I feel convinced that there is but one brood during the season. This is an important question, and should be placed beyond a doubt. If there are two broods in one season, it would be necessary to remove the bandages almost daily. (13) Have not seen a second brood. (14) Doubtful. (15) We have no evidence of a second brood.

8. In the case of "(*b*)," what is the earliest date at which you have seen the insects on the move?

(4) Not observed. (6) I cannot say, as it is only lately that I knew the moth.† (7) The beginning of November. (8) Not conversant. (9) I think in November, though it does not occur simultaneously. (10) Cannot say. (11) On the 8th of October. The time varies according to season. (12) No experience with this pest. (13) Cannot say for certain. (14) Cannot say. (15) About the middle of October.

9. Which of the above (or other) blights do you consider the most troublesome?

(1) Fire-blight in some seasons. (2) Pear slug, codlin moth, and the scale. (3) Scale at present. (5) Codlin moth, American blight, and fire-blight. (6) Blight on pear trees. (7) Codlin moth and mussel-blight. (8) Codlin moth. (9) In old trees mussel and American blights; in the young trees the apple-leaf roller, which has shown a strong partiality for the terminal buds. (10) Codlin moth—pear *(Phytoptus?)*. (11) Scale. (12) Scale blight. (13) American blight. (14) American blight. (15) Scale blight.

10. Have the provisions of the Codlin Moth Act been satisfactorily carried out in your district, and with what measure of success?

(1) There is far less moth than there was two years ago. (2) No; great failure under Board system; still, good has been done. (3) Not as we would like. (4) Yes. (5) Yes, in the face of many obstacles the pest has been much reduced. (6) I think not by some orchardists, but think treatment will improve. (7) Where the orchards are in the occupation of the owners the provisions of the Act have been very well carried out, and, I believe, with very encouraging results. (8) (See Appendix D.) (9) Luckily there is no moth; but district too large to be capable of thorough inspection. No notice taken of other insects. (10) Yes; only two infected orchards at present. (11) No, and not likely to, while administered by a Board. (12) Not sufficient attention paid to the gathering of infected fruit; this I consider the most important means of dealing with the pest. Unfortunately, many gather fruit after grub has escaped. (13) Good success this year (1889-90). (14) Yes. (15) Satisfactorily, and with a fair amount of success.

11. Are any remedies being applied in the case of the above pest?—and if so, what?

(1) Only destroying the infected fruit. (2) Bandaging, spraying. (3) None that I know of. (4) Solutions of sulphate of copper, sulphurous acid, soft soap. (5) Scraping and bandaging, picking the infected fruit. (6) Lime and sulphur boiled and a little kerosene added. (7) The regulations under the Act are being enforced, and spraying with London Purple has been tried, with very satisfactory results, to a limited extent. (8) Spraying, in a few cases, with London Purple. (9) There is a mixture recommended by the Inspector. (10) Cleaning trees, bandaging, heading back, &c. (11) Those under "The Codlin Moth Act." (12) Poisonous sprays have been used by some growers. (13) Bandaging and picking infected apples. (14) Bandaging and spraying. (15) Bandaging and close attention.

12. Have they proved successful?

(1) Yes. (2) Fairly so. (5) See answer to 10. (6) In my case, yes. (8) No; but I think it did not have a fair trial. (9) It is said so. (10) Yes; expect to be clean this season, or nearly so. (11) No; because not enforced. (12) No reliable information as to success or otherwise. (14) Yes. (15) Partially. The first orchard affected is now clean.

13. Do you consider that any of the blights are on the increase.

(1) No. (2) Yes, pear-slug and scale. (3) Yes, scale. (4) No. (5) No. (6) The pear-blight is, certainly. (7) Yes, all save the codlin moth. (See Appendix B.) (8) In number, but not individually. (9) I think that it would almost be impossible to increase the scale and woolly aphis except by planting fresh trees. (10) Yes, grass-grub, mussel-scale, fire-blight. (11) Yes, scale. (12) Insect pests are on the increase. (13) Yes. (14) Yes, mussel-scale and American blight. (15) Yes, the scale blight.

