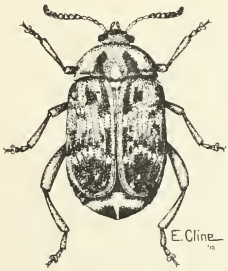
MONTANA AGRICULTURAL COLLEGE
EXPERIMENT STATION

F. B. LINFIELD, Director.

BULLETIN No. 88.

# Ninth Annual Report of the State Entomologist of Montana




BY
R. A. COOLEY

BOZEMAN, MONTANA
FEBRUARY, 1912

# MONTANA AGRICULTURAL COLLEGE
# EXPERIMENT STATION

BOZEMAN, MONTANA



NOTICE—The Bulletins of the Experiment Station will be mailed free to any citizen of Montana on request. Please state whether all the publications are desired as issued or only those specified. Give name and address plainly.

All communications to the Experiment Station should be addressed to
THE MONTANA EXPERIMENT STATION.
Bozeman, Montana.

# LETTER OF TRANSMITTAL.

Bozeman, Mont., Dec. 15th, 1912.

To His Excellency,
Governor Edwin L. Norris,
Helena, Montana.

My dear Sir:—

I have the honor to transmit to you the Ninth Annual Report of the State Entomologist which will appear as Bulletin No. 88 of the regular series of the Montana Experiment Station.

The entomological feature of the year has been an increased public interest in insect pests, which have recently found their way into Montana, or which seem certain to appear here in the near future.

Very respectfully,

R. A. Cooley.

# The Ninth Annual Report of the State Entomologist of Montana

## INSECT PESTS OF 1911.

**The Cabbage Butterfly** (*Pontia rapae* Linn.). Common as the cabbage butterfly is, the gardeners of the State are very little informed regarding the method of controlling it. Many fear to spray their cabbages with arsenicals, thinking that to do so would make them poisonous. It has been demonstrated by a number of experiment stations besides this one, that sprayed cabbage may be eaten with safety and we have shown that this insect may be controlled if a small amount of soap is added to the spraying solution, thereby making the arsenical adhere to the waxy foliage of the cabbage.

**The Diamond-back Moth** (*Plutella maculipennis* Curtis). This small insect probably stands third as a cabbage pest in Montana and is a very serious one. It is so small that it almost escapes attention, yet if present in large numbers it does much to check the growth of the cabbage. It is an introduced species which has found its way all through the United States.

**The Beet Webworm** (*Loxostege sticticalis* Linn.). This is another pest of the sugar beet, which gets upon the leaves, in some cases causing complete defoliation. A few inquiries were received during the year, but not a large amount of damage was done.

**The White-lined Sphinx** (*Deilephila lineata* Fab.). The large horn-tailed caterpillars of this species appeared in phenomenal numbers at one point in the Yellowstone Valley. This is a native Montana species which feeds on a large variety of weeds and crops. It is not surprising that its large size and great abundance led to a mild alarm among the property holders, although it is clear, from the history of the species, that it is not likely to become a real pest. It is easily controlled by spraying with arsenicals.

**Cutworms** (Fam. *Noctuidae*). Nineteen hundred and eleven

was noticeable for the unusual abundance of cutworms. Complaints were received principally from town gardens where crops of various kinds were more or less injured. The cutworms of the Northwest have been very little studied and we are not usually able to name the species as they are received at the college. Under the Adams Fund we are making a serious study of the leading destructive species and hope gradually to bring together the much-needed information. Complaints of the army cutworm in grain, the leading cutworm pest of Montana, were more numerous than in preceding years.

**Cutworms on Apple** (*Polia aedon* Grote). Mr. Parker found this cutworm in abundance on apple trees at Thompson Falls. Specimens were reared to the adult stage. A cutworm which is probably the same species was reported on apple trees at Victor. No serious damage was reported although the occurrence of these caterpillars on valuable trees naturally causes comment.

**Cutworms on Cottonwood** (*Ufeus plicatus* Grote). Mr. Parker also found another species very abundant on cottonwoods used for shade and along the river course near Thompson Falls. This, of course, is not a serious matter economically, but is of interest as indicating the abundance of cutworms as a feature of 1911.

