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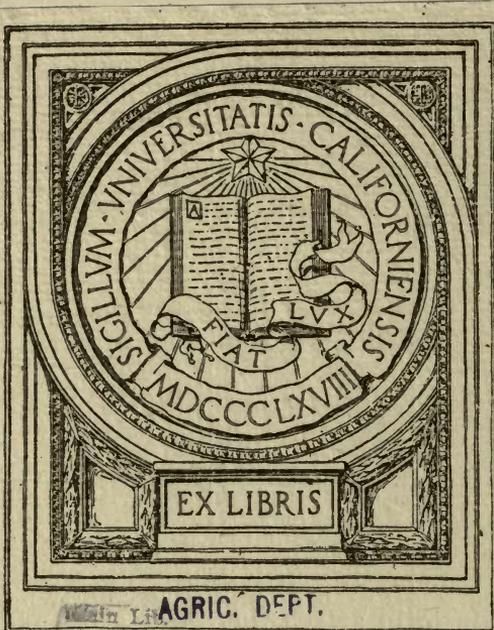
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REPORT ON  
INJURIOUS INSECTS

COLLINGE

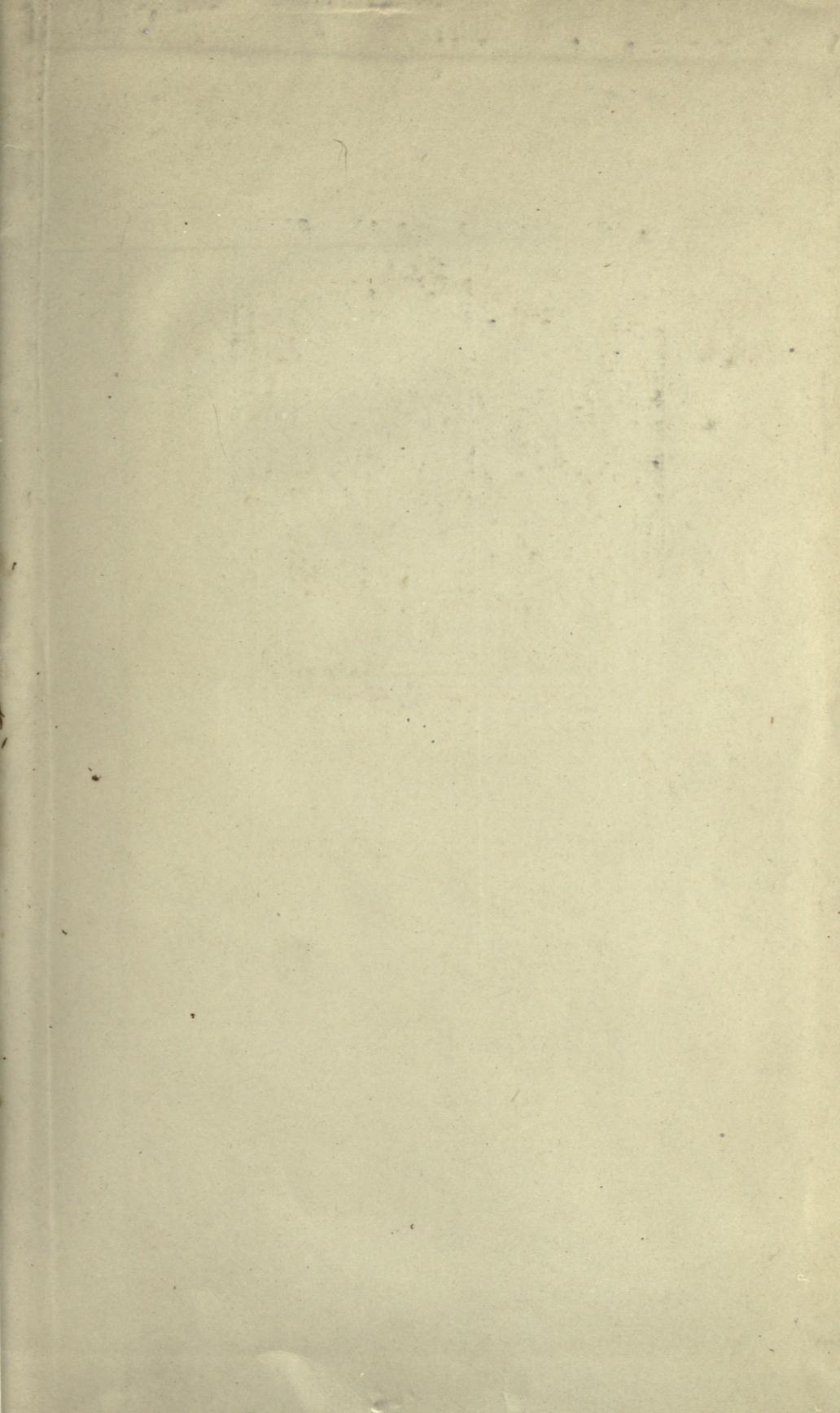
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REPORT

ON THE

# INJURIOUS INSECTS

AND OTHER

## Animals

OBSERVED IN THE MIDLAND COUNTIES

DURING 1903.

BY

WALTER E. COLLINGE, M.Sc.,

LECTURER AND DEMONSTRATOR IN ZOOLOGY AND COMPARATIVE ANATOMY  
IN THE UNIVERSITY OF BIRMINGHAM.

