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OBSERVATIONS UPON
INJURIOUS INSECTS,
SEASON OF 1891.

*Approved by the Station Council, Alston Ellis,
President.*

FORT COLLINS, COLORADO.

MAY, 1892.

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OBSERVATIONS
UPON
INJURIOUS INSECTS

SEASON OF 1891.

BY C. P. GILLETTE.

THE FRUIT-TREE LEAF-ROLLER.

(*Cacæcia argyrospila*, Walk*.)

IMPORTANT REFERENCES AND SYNONYMS.

1869.—Robinson, C. T. *Tortrix furrana*. Described as new species.

1870.—Packard, A. S. *Tortrix I'-signatana*. Mass. Agr'l. Rep. Described.

1885.—Packard, A. S. *Cacæcia argyrospila* Walk. Rep. Com. of Agr. p. 329.

1890.—Riley & Howard. *Cacæcia argyrospila* Walk. Insect Life v. 3, p. 19.

1890.—Packard, A. S. *Cacæcia argyrospila* Walk. 5th Rep. Ent. Com. p. 192.

Soon after arriving at Fort Collins in January of last year, I noticed upon the trunks, branches and small twigs of apple and other fruit trees, little grayish egg-patches (Fig. 1, a) of some small moth.

*Determined for me by Mr. L. O. Howard, Washington, D. C., and by Dr. C. H. Fernald, Amherst, Mass.

From these eggs myriads of minute larvæ (worms) hatched in time to begin feeding upon the very young leaves and, in case of the cherry trees that started late last spring, they ate into and destroyed

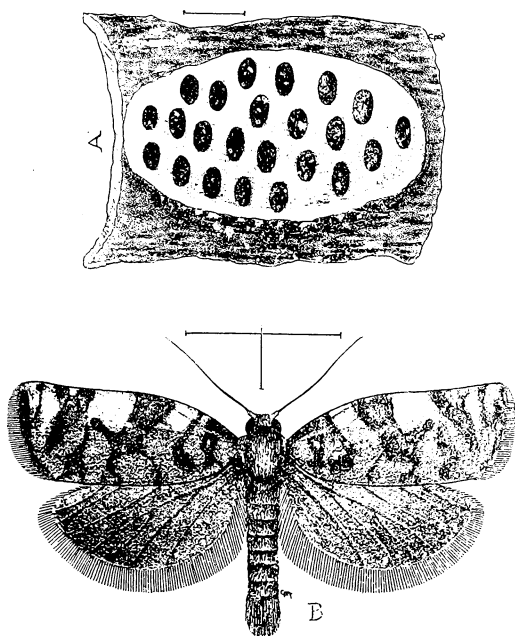


Fig. 1.—The Fruit-tree Leaf-roller, *Cacacia argyrospila* Walk.: A, egg-patch from which the larvæ have escaped; B, moth (original.)

a large portion of the buds. Figure 2 is from a photograph of a cherry tree that was thus attacked, the few uninjured buds alone having put forth leaves. Later in the season new buds were formed and the trees put on full foliage, but bore no fruit.

Aside from the apple trees and the cherry trees, this insect attacked the plum and honey locust, and the rose, currant, raspberry and goose-

berry bushes and a species of *Circocarpa* growing on the foot hills in great abundance and known as "Deer-Bush."

Aside from the peculiar appearance of the cherry trees, the first thing to attract popular attention, on account of the attacks of this insect, was the rolling and fastening together of the leaves

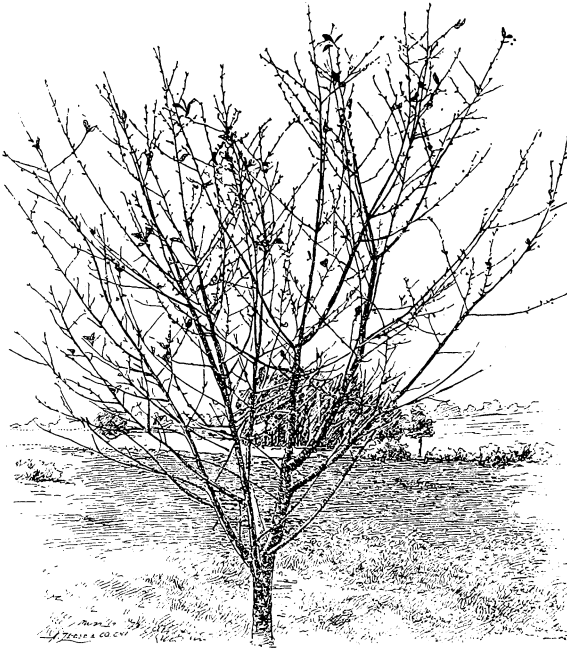


Fig. 2.—A cherry tree that had its buds nearly all destroyed by the Fruit-tree Leaf-roller. From a photograph (original).

as shown in Fig. 3. This is done by means of silken threads which the larvæ spin. These rolls or clusters of leaves form excellent hiding places for the larvæ which only leave them long enough to feed, and then quickly retreat out of the sight of their many enemies. In fact, they usually feed

upon the edges of the leaves that form their hiding places, so as to expose their bodies as little as possible.