14. What are the principal descriptions of fruit grown in your district?

(1) Apples, pears, and plums. (2) All kinds. (3) Apples, pears. (4) Apples, pears, plums, peaches, cherries, and apricots. (5) All kinds, grown chiefly for home use. (6) Apples and pears. (7) Apples, pears, and plums, (8) Apples, pears, cherries, peaches, apricots, and quinces. (9) Apples and cherries are the most common. (10) Apples and pears. (11) Apples, plums, apricots, and pears. (12) Apples. (13) Scarlets, sturmers, and New Yorks. (14) General. (15) Crabs, sturmers, and scarlet permains.

15. Are some kinds more liable to the attacks of insects and blights than others?

(1) The apples. (2) Cherries and pears to the pear-slug, and plums. (5) The softer kind of apples and pears. (6) Stone-pippins to fire-blight. (7) Yes. (8) Ribstons, crabs, Alexanders, Victoria Alexanders. (9) My own orchard is too young. I cannot speak of others with definiteness. (10) Yes, in some situations, where planted in unsuitable spots. American blight attacks apples severely. (11) Apples, plums, and pears. (12) I find the Napoleon pear almost exempt from the codlin moth, whilst the Bergamot suffers considerably. Apples, both hard and soft, appear to suit the moth. The New York Pippin appears most subject to fire-blight. (13) Yes. (14) Yes. (15) New Yorks are more subject to fireblight than other sorts.

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* The observer has evidently misunderstood the meaning of Question No. 7. I never for a moment contemplated the possibility of the same moth being twice fecundated and depositing a second brood. The question really is, whether the grubs reared in one season undergo all their metamorphoses and become moths, which in turn deposit eggs and larvæ, are hatched all in the same season. In America, New South Wales (and Victoria?) it has been proved that they do.

† The observer seems to have mistaken this question, as it refers only to the mussel scale.

16. Do you find that some kinds flourish better than others?

(1) Sturmers, crabs, and crows' eggs. (4) Depends on local circumstances. (5) Depends on soil, aspect, &c. (6) All kinds do well here. (7) Yes. (8) Not noticed. (10) Yes. (11) No. (12) Stone-fruit trees do much better with me than pippin fruit. (13) Yes. (14) Yes.

17. What is the general character of the soil in your locality—(*a*) surface soil; (*b*) sub-soil?

(1) (*a*) Gravel, with (*b*) clay bottom. (2) (*a*) Heavy black, with (*b*) clay sub-soil. (3) (*a*) Sand, with (*b*) clay sub-soil. (4) (*a*) Light sandy, with (*b*) clay or sand. (5) (*a*) Either light or loamy, with (*b*) thin substratum of ferruginous gravel, overlying retentive clay. (6) (*a*) Chocolate, with (*b*) hard red soil or clay. (7) Very varied, embracing almost every character of surface and sub-soil in the Colony. (8) Being a large district, a variety. (9) (*a*) Chocolate loam, with (*b*) sub-soil of the same character, only probably with less *humus*. (10). (*a*) Chocolate or grey loam, with (*b*) clay; sandy soil without doubt suits trees best in this district. (11) (*a*) Alluvial, (*b*) clay. (12) (*a*) Heavy black, (*b*) clay. (14) (*a*) Loam with (*b*) clay. (15) various sorts.

18. What is the average rainfall?

(1) From November to April very little. (2) 23 inches. (3) About 40 inches. (4) 32·86 inches. (6) Cannot say. (7) I cannot say. (8) Not aware. (9) From 35 to 40 inches. (10) 35 to 40 inches. (11) We do not know. (42) No record. (14) Cannot say. (15) Cannot say.