ILLUSTRATED.

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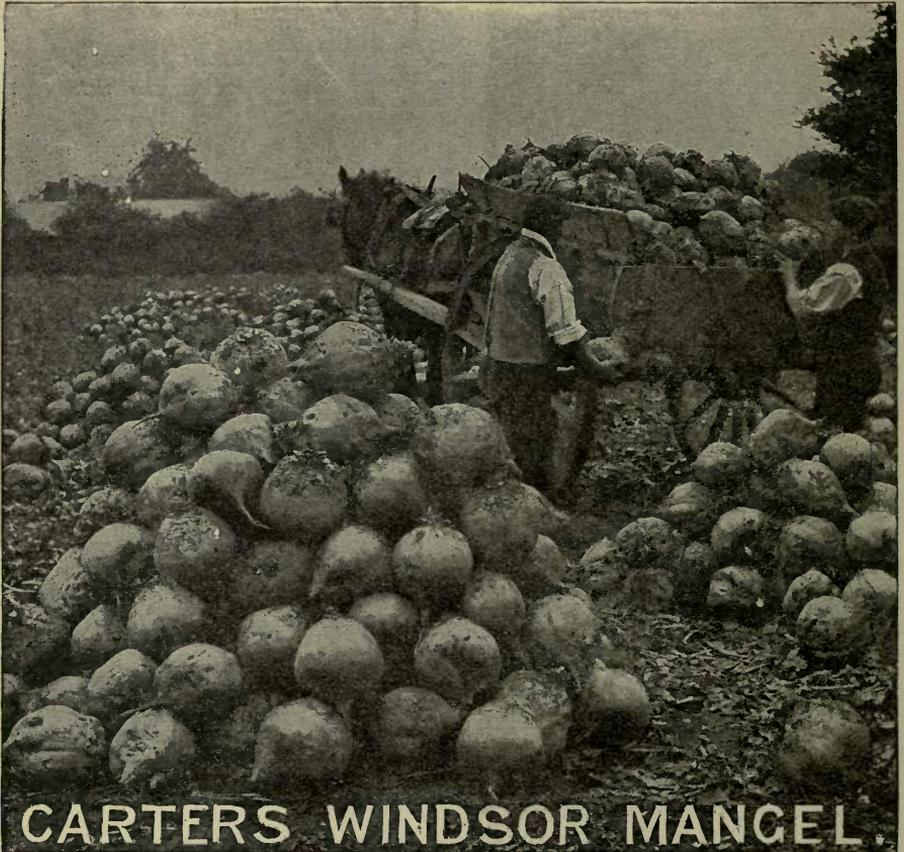
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AND OTHER

**Animals**

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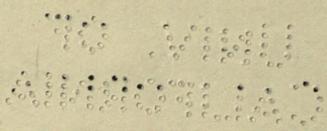
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## Preface.

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The present Report deals with those Injurious Insects and other animals, which have been forwarded to me by various correspondents in the Midland counties of England during 1903; these counties are:—Stafford, Derby, Nottingham, Leicester, Worcester, Warwick, Northampton, Oxford and Buckingham.

To the many correspondents who have from time to time forwarded material and specimens, I here wish to express my best thanks, and also for the kind courtesy which my applications for specimens, etc. have at all times received.

My thanks are also due to Mr. C. Mosley for the loan of the figures illustrating the various species.

I hope to continue the issue of these Reports year by year, and I shall always be pleased to receive information or specimens from anyone practically acquainted with the subject or in any way interested.

WALTER E. COLLINGE.

THE UNIVERSITY,  
BIRMINGHAM.

*January, 1904.*



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REPORT  
ON THE  
INJURIOUS INSECTS AND OTHER ANIMALS  
OBSERVED IN THE MIDLAND COUNTIES

DURING 1903.

**I. ARACHNIDA.**

**The Red "Spider," or Spinning Mite.**

*Tetranychus telarius*, L.

Specimens of this mite have been received from various correspondents who complain of the damage done to greenhouse plants, tomatoes, etc.

PREVENTATIVE AND REMEDIAL MEASURES.

Where the attack is a bad one, fumigating with hydrocyanic acid gas is always best. For every 1,000 cubic feet of space the following quantities are required: 2 ozs. of 98% of cyanide of potassium, 4 ozs. of sulphuric acid, and 7 ozs. of water. Proceed as follows: Add the 4 ozs. of sulphuric acid to the 7 ozs. of water in a jar; then take the cyanide, which should be wrapped up in blotting paper, and by means of a stick or piece of string, drop it into the water from the outside of the greenhouse. The window or door should then be shut, and the house should remain closed for three-quarters of an hour at least; after which time they can be opened to ventilate, but it should be remembered that it is unsafe to enter the house until an hour or more after the windows and doors have been opened. The best results have been obtained at a temperature of 50° F., about one hour after sunset, when the foliage is dry.

**The Black Currant Gall-Mite.**

*Eriophyes ribis* (Nalepa).

As in previous years this mite has done considerable damage and is rapidly increasing. Specimens from all parts of the Midlands have reached me during the past year.

I hope to publish shortly the results of an investigation on this mite, which has now extended over some years, and has produced some very encouraging results.