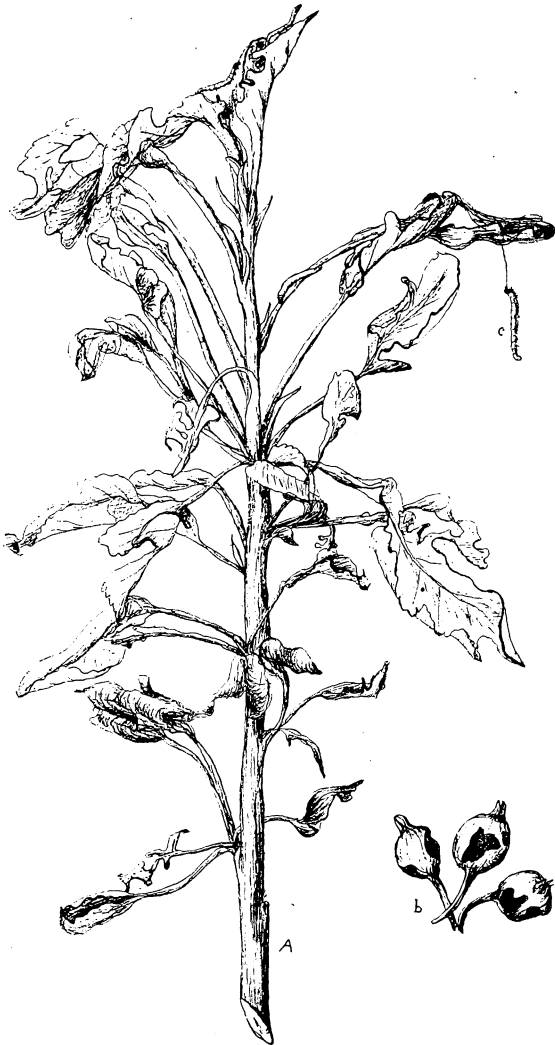


Fig. 3.—A, twig of an apple tree showing the work of the Leaf-rollers; b, small apples gnawed by the Leaf-rollers (original).

If a tree supplies food enough for the larvæ that are feeding upon it, they will pass the pupa state in the rolls of the leaves. The pupa in a few days wriggles itself partly out of the leaf fold, the pupa case splits on the back and the moth (Fig. 1, b) escapes. The developement of this insect was closely watched last summer, and on June 17, I noted the fact that the larvæ were fast changing to chrysalids. On June 24 the first moths appeared in the breeding cages and on the evening of June 29 a number of the moths flew to light in my office for the first time, and on July 6 the moths were swarming in the trees in the evening for the purpose of egg-laying. The eggs deposited at this time are still (April 28) unhatched, so there can be but one brood of this insect in a year in Colorado.

The moth measures about four-fifths of an inch from tip to tip of the wings when spread and the length of the body is about two-fifths of an inch. The predominant color of the fore wings is rust brown and the markings are very light yellow, almost white. When the wings are spread, the most conspicuous markings are a rather large rust-red area at the base of the wing, a similarly colored broad band extending from near the middle of the anterior margin back and outward to or beyond the middle of the wing, and a spot near the outer margin of the wing. Either side of the band on the costal margin is a rectangular or triangular light area, the outer one being fully as broad as the rust colored band but the inner one narrower. The posterior wings are of an uniform smoky or slate color. It should be said, however, that the markings vary a good deal in different specimens.