19. Are you subject to any extremes of temperature—frosts, hot winds, &c.

(1) Often hot winds. (2) No. (4) Equable; slight frost in valleys. (5) Severe frosts, no hot winds. (6) Summer frosts—yes. (7) Late spring and summer frosts. (8) Frost and south winds. (9) We do not suffer from frosts or hot winds. (10) No, mild. (11) Not more so than elsewhere in this Colony. (12.) No. (13) Yes. (14) Moderately. (15). No.

20. What is the prevailing system of manuring in your district; if artificial, whether (*a*) bonedust; (*b*) superphosphates; (*c*) guano, &c.?

(1) Stable manure, bonedust. (2) Chiefly stable. (3) None. (4) Bonedust, supherphosphates of lime, chiefly stable manure. (5) Principally artificial; guano and bone dust. Experiments show that guano does not have beneficial effect when applied consecutively. (6) Our orchards do not require manure; on virgin soil principally. (7) Very little attention has been given to manuring. The prevailing system has been to plant and then neglect. (8) Where any is used it is generally mulching with stable manure. (9) Bonedust almost universally for potatoes, not fruit. (10) None for fruit trees; bonedust and guano for crops, grain, &c. (11) Farm-yard manure dug or ploughed in; bonedust. (12) Stable manure. (13) Superphosphates and bonedust. (14) Artificial; bonedust principally. (15) Bonedust.

21. From your experience, which do you consider the best, and in what proportion to the acre, for (*a*) young trees; (*b*) trees in full bearing.

(1) Half barrow-load to each tree. (4) Mixed farm-yard manure. (7) Bonedust or stable manure. The quantity per acre entirely depends on the character of the soil. (8) Not had any experience. (10) Bonedust, (*a*) 2 cwt. to acre yearly broadcast; (*b*) 4 cwt. to acre yearly broadcast. (11) Believe bonedust the best; from 5 to 10 cwt. to the acre. (12) I have not used any artificial manures. (13) About 10 cwt. per acre. (14) Bonedust, say half ton to an acre. (15) About 5 cwt. to the acre.

22. Do you irrigate? and if so, do you find that it prejudicially affects the keeping properties of the fruit?

(1) No. (2) No. (4) No. (5) A few do. Fruit is rendered deficient in flavour and keeping qualities. (6) No; I believe the apples would be injured; not the stone fruit, especially peaches. (7) I irrigate to a slight extent with prejudicial effects to the keeping of the fruit. (8) Some three or four estates irrigate; but I do not know whether it has effects as stated. (9) No. (10) No; do not require it. (11) No. (12) No. (13) Very little. (14) No. (15) No.

23. With regard to cultivation, do you work all the ground, or only just round the trees?

(1) All the ground. (2) All the land frequently. (3) All the land. (4) Chiefly all the ground. (5) Practice varies. (6) For the first five or six years cultivated between the rows and kept free from weeds. (7) I work all the ground; thorough cultivation, not irrigation, is what we require. (8) Both ways. (9) I work all the ground regularly. (10) Trees neglected; seldom work soil at all. (11) All. (12) I cultivate all the ground. (13) Work all the ground: (14) All the ground. (15) All the ground.

24. Have you experimented with summer pruning, tying down, &c., and with what result?

(1) No. (2) Some pinching apricots hastened fruiting. (6) Not much. (7) Yes, with good results from summer pruning. (8) No. (9) Yes, all my trees; have not noticed any result. (10) No. (11) Not sufficiently to warrant remarks. (12) No. I have some espalier trees; they are not so good as the standard ones. (14) Yes, but not satisfactory. (15) We advise summer pruning, but have not tried tying down.

25. Have you tried any of the new varieties of apples, such as Cox's Orange Pippin, New Town Pippin, Bismarck, Lord Wolseley, &c.?

(1) No. (2) Yes, a lot of new ones. (3) Yes, a host of kinds. (4) Some have. (6) No. (7) Yes, the three first, which are doing well. (8) Am trying them now. (9) No. (10) Yes; New Town Pippin and Bismarck are a success. (11) No. (12) No. (14) No. (15) No.