Mr. Cecil Warburton in his Annual Report for 1902<sup>(1)</sup> writes "It has occurred to me that great benefit would accrue both to sellers and buyers of black-currant cuttings, if those who supply them would have their crops examined by an expert to determine whether the mite is present or not. A certificate of freedom from the disease would be of considerable value to the possessor of a fine crop, and buyers would be only too glad to be sure that the cuttings supplied to them come from a pure stock. I would suggest, in the first instance, that any . . . who believe that the disease is not present in their plants, and who are willing to supply cuttings, should have their fruit gardens visited by an expert, and reported on, and that those . . . who require cuttings, should insist on some attestation of the purity of the plants from which they are taken. In this manner much would be done to gradually stamp out the disease." I most heartily endorse this very wise and valuable suggestion, as the importance of obtaining pure stock cannot be over estimated.

#### The Birch Gall-Mite.

*Eriophyes rudis* (Canest.).

Like the former species this seems to be rapidly increasing, especially in Worcestershire and Warwickshire, but fortunately it seldom results in killing the tree.

## II. MYRIAPODA.

### Notes on Two Millipedes.

*Julus pulchellus*, Koch, and *Polydesmus complanatus*, L.

The two millipedes here dealt with are common species, widely distributed, and occur in plenty throughout the British Isles.

It has long been uncertain whether or not these millipedes really do any appreciable amount of damage to crops, and especially to beans and peas. Mr. Cecil Warburton<sup>(2)</sup> who has examined infested beans, writes "The Spotted Millipede (*Julus guttatus*) has been accused of injuring various kitchen-garden plants. There is often a doubt as to whether this creature is the original cause of injury, or whether it only attacks something already partially decayed. In the present instance, beans alleged to be infested by it were sent, and they were found to have been previously badly injured by the Bean Beetle, *Bruchus*. In any case, the millipedes certainly aggravate the injury."

1. Journ. R. Agr. Soc., 1902, vol. 63, p. 305.

2. Journ. R. Agr. Soc., 1893, p. lxx.

Mr. F. V. Theobald<sup>3</sup> more recently records damage to potato crops, by *ℑ. pulchellus*, and another species, and a species of *Polydesmus*.

During 1903 I received potatoes very badly infested from Stafford. In this case both species of millipede were present, *Polydesmus* being, perhaps, the more numerous.

In September a correspondent sent me some seedlings of the wallflower (*Cheiranthus cheiri*), the roots of which were covered with young and medium sized specimens of *ℑ. pulchellus* and very small examples of *P. complanatus*. Of the former there were 60—80 on each plant, and 12—20 of the latter. The whole of the secondary roots had been bitten away, and the epidermis almost entirely denuded from the tap-root. Further there were small irregular shaped holes eaten out of the root.

In discussing the matter with him he mentioned that he had found beans (*Vicia faba*) eaten, and in the holes numerous specimens of *ℑulus*, but was doubtful as to whether or not they were the real culprits. Various writers have stated that the millipedes are not the culprits, and this opinion, I find, is largely held by horticulturists and others. This being so, it seemed desirable to place the matter beyond all doubt, the following experiments were therefore undertaken.

A plentiful supply of both species was obtained from the wallflower roots, and these were placed in soil, which had been very carefully, but unsuccessfully examined for traces of any other animal life. The soil was then placed in nine glass vessels, with about 50 specimens of each millipede in each. Into these the seeds of *Phaseolus multifloris* were sown on October 6th and the vessels were covered with glass lids. On the second day all the beans were found to have a few of the millipedes upon them, and these became more numerous later. On October 22nd, very small holes were observed, which rapidly increased in size until the 28th, when all the beans were removed and washed in 90% alcohol. The soil, etc., thus removed from the seeds was then dried and very carefully examined, but excepting the two species of millipedes no other animals were found. The soil from the glass vessels was then dried, and carefully worked through, with a like result.

The broad beans *Vicia faba* were sown in six similar vessels with the following results. On the second day they were noticed to have numerous specimens of *Polydesmus* running about them, but it was not until the sixth day that *ℑulus* was noticed. On October 26th three or four specimens were taken up and all were found to be infested with both *ℑulus* and *Polydesmus*, while the cotyledons were riddled with holes, more so than those of *Phaseolus*.

---

3. First Rpt. on Economic Zool., 1903, Brit. Mus. (Nat. Hist.), pp 84 & 86.

The soil was in each case treated as described above, but nothing beyond the millipedes was found.

#### PREVENTATIVE AND REMEDIAL MEASURES.

The only treatment of any practical value on a large scale is liming the soil, but for gardens, nothing is better than pieces of mangold or potato which have been dipped in a strong solution of Paris green (*Blundell's*). These should be put down at night and covered with a cabbage leaf.

### III. INSECTA.

#### The Woolly Aphis (*American Blight*).

*Schizoneura lanigera*, Hausm.

Although but few complaints have reached me of the presence of this aphid during 1903, I have learnt from many sources of, and personally seen, its ravages on apple trees throughout the Midland Counties, and particularly so in Warwickshire and Worcestershire, especially the latter county.



Fig. 1.



Fig. 5.

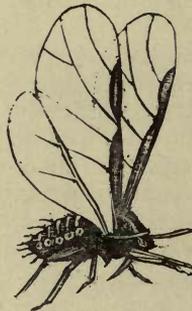


Fig. 4.



Fig. 2.



Fig. 3.

#### THE WOOLLY APHIS (*Schizoneura lanigera*, Hausm.).

Fig. 1.—Queen Aphis. Fig. 2.—Apterous viviparous female. Fig. 3.—Pupa.