**The Green Fruit Worm** (*Xylina* sp.). These little-known insects have become surprisingly abundant during the past few years. They have led to a number of inquiries and at farmers' institutes have been complained of by fruit growers. They are not ordinarily seen by the growers because they so closely resemble the foliage. They eat holes in the young apples when the latter have reached the size of marbles. This is not a difficult insect to control by spraying but just what its future will be in Montana is not clear. They are able to withstand heavy doses of arsenic.

**The Blister-mite of Pear and Apple** (*Eriophyes pyri* Pgst.) The blister-mite, formerly only a pear pest in Montana, has recently become even more serious on apples. It was one of the leading pests of these fruits this season and we feel sure that much spraying will be done for it during the coming season. It is easily controlled and there is no excuse for neglecting it.

**Mites on Strawberry** (*Tetranychus bimaculatus* Harv.). The season was notable for the abundance of mites. This species

was very abundant and injurious on strawberry. Currants and raspberries were also injured in a number of localities, probably by the same species, although identifications were not made.

**Grasshoppers** (*Acrididae*). For a number of years past grasshoppers of many species have been abundant in different parts of Montana. We received no complaints of injury to range grasses during the year, but the two-striped locust, (*Melanoplus bivitattus* Say) was abundant in a number of places, particularly among cultivated crops and in orchards.

**The Cicada** (*Platypedia putnami* Uhl). This cicada is not well known and it was of much interest to us to find it in great abundance in wooded regions near Thompson Falls. It was not reported as doing injury, although it is probable that some was done for we have observed that the various cicadas found in Montana attack fruit trees quite freely, depositing their eggs in the twigs, thereby injuring young trees often quite seriously. The injury is similar to that inflicted by the seventeen-year-old locust which occurs in the East. The seventeen-year-old species is not found in Montana, contrary to the opinion of many people. Many visitors to the better farming train inquired about this insect, having read in eastern papers that a brood was due this season. Another species (*Tibicen cruentifera*) has been found quite abundantly in the orchards of the Bitter Root Valley for a number of years where it has done some damage to fruit trees.

**The Chinch Bug** (*Blissus leucopterus* Say). The chinch bug, a notorious and much-feared pest of grains, grasses, and corn, had not been known in Montana previous to 1911, when in March specimens were sent in from near Glasgow. An assistant was sent to the locality, who found the insect in moderate numbers not only in Glasgow, but in neighboring towns. This is a serious pest in the Mississippi Valley states and it may develop into a serious one here, but the future alone can tell. We are keeping in touch with this matter and shall keep the farmers advised.

**The Bumble Flower Beetle** (*Euphoria inda* Linn). This beetle of striking appearance has not previously been reported from Montana so far as our record specimens show. It was sent in from the eastern part of the State. It is not a serious pest, although it is sure to attract attention when found.

**The Rose Snout Beetle** (*Rhynchites bicolor* Fab.) This beetle is a wide-spread and serious pest of roses in Montana. It is often almost impossible to get any roses from choice bushes in the dooryard on account of this beetle which bores into the buds and stems. During the past two or three years it has been less abundant, although formerly it was exceedingly common. From the fact that inquiry was made this year, we fear that next year and for a few years succeeding it will again be a serious drawback to rose-growing.

**The Potato Blister-beetle** (*Epicauta vittata* Fab.). This conspicuous beetle has been a pest of potatoes from the beginning of Montana's agricultural history. It has often been spoken of as the "old-fashioned potato bug" since it appeared before the Colorado potato beetle. It is not as serious a pest as the Colorado species, but occasionally occurs in large numbers. A few complaints were received in 1911.

**The Plum Gouger** (*Anthonomus scutellaris* Lec.). So far as we know this insect occurs only in the eastern part of the State where it is a native species, feeding on native wild plums. It has found its way into cultivated plums all through the Yellowstone Valley and is responsible for a material reduction in the crop. A number of complaints were received. It it not easily controlled and fruit growers should be informed regarding its habits and the remedies.

**The Pea Weevil** (*Bruchus pisorum* Linn.). There has recently sprung up in Montana, particularly in the Gallatin Valley, a keen interest in growing garden pea seeds for eastern houses. The pea weevil, which has turned out to be a serious pest in this industry, has been sent in with the pea seed repeatedly. We have done our best to warn the people against allowing the pest to get a start, but we have no legal authority and can only advise. It is feared that the pea weevil is already established in one place in Gallatin County. If this is true there is great danger that it will become the serious pest that it has in other localities. See figure on cover page.