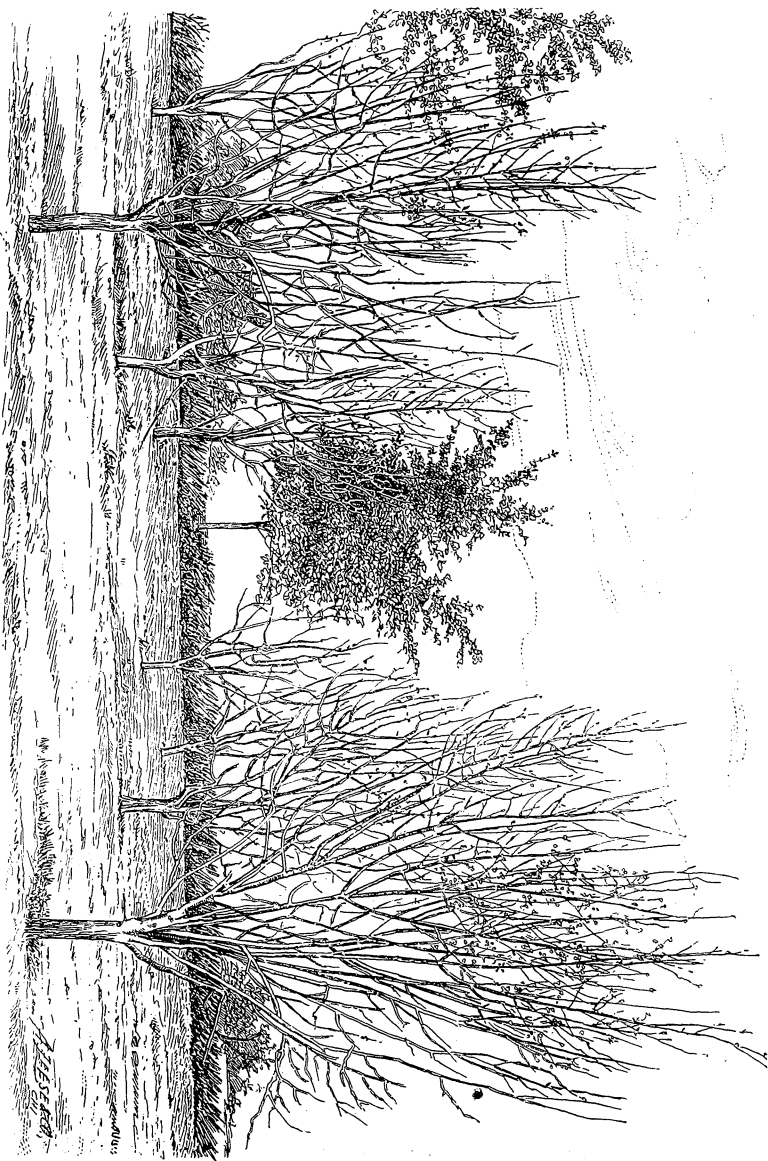
The larva, when fully grown, measures a little over three-fourths of an inch in length, is greenish in color, with the thoracic, legs and cervical shield black or blackish. The head and cervical shield are often lighter after the last moult.

Packard speaks of this insect as probably being double brooded, the first brood of larvæ appearing in June and the second in August and September. He also thinks that the pupæ of the second brood hibernate and that the moths appear early in the spring and lay the eggs for the first brood of larvæ. Such is not the habit of the species here, although in may be farther south.

This insect is one of very wide distribution. Robinson's descriptions were made from specimens taken in Maine, where it is said to be common, and it has been reported as far south as Georgia and Texas and west to California. Aside from the food-plants above mentioned it has been reported as feeding upon oak, hickory, horse-chestnut, soft maple, elm and wild cherry. I have also found it occasionally feeding on box-elder.

This insect was exceedingly abundant in many places in Colorado last summer and did a large amount of injury, especially to fruit trees and rose bushes which, in many cases, were entirely defoliated in the latter part of June. Figure 4 is from a photograph taken in a young apple orchard in Greeley, Colo., last summer, where not a green leaf was left on any of the trees. The trees with leaves showing in the picture are elm trees in the street, which were not attacked.

Fig. 4. View in an apple orchard at Greeley, Colo., showing how completely the trees were stripped by the leaf-roller. Drawn and engraved from photograph (original).



THE BOX-ELDER LEAF-ROLLER.

(*Cacæcia semiferana* Walk.*)

IMPORTANT REFERENCES AND SYNONYMS.

1863.—Walker. *Lophoderus*(?) *semiferanus* n. sp. Cat. Lep. Het. xxviii, p. 336.

1869.—Robinson, C. T. *Tortrix flaccidana*. n. sp. Trans. Am. Ent. Soc., Vol. 2, p. 277.

1875.—Zeller. *Tortrix* (*Loxoteneæ*) *flaccidana*, n. sp. Beitr. p. 13.

1879.—Lord Wals'm. *Cacæcia semiferana*. Ill. p. 7. pl. 62.

1890.—Packard, A. S. *Cacæcia semiferana*. 5th Rep. U. S. Ent. Com. p. 314

1890.—Gillette, C. P. *Cacæcia semiferana*. Can. Ent. vol. xxiv, p. 36.

Miss Murtfeldt reports this insect as attacking oak and hickory in Missouri. I have called it the Box-elder Leaf-roller because of its occurring on this tree in such numbers in Colorado, and I have not seen it on any other. Oak and hickory, however, do not occur in this vicinity.