Fig. 4.—Winged female. Fig. 5.—Winter form.

(All greatly enlarged, after Buckton.)

The damage has been most serious where the roots of young trees have been attacked.

As is well-known the insect attacks the roots as well as the trunk and branches of apple trees and other plants. The root form is by far the more injurious, especially to young trees. Infested roots develop at about a depth of a foot or more, peculiar clubbed, knotted growths, consisting of hard fibrous enlargements, in the crevices of which the aphids live. After a time these gall-like bodies commence to seriously interfere with the root functions and in addition set up centres of decomposition.

The form which lives upon the trunk and branches feeds upon the sap thus weakening the tree, and often causing the bark to split.

A very bad case of infection recently inspected was a conservatory, where both the root and branch forms were present attacking palms and ferns only. Applications of soft-soap and hot water as a sprayfluid, and hot water to the roots, entirely cleared the plants.

#### PREVENTATIVE AND REMEDIAL MEASURES.

It cannot be too often emphasised that in adopting any remedial measures, such must be taken immediately any appearance of the characteristic white cottony fluff is observed. A strong solution of soft-soap with a little paraffin in, dabbed on with a paint brush is very effective in the case of trees. Almost every sprayfluid and wash known, has at one time or another been recommended, but I have found nothing better for the branch form than soft-soap and hot water, in the following proportions: 1 lb. of soap to every 7 gallons of water.

For the root form, hot water, nearly boiling, should be applied about the roots of young trees. Strong soap and tobacco washes, or finely ground tobacco dust buried about the roots have also been very successful.

Old trees, which have not borne fruit for many years, are often found to be badly infested, and are a continual source of danger. Wherever possible these should be taken up and burnt.

In addition to the remedial measures suggested above, there are a number of natural enemies, such as tits amongst birds, lady-bird beetles and their larvae, lace-wing flies, etc.

#### The Turnip Aphis.

*Rhopalosiphum dianthi* (Schrank.).

Specimens of turnip leaves, badly infested with this well-known pest, have been received from the Counties of Derby, Nottingham, Worcester and Oxford.

A sprayfluid consisting of 5 lbs. of soft-soap, 5 gallons of water, and  $\frac{1}{4}$  lb. of tobacco, the whole to be well boiled together, and when applied, add three gallons of water to every gallon of the mixture, effected an almost complete cure.

#### The Plum Aphis.

*Hyalopterus pruni* (Fabr.).

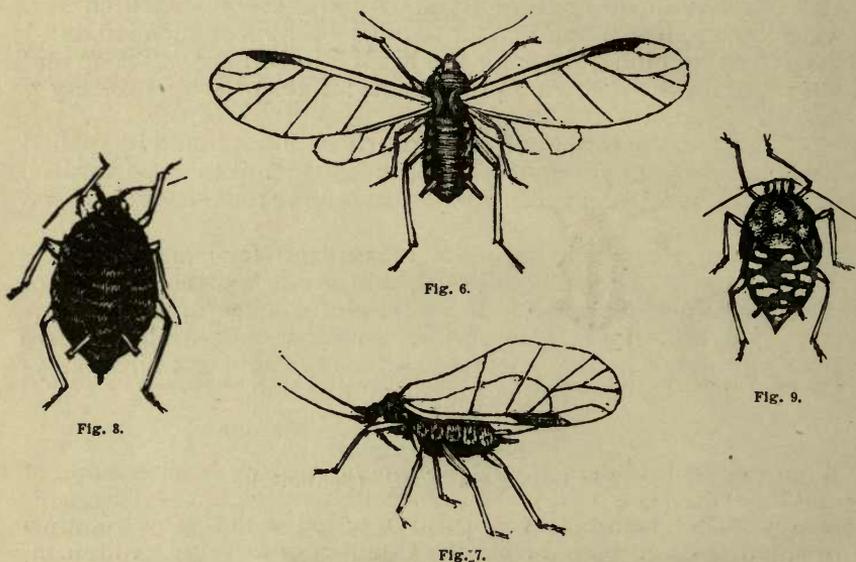
Examples of this exceedingly destructive aphid made their appearance on plum trees, in a garden near to Birmingham. The soft-soap and tobacco sprayfluid recommended for the turnip aphid was applied, but only partially reduced their numbers; various other sprayfluids were experimented with, but none succeeded in killing it. I hope to deal with this aphid again, when the results of further experiments will be recorded.

**The Bean Aphis.***Aphis rumicis*, Linn.

Few cases have been reported during 1903, and generally speaking cutting off the infested tops has proved efficacious. The soft-soap sprayfluid has also been found of service, but for bad attacks a mixture consisting of

|                     |             |
|---------------------|-------------|
| Soft-soap . . . . . | 2½ lbs.     |
| Hot water . . . . . | 3½ gallons. |
| Paraffin . . . . .  | 3 gills.    |

has been used with much success. The paraffin should be added whilst the soft-soap and water are still boiling. Before using add 12½ gallons of soft water.



THE BEAN APHIS (*Aphis rumicis*, Linn.).

Figs. 6 and 7.—Winged female. Fig. 8.—Apterous viviparous female. Fig. 9.—Pupa. (All enlarged.)

All Dock weeds and Thistles in the vicinity of the beans should be burnt, as the aphids are usually found in large numbers on these plants.