**Alfalfa Weevil** (*Phytonomus murinus* Fab.). This very serious pest of alfalfa has been destroying large tracts of this valuable crop in Utah for a number of years. During 1911 it extended into Idaho and Wyoming. Alfalfa growers in Montana are becoming

uneasy with excellent reason. This insect is not in our State yet so far as we know. During the coming summer we plan to make examination of the alfalfa fields along the railway of the Oregon Short Line, from Butte south. During the present year we have been making inquiry and putting people on their guard against it. Purchasers of alfalfa seed have corresponded with us regarding the advisability of buying seed out of Utah.

**New Aphis of Wheat** (*Brochycolus* sp.). This louse was reported three times from the Judith Basin and vicinity during the season. It was doing some damage and causing much alarm among grain growers. We have not as yet been able to determine the species. It may turn out to be entirely new. Attention will be given to this next season.

**New Aphis of Cottonwoods** (*Aretaphis* sp.). We have received two appeals for assistance in controlling an aphis new to science which we have had under observation in Bozeman for a number of years and which appeared in Deer Lodge this season in such abundance as to seriously blemish the shade trees of that city. This town is planning to provide suitable apparatus for spraying for this insect. In doing this they will take the lead in such action in Montana and will deserve commendation.

**The Elm Gall Louse** (*Schizoneura americana* Riley). The elm is becoming increasingly popular as a shade tree but, so far as our observations go, wherever the elm is present this insect is abundant, seriously deforming the foliage. It is a species which may be easily controlled but as yet very little has been done in that direction in Montana. This gall louse and various other insects demand attention.

**The Green Aphis** (*Aphis pomi* De G.). All things considered this is probably the most troublesome insect pest of the apple in Montana at the present time, although when the codling moth becomes more abundant, it will undoubtedly be more serious. As common and as well-known as this insect is, we have received many inquiries about it during the past year. The difficulty in controlling it lies in the fact that it is ordinarily overlooked until it has caused the foliage to curl, thereby making it almost impossible to destroy it. There is scarcely an apple orchard in Montana in which it does not occur.

**The Black Cherry Aphis** (*Myzus cerasi* Fab.). The black cherry aphis which attacks the foliage of cherries on the underside is gradually increasing in Montana. Up to this season it has been known only on the west side of the divide, but was found this year in Carbon County. It is an insect which should not be overlooked by our fruit growers.

**The Woolly Aphis** (*Schizoneura lanigera* Hausm). The woolly aphis has for several years been on the increase in the Bitter Root valley, especially at the upper end, and has reached a point where it demands attention. In some of the fruit growing states of the Northwest it is considered almost as serious a pest as the codling moth,—not that it damages the fruit trees seriously, but it occurs in such abundance, smearing the clothing and even the fruit at the time of picking, as to amount to a real nuisance. It is not easily controlled and for this reason some localities have abandoned all attempts to control it. We are urging upon our fruit growers the importance of keeping it under control rather than allowing it to spread and become more and more destructive.

**The Cabbage Aphis** (*Aphis brassicae* L.). One of the principal insect pests of the State, regarding which inquiry was frequently made, is the European cabbage aphis, found on cabbage, cauliflower, and turnips. This is one of the insects which has been present year after year and which demands further attention from this office. We have for some years been making observations and experiments and in time will issue a circular on this subject.

**The Sugar Beet Root Louse** (*Pemphigus betae* Doane). All things considered, this was probably the leading insect pest of sugar beets in Montana this year. It was very prevalent and was the occasion of a considerable amount of correspondence. The beet crops of the Yellowstone Valley were affected by its presence. This is one of the insects which is having special attention under the Adams Fund.

## STATUS OF THE BEEKEEPING INDUSTRY IN MONTANA.

It is roughly estimated on good authority that the average value of the annual production of honey in the United States is about $20,000,000.00 and of wax about $2,000,000.00. As indicated by the correspondence received at the Experiment Station, there

is a growing interest in beekeeping in Montana, and, although in former years it was believed that our climate or other conditions would probably not permit bees to do well, it has been found by actual experience that even in our higher mountain valleys there is nothing to prevent a successful bee industry. It seems very clear, therefore, that the industry may be made to become a very valuable one to our people. It deserves stimulation in every way possible.