The moth resembles very much the preceding species, but is larger and lighter in color. (Fig. 5, C.) Those obtained last year measure from four-fifths of an inch to an inch in the expanse of their wings when spread. The markings are distributed

*Determined for me by Dr. C. H. Fernald.

much as in the fruit-tree species, but the rust color is never so bright, and in some specimens there are no visible markings, the entire upper surface of the moth being of a light straw color. The larvæ (Fig. 5. A) also differ from those of the preceding species by being a trifle larger, much lighter colored, having hardly a tinge of green, and having

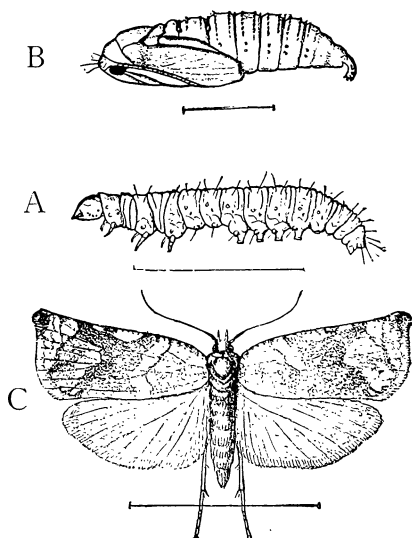


Fig. 5.—The Box elder Leaf-roller, *Cacecia semiferana* (Walker): A. larva; B, pupa; C, moth. (After Riley).

no black markings except the minute eye-spots and the tips of the mandibles.

The habits of the larvæ in attacking the box-elder are similar to those of the former species on its food plants. The moths are about ten days later in appearing. They began hatching in the breeding cages July 5.

This species is also single brooded. The eggs are deposited on the trunks and large limbs of the trees, and never upon the small, smooth

twigs. The female has a very peculiar method of protecting her eggs. They are first deposited in a compact cluster and then covered with a gluey substance that is very impervious to water. After this is done, it seems that the moth must lay her abdomen at full length in this sticky covering and leave it there until the glue has sufficiently hardened to hold fast the scales when the insect withdraws its abdomen. Figure 6 represents one of these shingled egg-clusters after the abdomen has been removed. The breaks in the lines of scales mark the joints of the abdomen. The eggs are in-

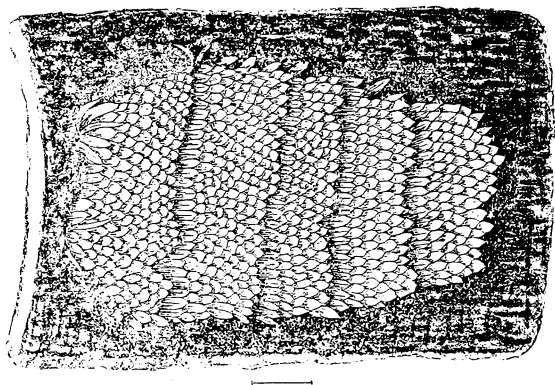


Fig. 6.—An egg-patch of the Box-elder Leaf-roller, *Cacacia semiferana*, covered with scales from the abdomen of the moth(original).

variably covered in this manner and so imitate little, light colored spots of the bark that they are not easily seen.

I have examined trees in the vicinity of Greeley and also in the vicinity of Fort Collins the past winter and find that the eggs of the two leaf-rollers are very abundant upon fruit and box-elder trees,

so it is fair to expect that the larvæ will be as numerous this year as last and do as much harm unless something is done to destroy them.

Two parasites, *Liophron*(?) s. p. and *Metcorus indagator*, Riley, were reared from the Leaf-rollers. The former was quite abundant and it is to be hoped will increase in numbers sufficiently to keep these insects in check.

REMEDIES.

Both of the leaf-rollers above mentioned can be very easily destroyed in the larval state by thoroughly spraying the trees with London purple or Paris green in water in the proportion of one pound of the poison to 160 to 200 gallons of water. The application should be made as soon as the leaves show any signs of rolling, or as soon as the presence of the larvæ is known. If the first application is not sufficient, another should be made about a week or ten days later, and should not be stronger than one pound of poison to 200 gallons of water. By adding enough freshly slaked lime to make the water quite milky, the injury that the arsenites often do to foliage may be avoided. If apple trees are sprayed for the Codling Moth the application will also destroy the Leaf-rollers.

While at Greeley last summer, I met one man, Mr. Eli Hall, who had sprayed his box-elder trees with Paris green and their foliage was perfect, while adjoining trees against his neighbor's lot were completely stripped of their leaves. Figure 7 shows one of the treated trees at the left of the picture and one of the untreated trees at the right. The illustration is from a photograph taken at the time. Any farther argument in favor of spraying seems unnecessary.



Fig. 7.—At the right a Box-elder tree not treated and entirely stripped by the Leaf-rollers; at the left an adjacent tree that was treated with Paris green and the foliage saved. From photograph (original).

Where shade trees in town are being attacked it would seem best for the town authorities to take the matter in charge and appoint some capable person to spray all of the trees in the place. Otherwise there will be a great many who cannot be induced to spray their trees and the pest will be continued from year to year.