**The Green Rose Chafer.***Cetonia aurata*, Linn.

The larvae have been reported from the Counties of Worcester and Stafford, and the beetle from Warwick.

In addition to attacking the rose in the adult condition, it has been found especially injurious to strawberry plants during the larval condition.

Usually the beetles appear about the middle of May, and lay their eggs in cracks or crevices in the ground. The grub hatches out and feeds for two or three years, attaining a length of an inch and a half; when full fed it forms a large cocoon of earth pellets, in which it passes its pupal stage.

#### PREVENTATIVE AND REMEDIAL MEASURES.

Picking the beetles off the plant by hand on dull days, and digging up the ground round rose trees, at the same time allowing poultry to pick up the larvae, are the only effectual remedies I know of.

#### The Turnip Flea-Beetle.

*Phyllotreta nemorum*, Linn.

The turnip "fly" or flea-beetle has been reported from all the Midland counties during the past year, but, owing probably to the wet season, it does not seem to have done much damage.

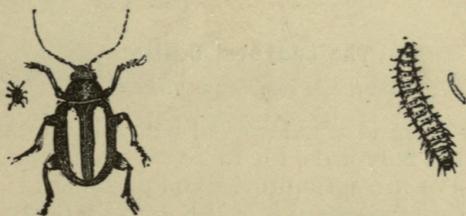


Fig. 10. The Beetle, natural size and enlarged. Fig. 11. Larva, natural size and enlarged

#### PREVENTATIVE AND REMEDIAL MEASURES.

A one per cent solution of potato-spraying mixture (copper sulphate and lime) has been used by Irish Agriculturists, with very favourable results. On a small patch of turnips, two applications of a mixture of equal parts of sulphur and soot scattered with the hand in the early morning when the dew was on the leaf, succeeded in entirely arresting these troublesome pests.

#### The Rust-Red Flour Beetle.

*Tribolium ferrugineum*, Fabr.

Specimens of this species were sent in October from a local brewery, having been found in crushed malt.

The life-history of a closely allied species, *T. confusum*, Duv., has been briefly described by Mr. F. H. Chittenden<sup>(1)</sup> as follows: "The tiny, clear white eggs are attached to some convenient surface in the cracks or on the sides of the bag, barrel, or other receptacle in which the infested substance is contained. These hatch into

1 U. S. Dept. of Agr. Div. of Entomol., Bull. No. 4, n.s., 1902, p. 114.

minute larvae, which feed for a period, depending upon the temperature, and then transform to naked, white pupae, which in due time change to beetles, which copulate soon after transformation, and another generation enters upon its life round. In this manner several broods are generated in the course of a year. From observations conducted by the writer it has been learned that this insect is capable, in an exceptionally high temperature, of undergoing its entire round of existence from egg to imago in thirty-six days. The minimum period of incubation was not ascertained, but it may be assumed as about six days. This with six days for the pupal period, gives twenty-four days as the shortest developmental period of the larva. In cooler weather these periods last two or three times as long. In well-heated buildings in a latitude like that of Washington we thus have the possibility of at least four generations in a year."

Fumigating with bisulphide of carbon is the best remedy, but as the vapour is deadly to all animal life, and also highly inflammable, it must be used with care.

#### The Ladybird Beetle.

*Coccinella septempunctata*, L.

Very fortunately there is a widespread belief in the Midlands, that it is unlucky to kill ladybirds, for these beetles and their larvae are distinct friends of the agriculturist and gardener.

The larvae are the enemies of the *Aphidae* (Green-fly) and the *Coccidae* (Scale insects), and in a lesser degree the beetles also.

The U. S. Agricultural Department have now for some years imported exotic species; from Australia, *Vedalia cardinalis*, was introduced to combat the destructive orange scale, *Icerya purchasi*, from the same country. A European and Asiatic species, *Chilocorus similis*, has been brought from China and Japan to deal with the San Jose scale, *Aspidiotus perniciosus*. From Hungary, *Coccinella septempunctata*, has been imported, and from Italy another species, *Leis conformis*, both of which feed upon plant lice.

Mr. Cecil Warburton,<sup>(1)</sup> reported in 1899 the introduction into England of a South African species, *Chilomenes lunata*, which it is to be hoped will flourish in this country.

More recently Mr. F. V. Theobald<sup>(2)</sup> has imported three well-known beneficial Tasmanian species, viz., *Leis conformis*, Boisd, *Orcus australasiae*, Boisd, and *Orcus bilunatus*, Boisd. The first mentioned species feeds only on Plant Lice, while both species of *Orcus* feed on Scale Insects and Aphides. Some 800 specimens of each of the latter species were sent, but unfortunately none arrived alive. About 170, however, of the *Leis* came to hand alive, and as

1. Journ. R. Agr. Soc., 1899, p. 670.

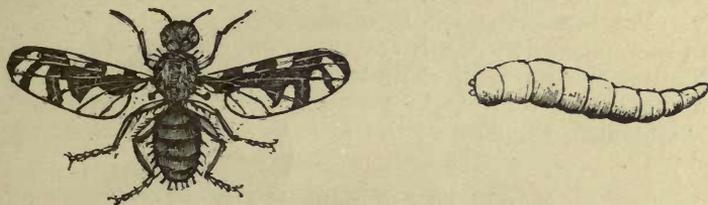
2. Journ. S. E. Agr. Coll. Wye, 1902, p. 49.

soon as the box containing them was opened many flew out of the window. Mr. Theobald remarks that we have no indigenous species with such a ravenous appetite, and if it succeeds in adapting itself to this country, it will form a substantial aid in checking the Hop Aphid.