## FOUL BROOD AND WAX MOTH.

Our first suspicion of the presence of a serious bee disease came in March, 1911, when Mr. W. M. White, of Joliet, wrote us of a disease in his apiary, which he took to be foul brood. Specimens received a few days later proved to be a clear case of American foul brood, which is the most serious of this class of troubles. Subsequent reports have indicated that the disease is probably present over an extensive territory in that part of the State. Our correspondence with Mr. White shows that it had been in his neighborhood for some three years prior to 1911. In correspondence with the beekeepers of Montana it was learned that no disease recognized as foul brood was present in the State, excepting in the locality above mentioned. We were surprised, however, to learn that the bee-moth or wax-moth is of very general occurrence. It was reported from five different counties, besides Gallatin, where we have known it to be present for several years.

In a general way the losses from an epidemic of foul brood are of two kinds; first, a direct loss through the killing of colonies, reduction of the crop and prevention of increase; and, second, a demoralizing influence on the whole business, reaching even down to the manufacture and sale of beekeepers' supplies. It may be stated that, where this disease starts in, it is liable to almost completely wipe out the industry, especially in localities like many in Montana, where beekeeping is new and on a precarious basis. Taking the State as a whole, it would be most unfortunate if foul brood should gain much headway. It would take years of time and much instruction and stimulation to recover the lost ground.

From present indications in Montana and knowledge of the experience of other states, we cannot expect the bee industry to

prosper here unless effective measures are adopted to bring such difficulties as are here mentioned under control.

## LEGISLATION NEEDED.

It is very clear that American foul brood will not be suitably controlled without laws which define and make mandatory correct methods of prevention and eradication. At least sixteen of the states have such laws at the present time and these provide for from one to fifteen inspectors in each state.

The best laws of this kind provide not only for inspection, quarantine, and eradication, but also for instruction. This is in response to a very natural demand, for the majority of beekeepers are sadly in need of information in regard to apicultural methods and practices.

It will be some years before apiary inspection work in Montana will require the full time of one man and yet the amount that is needed is badly needed. It is fortunate that the kind of training and information needed for this work is so similar to general economic entomology that one of the regular force of this department of the agricultural college can do this work in connection with other regular duties as provided in the State Entomologist law of Montana.

It is, therefore, proposed and recommended that in the near future the work of apiary inspection be regularly taken up by the State Entomologist's office and that legal authority be provided by the next legislature.

## STATUS OF THE SPOTTED FEVER TICK INVESTIGATIONS.

Following the announcement of Doctor H. T. Ricketts' discovery that our common so-called wood tick is responsible for the transmission of Rocky Mountain spotted fever, this office, at the request of the secretary of the state board of health, took up a study of this tick and, at the same time, of the other species found in Montana which are of importance in other ways. During the past few years we have received numerous requests for information regarding both the spotted fever tick (*Dermacentor venustus*) and the "elk tick" (*D. albipictus*) as pests of horses and cows. The veterinarian of the agricultural college is much interested in the

suspected connection of one or both of these ticks with the transmission of an important and little-known disease of horses in Montana. It is clear, therefore, that information regarding these ticks is very desirable.

At the time we undertook these studies, in the summer of 1908, we were without adequate financial means for carrying on the work on a sufficient scale to secure conclusive results and were unable to secure the means within the State. Accordingly a cooperative arrangement was made with the United States Bureau of Entomology whereby we secured not only the benefit of their knowledge and experience, but also valuable help in the field work. Their experience was of particular value to us on account of their having been engaged in a similar piece of work on the tick concerned in the transmission of the Texas fever of cattle in the southern states. The entire time of one assistant under the pay of this Bureau and part time of other assistants was given to this work, as well as the expert supervision of Doctor Hunter.

On the joint invitation of the Bureau of Entomology and the Montana State Entomologist, the United States Bureau of Biological Survey joined in the investigation in the spring of 1910, and put two assistants into the field for the purpose of securing detailed information regarding the mammalian fauna of the valley.