While speaking of the remedies for the Leaf-rollers, I should do wrong not to mention the valuable services of the toads.

One of the most interesting sights that came under my observation in Greeley last summer was the large number of well-fed toads that hopped lazily about on the walks under the trees from morning until night, watching for Leaf-rollers that were dropping on every side. The rollers were usually snapped in by the toads even before they could reach the ground. As many as fifty of these toads were counted under a single tree, and it was not uncommon for people to take the middle of the street to avoid the toads along the walks. Toads seldom do harm and feed almost entirely upon insects and should be carefully protected, as they are decidedly beneficial.

THE GRAPE-VINE LEAF-HOPPER.

Typhlocyba vitifex (?) Fitch.

This insect was mentioned in Bulletin 15 of this station where it was given the name *Typhlocyba vitis*, which is the hopper that attacks the vine in the eastern states. A careful examination of the insect showed it not to be the eastern species, and specimens sent to Prof. Osborn of Ames, Iowa, and to Mr. Van Duzee of Buffalo, N. Y., have been determined for me as *T. vitifex*. The form which occurs here, however, differs from the typical *vitifex* by having a large black spot on either side of the scutellum at the base, by having the red line on the middle of the thorax usually not forked in front and by not having the red on the head in two lines but in a large blotch more or less spotted with whitish.

The illustration, Fig. 8, was made from a specimen that most nearly approaches a typical *vitifex* in coloration. It seems that the Colorado form is a very distinctly marked variety and for it I suggest the name *Coloradocnsis*. The two spots on the scutellum, which are perfectly constant, will alone separate it from the eastern form.

REMEDIES.

The experiments of last season fully convince me that this pest can readily be kept in check by the use of kerosene emulsion, but to destroy

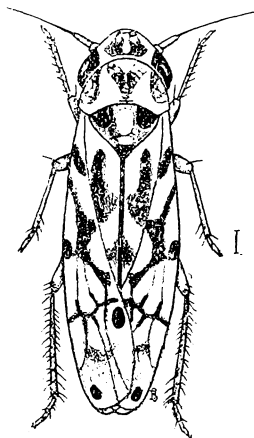


Fig. 8.—The Western Grape-vine Leaf-hopper, *Typhlocyba citifex* Fitch, var. *coloradoensis* Gill. (Original).

the mature hoppers, it should be made not weaker than one-fifteenth kerosene, and then it will not be wholly effectual if used in the middle of the day. The application should be made as early in the morning as one can see to work and before the sun is up to raise the temperature enough to make the hoppers active. Then, by throwing the spray upon the vines with a good deal of force, the hoppers can nearly all be knocked to the ground and destroyed. For further remedies see Bulletin 15 of this station.

THE GOOSEBERRY FRUIT-FLY.

(*Trypeta canadensis* Loew.*)

When the first green gooseberries were picked from our garden last summer, it was noticed that many of them had been stung by some insect. On visiting the bushes it was found that fully one-half of the berries had been stung and were turning red upon one side and falling. The punctures appeared as if they had been made by thrusting a sharp needle obliquely through the skin of the fruit. If the fruit was freshly stung, this puncture was all there was to be seen, but the fruit soon turned red about the stung spots and in a few days fell to the ground. By raising the skin at the puncture a little white egg or minute maggot could be easily found.

The gooseberry bushes under observation lost fully 75 per cent of their fruit from this cause, and the currants suffered a good deal. By a little careful watching among the bushes I succeeded in finding the insect that was the cause of the mischief and had the pleasure of seeing the eggs deposited. The parent insect is a two-winged fly

*Determined for me by Mr. L. O. Howard, Div. of Entomology, Washington, D. C.

(Fig. 9) about as large as a common house fly, but of a yellowish brown color, and has smoky patches on its wings. The ovipositor is very sharp at the

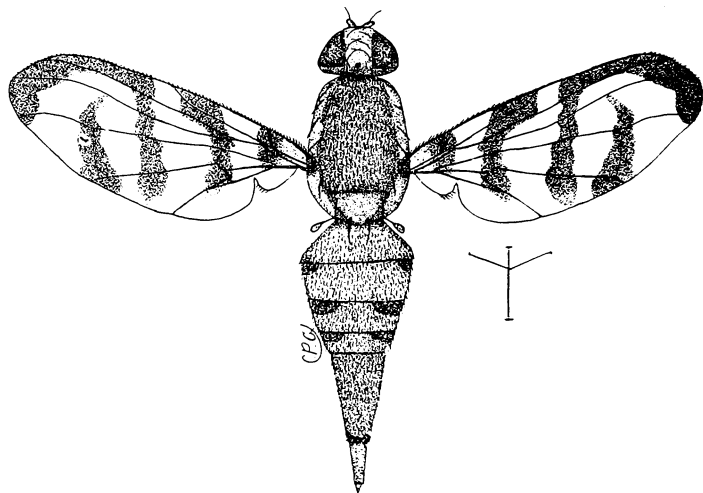


Fig. 9.—The Gooseberry Fruit-fly, *Trypeta canadensis* Loew (original). tip so that the fly is able to puncture the tough, smooth skin of the fruit and place the egg in the juicy pulp beneath.