### The Celery Leaf Miner.

*Acidia heraclei*.

This destructive enemy of celery plants was recorded in numerous instances during May and June, and again towards the latter end of the year. In most cases it was found on the celery plant, and not unfrequently where the same kind of crop had been grown year after year.



THE CELERY LEAF MINER (*Acidia heraclei*).

Figs. 12 and 13.—The fly and larva. (Both greatly enlarged.)

The fly which is one eighth of an inch long, makes its appearance towards the latter end of April, and the female deposits her eggs, which are numerous, on the upper side of the leaves. These hatch out in about six days time and the larvae at once commence to bury themselves in the tissues of the leaf, tunneling them and forming mines. In about a fortnight's time the larva changes to a pupa, inside a pupa case, and sometimes this remains on the leaf, but usually it falls to the ground. After a few days the fly hatches out and the life-cycle is again repeated. The last brood remains in the pupal stage in the earth throughout the winter.

#### PREVENTATIVE AND REMEDIAL MEASURES.

To keep the flies from laying their eggs upon the leaves, dusting the leaves with a mixture of finely powdered soot and lime (3 parts of soot to one of lime), has proved beneficial. It should be used when the leaves are damp.

When the celery has been dug up, the surrounding soil should be deeply buried, so as to prevent the pupae developing into flies; while all waste leaves, stems, etc., should be burnt.

The following sprayfluids have been used with success, especially upon young plants, (i) 1 quart of paraffin and  $\frac{1}{2}$  lb. of soft-soap to 10 gallons of water; (ii) 1 pint of carbolic acid and  $\frac{1}{2}$  lb. of soft-soap to 10 gallons of water.

**The Celery Stem Fly.***Prophila apii*, Westwood.

Numerous specimens of celery plants have been sent me very badly damaged by this fly. As yet its life-history is not fully known. The fly makes its appearance in May, and in all probability there are a series of broods during the year. The larvae eat their way into the solid part of the stem, and into the leaf stalks. The worm-eaten passages are clearly discernable, and turn a rusty-red colour.

## PREVENTATIVE AND REMEDIAL MEASURES.

As in the case of the Celery Leaf Miner.

**The Onion Fly.***Anthomyia ceparum*, Bouché.

A very badly infested crop of onions in Staffordshire was reported in July. Practically the whole of the crop was destroyed. The ground has since been deeply trenched and treated with gas-lime.

Planting the onions in shallow trenches, and, as the plants grow, gradually earthing them up, in order to prevent the fly from depositing her eggs near the base of the leaf, has been recommended as a good plan.

**The Beet or Mangold Fly.***Pegomyia betae*, Curtis.

The larvae of this destructive fly were received from a correspondent near Banbury, Oxford, in June, also leaves with the eggs in groups of twos and threes on the under surface.

In the case of those plants badly attacked and exhibiting blisters, they were pulled up and burnt, also many leaves. The crop was then sprayed with 1 gallon of parafin and  $\frac{1}{2}$  lb. of soft-soap, well mixed in 10 gallons of water.

Top-dressing with nitrate of soda and common salt is also recommended as forcing on the plants. The quantities per acre are from 1 to  $1\frac{1}{2}$  cwt. of nitrate of soda and 2 to 3 cwt. of salt.

**The Carrot Rust-Fly.***Psila rosa* (Fabr.).

As in 1899, the carrot rust-fly, has been very much in evidence in the Midlands during the past year, and this in spite of the very wet season.

It makes its appearance in the early spring and lays its eggs upon the carrot roots just below the ground, upon hatching out the larva, which is nearly a quarter of an inch long, without legs and yellowish in colour, with the anterior end pointed, makes its way into the lower part of the carrot, and then commences working upwards making passages in all directions. Leaving the carrot it goes into the earth and pupates. The last generation remains in the pupal stage in the earth until the following spring.

From the different accounts which have been given of the life-history, it is evident that there is much variation and great irregularity in the development.

#### PREVENTATIVE AND REMEDIAL MEASURES.

When the plants are singled the soil should be closely pressed around the root, so as to prevent the flies depositing their eggs there. Heavy watering has also been recommended for the same purpose.

Sand or ashes saturated with paraffin, scattered over the young plants tends to keep the flies off them. Watering with paraffin and water, 1 gill of the former to 1 gallon of the latter, after thinning has also proved most successful.

A good dressing of gas-lime dug into the soil before sowing has answered in many localities, as also strong liquid manure when the flies are first noticed.

#### The Cabbage Root Fly.

*Phorbia brassicae* (Bouché).

The larvae of this fly have been received from the counties of Stafford, Warwick, Worcester and Derby.

In 1894 Professor Slingerford, of the Cornell University Agricultural Experiment Station, published a very valuable paper on this fly, and amongst the various remedies suggested, the only effective ones were the application of a tarred disc of card around each plant, and the injection of bisulphide of carbon into the ground. The next best remedy was treating the roots of the plants with a mixture of 1 lb. of hard soap, 1 qt. soap dissolved in a gallon of boiling water, and 1 pint of crude carbolic. Sprinkling soot and lime around the base of the plants has in some cases proved effective in preventing the fly laying her eggs in the plants.