This information was desirable for a number of reasons. It is clear that these mammals serve as hosts of the ticks and also that some one or more of them serve as the source from which the ticks get the germ of the spotted fever. It was felt that a further knowledge of the mammals would aid materially in the work on ticks and at the same time facilitate work that doctors and pathologists might do on the disease itself.

In March, 1910, a field station was established near Florence to afford facilities for making close observations of what was actually happening in nature, for it was felt that only in this way could we get full and reliable information regarding the life and activities of the ticks and their hosts. The work was continued through the season of 1910 and resumed again in the spring of 1911.

The results of the studies in the season of 1910 were of great importance and have been published in bulletin No. 85 of the Ex-

periment Station and in bulletin 105 of the Bureau of Entomology. They pointed out a definite and feasible program of tick control by dipping and otherwise freeing domestic animals of ticks. However, the work of that season did not indicate conclusively just what solution to dip with, how often to dip, or how long to keep it up. We undertook to secure information on these points in the spring of 1911. It was nearing the close of the Bureau's fiscal year and they could not furnish us the funds required for the construction of the necessary dipping vat and yards and after an unsuccessful attempt to get the sum through the State Board of Health, to which a special appropriation for spotted fever investigations had been made, we accepted a fund made up by voluntary contributions by chambers of commerce and individuals in the Valley. At this point it was learned that the Public Health and Marine Hospital Service at Washington, D. C., was about to send representatives into the State under the auspices of the State Board of Health for the purpose of undertaking the extermination of ticks in the spotted fever district. A conference was held in Washington between the chief of the Bureau of Entomology and the head of the Public Health and Marine Hospital Service at which it was learned that the latter saw no necessity whatever for co-operative work. The situation led to the withdrawal of the Bureau of Entomology and the Bureau of Biological Survey. Instead of having two bureaus of the Department of Agriculture working on this problem in Montana on their own funds and in their special lines we now have the Public Health and Marine-Hospital Service working on ticks on funds furnished by the State.

The following publications, growing out of this work, have been issued by the Department of Agriculture and the State Entomologist:

1908. Cooley, R. A. Preliminary Report on the Wood Tick. Sixth Annual Report, State Entomologist of Montana.

1911. Bishopp, F. C. The Distribution of the Rocky Mountain Spotted Fever Tick, Circular 136, Bureau of Entomology.

1911. Cooley, R. A. Tick Control in Relation to the Rocky Mountain Spotted Fever, Bulletin 85, Montana Agricultural Experiment Station.

1911. Birdseye, Clarence. The Mammals of Bitter Root Valley,

Montana, in their Relation to Spotted Fever. Circular 82, Bureau of Biological Survey.

1911. Hunter, W. D. and Bishopp, F. C. The Rocky Mountain Spotted Fever Tick, with Special Reference to the Problem of its Control in the Bitter Root Valley in Montana.

1912. Birdseye, Clarence. The Common Mammals of Western Montana in Relation to Agriculture and Spotted Fever.

## FOREST INSECTS.

The extent and nature of entomological work in the United States is probably little understood by the general public. The entomological profession is attempting as far as possible to reduce the loss due to insect pests, which amounts, according to careful estimates, to about one-tenth of the total agricultural output of the country.

Two agencies are working to this end in Montana; the Experiment Station and the Bureau of Entomology of the United States Department of Agriculture.

The following letter from Doctor Hopkins is of unusual interest. It not only shows what a valuable work on forest insect pests is being done in Montana, but also that Montana forms an important part of their field of operations.

"UNITED STATES DEPARTMENT OF AGRICULTURE,
"BUREAU OF ENTOMOLOGY,

WASHINGTON, D. C.

"March 14th, 1912.

"Prof. R. A. Cooley,
"The Montana Agricultural College
and Experiment Station,
Bozeman, Montana.

"Dear Prof. Cooley:

"In reply to your request for information relating to the work of this Bureau on Forest insects in the State of Montana.

"The first information on extensive depredations by insects on the forest trees of the Rocky Mountains came from a correspondent of the Division of Entomology at Columbia Falls, Montana, in

November, 1898. Reference was made to extensive dying of the white pine, and specimens of insects sent from the bark of the dying trees included a Dendroctonus beetle which proved to be a new species and was later described under the name *Dendroctonus monticolae.*

"This report led to my engagement, in the spring of 1899, to make a special trip through the Pacific Coast States and Idaho, under Dr. Howard's instructions, to study the forest insects of that region. This was the beginning of the work on forest insects as one of the special features of the Division of Entomology.