26. Have you any especially good seedlings?—if so, what are their particular qualities?

(1) No. (2) No. (3) No. (6) Some very fine apples, but rather woody. (7) No; there are some, but of poor quality. (8) Not aware. (9) No. (10) None. (11) No. (12) No. (14) No. (15) No.

27. Are any of them blight-proof?—or are there any you would particularly recommend for increased cultivation?

(1) Crabs appear the most healthy. (2) No. (6) Some. (8) Not aware. (9) No. (10) None. (11) No. (12) No. (13) All trees on blight-proof stocks. (14) No. (15) No.

28. Is there any other information which you can supply bearing upon the subject for enquiry?

(6) I am sorry to say that I found the moth and grub in outhouses (in June), old manure, &c., old bagging, which will make it more difficult to get rid of them. (8) No. (9) No. (10) See Appendix E. (2). (12) See Appendix F. (14) I consider that American blight is far more prevalent this season than usual, and is increased by artificial manures. (15) No.

APPENDIX A.

[*See Replies (No. 6) from Mr. B. W. Thomas.*]

NOTES SUPPLIED BY MR. G. BISHTON.

Re *Codlin Moth.*—I find that the grub becomes a moth about the end of September, and begins to lay its eggs on the apples about Christmas. I have proved that in six weeks the egg will have hatched and the grub become a moth. I contend that the moth dies out as soon as it has laid its batch of eggs, as, if particular notice is taken, you will find there is always a complete cessation of eggs, lasting about a fortnight, two or three times in the season up to March. At the end of this month the weather has become too cold to allow the grub to go through its change into the moth; hence they become dormant till the above time (September).

There is not the slightest doubt but that bandaging is good; but they must be looked over at least every three weeks or they are useless. I can prove beyond all doubt, as stated above, that the grub becomes a moth in the bandage. I consider the Act ought to be amended at once to read—"bandages to be cleaned of all grubs every 14 days;" and if this were done we should then find a decrease of the pest, and not till then; and the inspectors must be men of experience and made to do their duty. The districts must be small, as it is impossible for one man to look after any great area. I am taking out all my old trees, which, I think, is necessary. I am also a great believer in spraying with London Purple, and intend to give it a good trial this season. I shall be happy to give you any other information I can.

G. BISHTON.

APPENDIX B.

[*See Replies (No. 7).*]

IN answering the schedule of queries you have submitted, I have endeavoured to make my answers applicable to the district generally (Mersey).

There can, I think, be no question as to the urgent necessity for the appointment of an entomologist for Tasmania, and that the results of his investigations should be made known as widely as possible amongst fruit-growers.

I find that the absurd and varied theories set up by many of the fruit-growers are one of the greatest difficulties with which the Inspector has to contend.

As an old fruit-grower in the district, I can with confidence affirm that insect and other pests are spreading to an alarming extent, and that several new species have recently made their appearance which hitherto have been unknown in this district.

I am of opinion that the varied soils, &c. of this district give ample scope for the successful production of all the varieties of fruit grown in Tasmania.

Orcharding as an industry is only now beginning to receive attention in this district, but, where small orchards or fruit-gardens have been well kept, the results have been most satisfactory.

East Devonport, 3rd July, 1890.

APPENDIX C.

[*See Replies (No. 8) from Mr. William Newton.*]

Query No. 7.—The "second brood" theory, or, I think, more correctly speaking, the "second generation" theory, as far as my experience goes, is altogether a mistake. In not one case have I found chrysalides under bandages during the summer, and although there is a similarity with the codlin moth chrysalis, experiments have proved that they are a different moth altogether; in fact, the moth as stated in my remarks under Query No. 5 (the "Looper," probably *Anisopteryx*). The fact of a cocoon being empty is no criterion that the moth has emerged. If the moth had emerged the skin of the chrysalis would remain. I think the empty cocoons are easily accounted for by spiders, ants, &c. devouring the caterpillar. I have also experimented with them under cover, and with the same result as stated above.