Farmyard manure and organic manures generally, are said to attract the flies, and should therefore be avoided.

Cease to grow cabbages, and cruciferous plants generally, if the infestation continues, on the same land for at least two years, and plough deeply.

#### The Pear Midge.

*Diplosis pyrivora*, Riley.

This fly, first determined as occurring in England in 1893, is rapidly increasing. Its presence may be detected by the small stunted fruit, which if opened will be found to contain numerous tiny jumping maggots. Briefly the life-history is as follows. The fly, which is black and gnat-like makes its appearance in April. The female introduces her eggs into the unopened flower-buds, which hatch out into tiny white maggots, tapering at each end of the body. These eat their way into the core of the young fruit, causing it to

shrive and drop, and towards the end of May, or in the beginning of June they leave it ; they then burrow into the ground and remain there in the pupal condition through the winter.

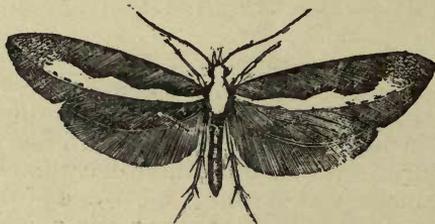
#### PREVENTATIVE AND REMEDIAL MEASURES.

As soon as noticed it is best to strip off and burn the whole of the fruit ; this of course must be done before the maggots have left the fruit and burrowed into the ground. Where the pest has not been noticed early enough for such treatment, a heavy dressing of the soil around the trees with kainit has been found to kill those in the pupal condition.

#### The Diamond-back Moth.

*Plutella maculipennis*, Curtis.

Leaves of cabbage with the caterpillars of this moth were sent me from north Stafford. It is exceedingly destructive and in some years it has caused serious injury to swedes, turnips, cabbage, etc. In 1891 it was especially numerous in the eastern counties of England and Scotland, and it then formed the subject of an exhaustive inquiry by the Board of Agriculture.



THE DIAMOND-BACK MOTH (*Plutella maculipennis*, Curtis).

Fig. 14.—The moth, greatly enlarged.

The caterpillar is about half an inch long, spindle-shaped and of a pale green colour, the head is grey and the first segment is minutely spotted with black. The moth appears at first sight not unlike a Clothes-moth, but when looked at carefully, or with a pocket-lens, it will be seen that the fore wings are marked at their hinder portions with a light wavy stripe. When at rest the two wings are brought together and the two light wavy stripes form a row of diamond-shaped markings.

#### PREVENTATIVE AND REMEDIAL MEASURES.

As a result of the 1891 inquiry and experiments, a dressing of one part of lime to three parts of soot mixed together, seemed to be the best remedy. Sprayfluids consisting of soft-soap and paraffin, carbolic acid and paraffin, solutions of quassia and soft-soap, etc., have proved only partly effectual.

Fortunately the caterpillars are attacked by an Ichneumonid parasite, *Limneria gracilis*, Gravenh., the female of which lays an egg in the caterpillar's body, upon which the larva when hatched feeds.

**The Raspberry Moth.***Lampronia rubiella*, Bjerk.

The small pinkish-red caterpillars of this beautiful little moth, have proved very destructive to raspberry canes in Buckinghamshire and elsewhere.

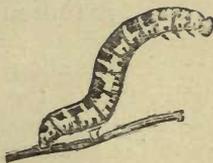
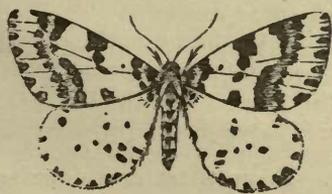
The eggs are laid upon the raspberry flowers towards the end of May, and hatch out in about five or six days, when the larva may be found in the small white receptacle upon which the fruits develop. It next makes its way out of the receptacle, and either crawls or lowers itself by means of silken cords, to the earth; here it forms a small, flat, white, silky cocoon, in which it remains for the winter. Up to this period it has not fed upon the fruits. Hibernation continues until early in the spring, March or April. The caterpillar is about a quarter of an inch long and of a pinkish-red colour. The head is black, and on the first segment there are two fused patches of black. It now commences to crawl up the canes, and makes its way into the base of the buds. Later it eats its way into the pith of the canes, just below the base of a bud, where it remains as a pupa for about three weeks.

## PREVENTATIVE AND REMEDIAL MEASURES.

The ground around the canes and poles should be deeply buried, in order to kill the hibernating caterpillars. The lower parts of the canes should also be painted with a mixture of soft-soap and paraffin early in March, so as to prevent the caterpillars from crawling up to the buds. Badly infested canes should be cut and burnt as soon as the caterpillars are noticed.

**The Magpie Moth.***Abraxas grossulariata*, Stephens.

The attacks upon currant bushes of the caterpillars of this moth have not been particularly injurious. In connection with another much more injurious pest, the black-currant gall-mite, I have had to examine large numbers of currant bushes, and excepting where the bushes were growing against walls, all were particularly free from either the caterpillars or pupae of this moth; the former were found to have numerous caterpillars and pupae on them.

THE MAGPIE MOTH (*Abraxas grossulariata*, Steph.).

Figs. 15 and 16.—The moth and larva.