The berries lie upon the ground for a number of days after falling before the maggots escape from them. So there is, at least, one method of combating this insect, and that is to carefully gather and destroy all infested fallen berries, before the maggots leave them to enter the ground for the purpose of undergoing their transformations.

No flies were reared last season from infested berries that were kept in breeding cages and none of the flies were seen late in the season, so there is but one brood of this insect in a year.*

*The flies are now (May 1) appearing in the cages where infested berries were placed last June.

This fly has never been considered a serious pest in the eastern states but it is certainly one of the worst enemies to the growing of gooseberries and currents in Colorado and its numbers are not liable to grow less until the gathering and destroying of infested fruit is faithfully attended to.

THE IMPORTED CURRANT BORER.

(*Sesia tipuliformis* Linn.)

This insect was imported from Europe and has spread rapidly to nearly all parts of this country where the common red and white currants are grown.

I have never before seen this insect as abundant as it was in the vicinity of Fort Collins last summer. The mature insect is a peculiar clear-winged moth much resembling a wasp in general appearance. The moths were very abundant about the bushes in the middle of the days from the 12th of June to the 5th of July, during which time the eggs were deposited. The moths are very quick flyers but are quite easily caught, especially towards the cool of the day, as they rest on the leaves. The body of the insect is about one-half of an inch in length and the wings span about three-fourths of an inch from tip to tip. The body is black with a steel-blue lustre and with a large tuft of long scales at the tip of the abdomen. Three narrow, bright-yellow bands cross the abdomen above, and a similar band surrounds the neck and broadens out

on the ventral surface. The wings are clear at their bases but are scaled along their anterior and outer margins, and have a black patch of scales about two-thirds of the distance from the base to the tip. The posterior wings have scales along their outer and posterior margins only. The female moths lay little, brown, almost globular, eggs, one in a place, on the stems of the bushes. From these eggs the little larvæ hatch and eat their way to the pith of the stem, up and down which they burrow until fully grown, which is early in May. The larva when about fully grown eats a hole out to the surface of the stem, through which the moth may afterwards escape. The winter is spent in the stems in the larval state. During the following May the larvæ change to pupæ in the stems and from these pupæ the moths begin to appear about the 10th of June.

REMEDIES.

The best remedy for this insect is to cut out all infected stems early in the spring and burn them. The bored stems can usually be detected by the little holes that the larvæ have eaten to the surface for the escape of the moths.

When the moths are abundant about the bushes a great many of them can be taken in nets and destroyed, and much of the egg-laying prevented.

THE WESTERN CURRANT AND GOOSE- BERRY SPAN-WORM.

(*Thamnonoma 4-linearis* Pack., and *T. flavicaria*
Pack.)

On the first of June, last year, Mr. Brose, foreman of the Horticultural Department, called my attention to the condition of the gooseberry bushes, some of which were entirely stripped of their leaves by a worm that was then leaving them and going in search of other food. These worms when fully grown were an inch in length, were light-colored, covered with small black spots, and traveled by looping their bodies, and are one of the so-called "measuring worms." Their appearance was so like the old currant span-worm that I did not think of their being anything else until specimens of the moths sent to Mr. G. D. Hulst, Brooklyn, N. Y., were determined for me as *Thamnonoma 4-linearis* (Fig 10, a, b, c, d., and *T. flavicaria* (Fig. 10, e, f, g.) A large number of these moths were reared in our breeding cages and the two species appeared in about equal abundance.

On June 25 the moths were noticed flying among the currant and gooseberry bushes where they continued plentiful for two or three weeks. It was during this period that the eggs were laid, and after this neither moths nor worms were seen. So these insects are also single brooded

The ground color of the moth is light yellow, and the markings are dark brown. The markings vary greatly in different individuals as shown in the accompanying drawings.

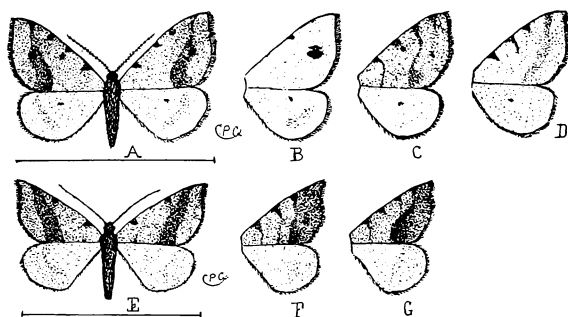


Fig. 10.—Moths of the Western Currant and Gooseberry Spanworms, showing variations in the wing markings. A. B. C. D, *Thamnonoma flavicaria* Pack.; E. F. G, *Thamnonoma quadrilinearia* Pack. (original).