W. NEWTON, *Inspector L. F. B.*
Cressy, 16th June, 1890.

APPENDIX D.

[*See Replies (No. 8) from Mr. Wm. Newton.*]

Query No. 10.—Bandaging has been strictly enforced, and during the past season a strict enforcement of picking clause was attempted, with only moderate success. Orchardists are very disinclined to carry it out, and as the district is so large and scattered it was impossible to enforce it strictly.

I have found a great amount of ignorance as to the habits of the moth, and all sorts of pre-conceived notions, and I have endeavoured to educate orchardists upon the question.

It must be understood this is not a fruit-growing district generally; the fruit is grown for domestic purposes, and people generally do not value it, and, being an agricultural district, the work of attention comes just when the farmer is busy harvesting; therefore I have found neglect just where it is absolutely necessary that the infected fruit should be gathered and destroyed; but not being gathered the evil is perpetuated.

WM. NEWTON, *Inspector L. F. Board.*
Cressy, 16th June, 1890.

APPENDIX E.

[*See Replies (No. 10) from Mr. Louis A. Peers*].

(1) Query No. 6—Codlin Moth.—Kept larvæ in boxes; found many did not enter pupa stage until October. Some of these moths emerged in November, others in December, and two in January. This and previous experiments satisfied me about the second brood theory. In examining bandages placed on trees this season I find an occasional cocoon pierced and the larvæ dead. Will keep a look-out for this enemy of the moth.

Larvæ of moth (*Dechelia sp.*) attacks apples in early part of season; is, however, kept in check by its natural enemy.

(2) Query No. 5—Potato Moth (*Lita solanella?* E.H.T.)—Very numerous this season; a great quantity of potatoes destroyed by larvæ. In one case a paddock returned about one ton of sound to acre. Shallow planting is the cause of tubers being attacked; the ends of tubers are exposed to sun and rain, which changes the nature of the potato and forms it into suitable food for the larvæ of this moth.

I enclose pamphlet I wrote for benefit of orchardists, as not one here had ever seen a codlin moth, although they had them in their orchards.

APPENDIX F.

[*See Replies (No. 12) from Mr. H. Hall.*]

Pear Slug.—The pear-slug, I am afraid, will become almost as destructive to the trees as the codlin moth is to the fruit. The rapidity with which this pest has spread is most surprising during the last season. I saw this pest some ten miles from town (Hobart). The pear, plum, and cherry trees suffer considerably from the ravages of the slug. During the last season the hawthorn hedges were also attacked by them, giving many of the hedges the appearance of being scorched by fire. I have seen the Napoleon pear quite bare of foliage, whilst the pears were hanging thick on the trees. This must have an injurious effect on the tree and fruit.

Last season I had all my trees dusted over with dry lime, the result being most satisfactory. On one tree (pear) I tried ashes with good results.

HENRY HALL.

NOTES ON THE CODLIN MOTH.

(By L. A. P.)

Published for Distribution among the Orchardists of the Circular Head District by the Circular Head Fruit Board.

THE CODLIN MOTH.

The Codlin Moth is indigenous to Europe, and has been introduced into America and the Australian Colonies by means which I shall mention hereafter. It was first noticed in America about 25 years ago, though it may have been established there many years before. The first mention of it in California was about 1875, where, owing to a favourable climate, it increased rapidly. According to our Tasmanian entomologists the Codlin Moth was to be found in the Colony over 25 years ago, and we are credited with having supplied New Zealand with the pest, it being first seen near Auckland in 1874, after a shipment of apples had been received from this Colony. In Victoria it has committed great havoc for many years past, but our energetic cousins hope to exterminate it. In South Australia it was not noticed until as late as two and a half years ago, and the Government seem to pay great attention to the means of exterminating it.