The moth makes its appearance towards the end of the summer, and lays its eggs in groups of three or four, near to the mid-ribs of the currant leaves. After about eleven days they hatch out, and the caterpillars feed for a short time upon the currant leaves. They then spin leaves together enclosing themselves, and fall to the ground. When, however, the bushes are grown against walls, the larvae hibernate in the cracks, etc., between the bricks, or in the accumulations of dead leaves between the branches and the wall. In the early spring they commence to feed upon the young leaves and become full fed usually about June, when they change to the pupae. The pupae may be found in the earth, fastened to the leaves or stems, or hidden away in crevices in the wall.

#### PREVENTATIVE AND REMEDIAL MEASURES.

Early in the spring and again in the autumn the bushes should be sprayed with Paris green (*Blundell's*) in the proportion of 1 lb. to 250 gallons of water, and 2 lbs of lime, the whole to be well mixed. This must not be used on ripe or ripening fruit, it may, however, be safely used four or five weeks before the fruit is gathered, if necessary.

Hand-picking, especially in the case of wall bushes, should be adopted in the spring, and the ground around the bushes hoed and dressed with quicklime.

Where, in the autumn, there are evidences of a bad attack, the bushes should be pruned and the cuttings burnt. The ground beneath should be treated with quicklime and early in the winter dug in deeply.

#### The Gooseberry Sawfly.

*Nematus ribesii*, Curtis.

Considerable damage has been done to Gooseberry bushes in Worcestershire by the larvae of this species.

The eggs are laid on the underside of the leaves, and the larvae hatch out in from six to eight days. At first they are very small, almost white with a few black spots anteriorly and a black head. There are four moults, and after the first one the caterpillars are greener in colour, and the black spots more numerous. They continue active for about twenty-eight days. On becoming full-fed they usually fall to the ground, enter the earth, and there spin brownish-coloured, oval cocoons. Sometimes the cocoons are found upon the bushes themselves. From these cocoons the flies appear in about twenty-one days. Usually there are three broods during the summer; the cocoons of the last brood remain in the earth until the spring, and the flies appear early in April.

PREVENTATIVE AND REMEDIAL MEASURES.

Early in the spring the surface soil from beneath the bushes should be removed to the depth of a few inches, and buried in a deep hole ; in this way the pupae are destroyed ; the soil from the hole may be used to replace the surface soil removed.

Handpicking the leaves which have eggs or young caterpillars on, soon reduces the number.

Amongst the various sprayfluids Hellebore powder and water is largely used and with considerable success ; many growers, however, object to it on account of its poisonous nature. Flour of sulphur dusted on the plants when the dew is on the leaves is said to be quite as efficacious. Dusting with fresh lime has also proved valuable.

A mixture of 6 lbs. of soft-soap and 4 gallons of paraffin added to 100 gallons of water, has been used with fair success by some growers.

IV. MOLLUSCA.

**The Destruction of Bean and Pea Crops by the Common Field Slug.**

*Agriolimax agrestis*, L.

During the past year I have received from all parts of the British Isles, and particularly from the Midland and Eastern counties of England, numerous examples of the common field slug (*Agriolimax agrestis*, L.), which have been found injuring Bean and Pea crops.

*Agriolimax agrestis*, L., is the commonest and most destructive slug in the British Isles. It was first recognised in this country by Dr. Martin Lister in 1674. It is almost world-wide in distribution and owing largely to its wonderful powers of adaptation, it has established itself wherever the white man has made his home, very often at the cost of less destructive species.

After a mild winter, and the occurrence of warm weather in the early part of the year, these slugs are exceptionally numerous and exceedingly destructive to young vegetables, seedlings, beans, peas, clover and oats, and in view of the loss occasioned by their depredations, some account of the life-history and suggestions for preventative and remedial measures may be useful.

The full grown slug measures from one to one and a half inches in length, the body is slender, usually yellowish in colour, mottled with darker speckling, but the colour is subject to much variation, the slime is thick and milky-white. The mantle, which is one-third the total length of the body, is large and round in front, more broadly so behind and concentrically striated ; near the tail the back exhibits a slight keel. The sole of the foot is pale grey or cream colour.

The shell, which is internal, being situated below the mantle is small, nearly oval, concave beneath, nearly flat above and thin, the margins being membranous, the nucleus is small and slightly eccentric.

The eggs are globular and quite transparent, measuring 2 millim. in diameter. The slugs commence to deposit the eggs in clusters of from 20 to 30 towards the end of March and continue to do so until the end of November. The young are exactly like the parents only smaller.

Generally speaking they attack the developing plant immediately it makes its appearance above the level of the soil, feeding upon the young leaves from dark until daybreak; on the approach of light they make their way beneath the surface, lying concealed amongst the loose earth which the germinating plant has dislodged, in the burrows of earthworms or underneath stones, etc.

#### PREVENTATIVE AND REMEDIAL MEASURES.

Where the extent of ground is limited, such as a garden, the young plants should be covered at night with plant pots, in which the drain hole has been filled up with a bit of clay, when the pots are removed in the morning, the slugs will be found on the plants and sides of the pots, and may be picked off and killed. Starlings, however, will clear more specimens in an early morning than any amount of picking. Toads are also very fond of them.

Until the plants are four or five inches in height, I have seen excellent results from the use of very fine ashes sprinkled over the ground to a thickness of about half an inch, but this is of no use in wet weather, and to be any service the ashes must be renewed each evening. Soot may be used in a similar manner.

In fields the use of sand saturated with paraffin scattered amongst the beans, has proved a very effectual remedy.

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