REMEDIES.

Kerosene emulsion and insect powder (Buhach) were very effectual in ridding the bushes of these worms. Paris green or London purple might also be used before the fruit has set, but would hardly be safe after that. The insect powder may be applied in water in the proportion of a tablespoonful to a gallon, or it may be dusted lightly over the bushes from a cheese-cloth sack.

THE SPOTTED BEAN-BEETLE

(*Epilachna corrupta* Muls.*)

IMPORTANT REFERENCES.

- 1883.—Riley, C. V. Rural New Yorker, p. 42.
1883.—Riley, C. V. American Naturalist, p. 193.
1883.—Riley, C. V. Prairie Farmer, p. 87.
1889.—Riley and Howard, Insect Life, pp. 114, 377.
1890.—J. F. Wielandy, Insect Life, pp. 121, 419.
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This beetle out-does all other insect pests that the bean crop has to contend with in the West. It is to the bean what the old "Colorado Potato Beetle" used to be to the potato crop in destructiveness, and it is much more difficult to manage from our present knowledge as to the remedies to be applied.

The beetle (Fig. 11 a) is oval in outline, nearly one-third of an inch in length by one-fifth of an inch in breadth, of a light yellow to a yellowish brown color and has eight small black spots on each wing cover. The mature larva is about the same in length as the beetle, is of light yel-

*Determined for me by Mr. L. O. Howard, Div. of Entomology, Washington, D. C.

low color and is covered with stout branched spines that are black at their tips. One of these

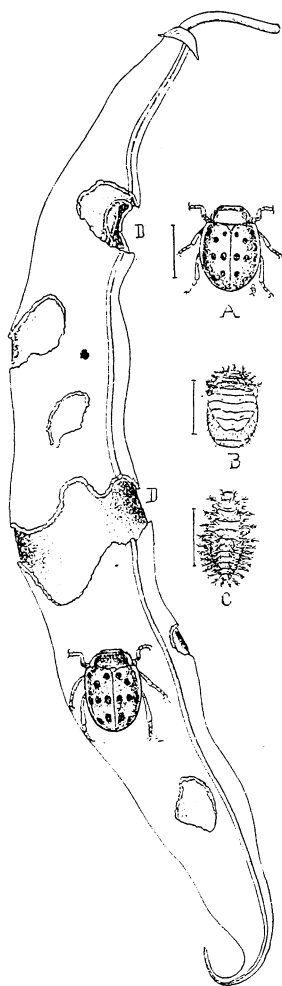


Fig. 11--The Western Bean-beetle, *Epilachna corrupta* Muls. A, mature beetle; B, pupa; C, larva; D, bean pod, showing injuries (original).

larvæ is shown enlarged at Fig. 11 c, and at Fig. 12 is represented one of the spines much magnified. The larva when fully grown fastens the posterior end of its body to the under side of a leaf and then in a few days sheds its outer skin containing the spines and changes to the pupa state (Fig. 11, b). From these pupæ the beetles appear a few days later. They live over winter and appear about as soon as the beans are up in the garden or field and begin to feed upon the leaves, on the under side of which they deposit their yellowish brown eggs in large clusters, after the manner of the "Colorado Potato Beetle." The spiny little larvæ that hatch from these eggs remain on the under side of the leaves which they skeletonize in feeding. The beetles eat through the veins of the leaves and do not skeletonize them. They also eat into and destroy the green pods as shown at Fig. 11 d.

There is only one brood of this insect in a season.

REMEDIES.

Last summer was my first acquaintance with this pest and the application that I fully expected would keep it in check did not prove altogether satisfactory. In gardens, much can be done by gathering the eggs before the larvæ hatch. If London purple or Paris green are used dry, one part should be put with not less than 100 parts of the dilutant, and I would recommend slaked lime as being the best for this. The application should be made very light or the poison will kill the leaves of the plants. If these poisons are used in water, there should not be more than one ounce of the poison to twelve gallons of water, and slaked lime should be added to the mixture to prevent the

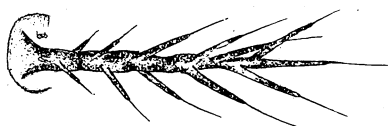


Fig. 12.—One of the branched spines from the larva of the Bean-beetle, greatly enlarged.

burning of the leaves. It is probable that kerosene emulsion or insect powder thrown on the larvæ from the under side of the leaves would be useful, but these insecticides have not been tried as yet.

I hope to be able to recommend some thoroughly efficient remedy for this pest another year.