The Codlin Moth *(Carpocapsa pomonella)*, like all other moths, passes through four stages, viz. :— 1st, the egg ; 2nd, the larva or caterpillar ; 3rd, the pupa or chrysalis ; 4th, the imago or perfect insect, in which state it is ready to lay eggs, to go through the same changes again.

In the early summer or spring months the caterpillar, which has lain all winter in a dormant state, and but lately changed to the pupa or chrysalis stage, emerges from its prison as a handsome little moth, to enjoy its short life of one week. Having a duty to perform it at once sets about business, by looking for a partner, though not for life. Within two days after leaving the chrysalis the female moths fly from apple to apple depositing an egg—rarely more—on each, until their whole stock is disposed of.

The eggs are hardly visible to the naked eye, and are nearly always deposited in the eye of the young apple or near the stalk ; the place is chosen according to the position of the apple, the object being to find a cavity to receive the egg ; also because the skin of the apple is thinner near the eye or stalk than on the sides. In a few days, eight or nine, according to the weather, the young caterpillars are hatched, and they at once begin to bore their way into the fruit, always downwards. In about a week's time the caterpillar will be found to be about a quarter of an inch long, and as thick as a fine thread ; its presence in the apple soon being known from the brown dust it throws out of the hole it has made, which, I should mention, is enlarged from time to time as the caterpillar increases in size. In about three weeks the larva has come to maturity and turns its attention to the pips of the apple, no doubt wishing a change of food. After the pips are devoured the apple, recognising that the purpose for which it was growing—producing seeds, has been frustrated, falls to the ground. This just suits the caterpillar, which crawls out of the apple during the night to look for a place to spin its cocoon, in which to pass the winter, it having been a resident in the interior of the apple for about one month. It wanders about the ground until it finds the stem of a tree, an old fence, or in fact anything in which it can find a convenient crack or corner to stow itself away ; its favourite spot being under a piece of loose bark on the stem of the tree. When the place is found the caterpillar spins a small quantity of silken web on the surface of the chosen spot, and then a silken web over the top of itself, to which it attaches small pieces of bark or wood, thereby making it very difficult to detect. In this cocoon the caterpillar lies in a semi-dormant state for many months, probably eight or nine, before changing into the pupa or chrysalis.

It is an open question whether there are two broods in a season in this Colony or not. The moths, appearing at different times, may account for the supposed second brood, for, no doubt, the weather has a good deal to do with the time of the moths making their appearance, as in a warm dry spring all the moths would likely make their appearance about one time, whereas in a changeable season they would come out in batches, and so form supposed second broods. It will be interesting to experiment to settle the question, particularly as Cooke, in his *Treatise on Insects in California*, distinctly states that there are "three broods" in that country in one season.

Description.—The Codlin Moth is a small insect about three quarters of an inch across when its wings are spread. Its upper wings are light brown, marked with darker brown, with a reddish brown spot upon the hinder part ; the under wings are of a yellowish brown. The male can be distinguished from the female by a small tuft of black hair near the base of the under wings.

The larva, or caterpillar, is, during the first week of its existence, of a whitish colour, with a black head and neck, also two rows of black dots down its back and one row on each side. When it has come to maturity its body changes to a pinkish colour, and its head and neck are not so dark as formerly.

Speaking of orchards in California, Cooke says, "It is necessary to examine every tree in an orchard, that is, of apple, pear, and quince. We made an examination of a small orchard containing about 75 trees ; on 58 trees that we examined carefully, we found, all told, three larvæ, and on the 59th tree we found no less than 35 larvæ in less than fifteen minutes ; on the remainder we only found a few." The above shows that a thorough examination should be made in each orchard by a person competent to undertake the task.

The Codlin Moth is supposed to have been introduced into this and other countries by means of cases and boxes that contained apples, or had contained them at some time. The larva, when looking for a suitable place to spin its cocoon after coming out of the apple, finds a corner or crack in the box just the thing, and as the cocoon is very small, and covered over with little chips of wood, which the caterpillar gnaws off the box and mixes with the silk of its covering, it requires a practissd eye to detect it from the ordinary wood of the box.

Remedies.—I should recommend the following as being the most likely to keep down the pest ; they are similar to those recommended by entomologists in other countries, with a few hints from your humble servant :—

1st. During the winter months scrape off all loose bark and carefully gather up and burn. Remove all old props and rank weeds from under or near the trees, and burn at once. I have found cocoons under the bark of sapling props used for supporting the branches, and also in the dry seed stalks of docks and thistles.

2nd. Make a wash of either Caustic Soda or Kerosene and Soft Soap. (For directions see below.) After scraping the trees as above, apply this wash to the stems with a whitewash brush. It will destroy all insects and also fungi and mosses, and greatly improve the health of the trees. It can be done in a very short time by even a boy, and at a very trifling expense, say about one penny per gallon for the wash.

3rd. During the spring or early summer months try a few lamps, hung over dishes of water, in the orchard at night ; the light attracts the moths, which will be found floating on the water.

4th. Put bands of sacking or woollen rags round the stem of the tree, about six inches from the ground. These, if put on properly—for there is a right and wrong way of doing even this simple thing—will catch all the caterpillars that attempt to climb the tree. These bands should be put on the trees before the earliest apples begin to turn for ripening, and should remain on until all the fruit is picked. They should be examined weekly, and the caterpillars picked off into a tin of kerosene and water, which kills them at once. If these bands are fixed to the trees with small wire, there is no difficulty about tying and untying them, and there will be no need of the cry often heard in the bush, "We have no string to tie them on." One shilling's worth of wire would suffice for an ordinary orchard in this district, and would do duty several years if put away afterwards.

5th. All windfalls should be picked up as soon as possible, and used or destroyed before the larva escape.

6th. Don't have any old cases brought to your garden or orchard under any circumstances, unless you can dip them in boiling water containing soda.

Remember that no law, however strict, will do any good unless all join and do their best to carry it out, and so try to exterminate the pest, as if allowed once to get the footing it has done in New Zealand and other places, then apple-growing will be a thing of the past, and the cry will then be, "Who would have thought it would get so bad." That the Codlin Moth is in our orchards is not to be disputed, though not, perhaps, very numerous as yet. Let us all put our shoulders to the wheel and keep it going until the last moth is killed.

In conclusion, I cannot do better than quote the advice of F. S. Crawford, Esq., the able Inspector of Fruit Trees in South Australia. He says, "The object of the Government regulations is to protect the trees from the moth, and thereby increase the yield of sound fruit, and not to cause the destruction of orchards and fruit trees. The Inspector should be one, not only to see that the regulations are properly carried out, but also to instruct the owner of the orchard as to the easiest and best means of doing so. Do not hold the Codlin Moth too lightly. Remember that the cost of a little labour spent at the right time may save many hundred times that amount of money in the long run. The moth is bound to go ahead, unless active measures are taken to stamp it out on its first appearance."

I may add that the cost of carrying out the provisions of "The Codlin Moth Act" need not fall heavily on the owners of gardens and orchards if done in a prompt and systematic manner, but the sooner some action is taken in the matter the better for all. Spring will be upon us, and another batch of moths will go abroad to deposit their eggs and so increase the evil before orchardists have taken any steps whatever to prevent it. "A stitch in time saves nine."

Directions for making Kerosene Wash.

Kerosene, one pint; soft soap, two ounces; boiling water, one pint. Dissolve the soft soap in the boiling water, then add the kerosene and churn together for five or ten minutes until the two ingredients unite and form a cream. This cream can be diluted for use as a wash, at the rate of one pint of cream to two gallons of hot water. It destroys American blight and all insect pest.

Note.—For some of the above information the writer is indebted to Mr. F. S. Crawford, South Australia; Mr. M. Cooke, California, and Miss E. A. Omerod, F.M.S., author of "Guide to Methods of Insect Life."

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.