This insect, in the beetle state, has a method of protection that is worthy of mention in this connection. If a beetle is disturbed it will draw up its legs and from each knee joint there will be exuded a small drop of a yellow liquid that has a very strong, disagreeable odor which, I have no doubt, gives the insect perfect immunity from the attacks of birds.

THE SQUASH ROOT-MAGGOT.

(*Cyrtonema stabulans* (?) Fabr.*)

As early planted squashes were just beginning to send out vines last summer, it was noticed that many plants suddenly wilted and died. The ground in each case was wet with the juices that had escaped from the injured roots and crown of the plant. I was told that the death of the plants was due to the punctures of the squash bug (*Anasa tristis*) which was very abundant about the plants. I found, however, on examination, that the stems of the plants below the surface were completely honeycombed by a white maggot, the young of some two-winged fly. In the earth about the stems, eggs, maggots and pupæ of the fly were found as late as July 13 and from maggots and pupæ gathered at that time flies began to appear during the last day of July.

The eggs are pure white in color, about one twentieth of an inch in length and, as seen under a microscope, are ribbed longitudinally except along one side, which is smooth. A single egg is so small

*Determined for me by S. W. Williston, Lawrence, Kan. as *Cyrtonema* sp. and probably *stabulans*.

as to hardly be seen with the unaided eye but the eggs are usually deposited in clusters between the earth and the stem of the plant. They are usually removed with the earth as it is taken from about the plant and then appear as little white mouldy spots.

REMEDIES.

When this insect was first discovered last summer it was too late to do much with remedies but the remedies that are used against the cabbage and radish maggots should be equally as effectual in destroying this insect. First, I would recommend removing the dirt from about the stem of the plants every two or three days during the egg-laying season and replacing this dirt by fresh soil. Dilute kerosene emulsion, strong tobacco tea or a decoction of insect powder put about the stems of the plants every three or four days would undoubtedly do much to destroy the eggs and young maggots.

THE PEA-WEEVIL. (*Bruchus pisi* Linn.)

I have never before seen this insect so enormously abundant as it was in this vicinity last summer. From the examination of peas in gardens and in the stores in Fort Collins, it was evident that those who ate of this favorite vegetable here last summer must have devoured more maggots of the pea weevil than peas. It was not uncommon to find pods with thirty or forty eggs of the weevil upon them and by the time that the peas were fully grown nearly every seed would be infested.

The eggs are yellowish brown in color, rather elongate, somewhat curved and very small, though they can be plainly seen scattered over the green pods. The little grubs, on hatching from the eggs, burrow through the pods and can often be seen as minute yellow objects crawling over the peas before entering them. In eating their way into the peas they leave small holes appearing as the punctures of a fine needle. Very soon after one enters a pea there appears a dark green blotch about the puncture that is very noticeable.

"Buggy" peas can easily be detected, either by the eggs upon the outside of the pods or by the

themselves. By rejecting all such peas that are offered in the markets the growers will soon learn to take the proper precautions to raise peas free from the weevils.

REMEDIES.

This insect was first brought among us in "buggy" peas shipped from the East for seed and the pest can never be subdued so long as such seed is used. If seed peas are found to have the weevil in them, one of the following things should be done: The peas, weevils and all may be destroyed by burning or feeding to some animal that will eat them. If the peas are to be saved, they may be kept in a paper sack for a year before planting, at the end of which time all of the weevils will come out of the peas and die. Or, the peas may be put in a jar, a little chloroform, ether or carbon bisulphide poured in, and the jar tightly sealed for twenty-four hours. This will kill the insects but will not injure the peas for seed. It is also claimed by those who have tried it that the weevils can all be drowned by immersing the seed for a few hours in water before planting.

Seed men kill the weevils by putting the seed in a tight bin and pouring in a quantity of carbon bisulphide and closing the bin very tightly for a number of days. First-class seed men are very careful not to send out seeds with weevil in them.

Taking care not to plant peas with the weevil in them will only serve to keep the pest away when it is not already in our fields and gardens. In order to rid ourselves of this pest now, great care will have to be taken to see that none of the beetles that are in the peas in the fall shall live over till

punctured and blotched appearance of the peas planting time the following spring. The vines in the garden should all be pulled and burned as soon as the peas are too large for table use. As soon as peas are harvested from the field, hogs or sheep should be turned in to pick up all scattered seed, and the harvested crop should be so managed as to secure the destruction of all the weevils that are taken with it if possible.

We found that we could use the peas from our garden last summer by picking them quite green and then looking them over and throwing out all infested ones before cooking.

The illustrations in Figs. 1, 6, 8, 11 and 12 of this bulletin were drawn by Mr. C. F. Baker, assistant entomologist of the station, and Fig. 3 by Miss C. M. Southworth. Fig. 5 is from the Fifth Rep. of the U. S. Entomological Commission and was obtained through the kindness of Dr. C. V. Riley.