"While general investigations have been conducted in all the Western States since 1902, no special work was done in Montana until in the spring of 1909, when a demonstration of methods of controlling the mountain pine beetle was conducted on private, state and federal lands in and adjacent to the Jefferson National Forest.

"Investigations by an Agent of the Bureau, Mr. Josef Brunner, showed that about 3,000 pine trees had been killed by the beetle in five years, and that about 1,500 were infested in the spring of 1909. Under my special recommendations and instructions, carried out by Mr. Brunner in co-operation with private owners and the Forest Service, 1,355 trees were felled and barked in such a manner as to destroy about 85 per cent of the insects. The cost averaged 30 cents per tree and the work was finished in July before the beetle began to emerge.

"Information up to the spring of 1911 shows that the control was complete, thus demonstrating the practicability of controlling this most destructive insect enemy of the pine forests of Montana.

"Mr. Brunner conducted general investigations on the character and extent of insect depredations on private, State and national forest lands of the State, until September, 1909, when Forest Insect Field Station 1 was located at Columbia Falls, Montana, with Mr. Brunner in charge.

"Since that time, Mr. Brunner, with a corps of from three to six field agents, has been very active in conducting special demonstrations on methods of protecting the forests from the great waste of forest resources caused by insects.

"The principal work done has been in two demonstration projects; one, in co-operation with small owners of timber land in

the vicinity of Columbia Falls, in which the utilization for fuel, etc., of about 10,000 Douglas fir infested by the Douglas fir beetle resulted in the complete control of depredations by this beetle, which, during the preceding 10 to 15 years, had caused the death of more than a million trees in the general area involved. This was accomplished without ultimate cost to the owner or the State.

"The other demonstration was in the new Glacier National Park in co-operation with the Interior Department, in which the Department paid the expenses of treating the infested trees under the immediate supervision of Mr. Brunner. The disposal, according to our recommendations, of 819 "white pine" trees infested with the mountain pine beetle at a cost of about 50 cents per tree has evidently stopped depredation by this beetle, which, during the past 10 to 15 years, caused the death of over 10,000 trees.

"Two important control projects are now under way; one known as the Swan Lake Project, conducted under our recommendations and instructions in co-operation with the Forest Service, the State of Montana, and the Anaconda Copper Mining company; the other, known as the Tongue River Project, located in the Tongue River Indian Reservation, in which the timber is being cut and barked or utilized for lumber principally by Indian labor. Some $10,000 will be expended on this project to protect timber having an estimated stumpage value of over $125,000 and the value of the utilized product will go far towards balancing this direct cost. There is every prospect that this demonstration will be a success.

"The work that is being conducted by the Branch of Forest Insects of this Bureau, through Forest Insect Field Station 1 at Columbia Falls, Montana, includes the States of Montana and part of Idaho, with a temporary assignment of Wyoming and Colorado.

"The objects as set forth in Amended Project 37, 1911 (copy of which was sent to you with my letter of June 20, 1911) are as follows:

"1. Co-operate with federal and state officials and private owners in efforts to prevent losses from insect depredations on forest trees and forest products.

"2. Co-operate with federal and state officials and private owners in conducting control work to demonstrate the efficiency of recommended methods.

"3. Co-operate with federal and State officials and private owners in efforts to establish the most economical and effective insect control policy in special forests and in forest areas where general co-operation is essential for the promotion of common interests.

"Very truly yours,

"A. D. HOPKINS,

"In Charge of Forest Insect Investigations."

## THE MONTANA INSECTICIDE LAW.

The Federal Insecticide Act of 1910 has jurisdiction over adulterated and misbranded insecticides and fungicides that have entered into interstate commerce, but previous to 1911 Montana had no protection against adulterated or other fraudulent products of this character that might originate within the State boundaries.

The Twelfth Legislative Assembly enacted a wise and sufficient law, the provisions of which are very similar to those of the Federal act. In fact, the two laws are identical in their essential provisions. The responsibility for the enforcement of the law is placed upon the Director of the Experiment Station and the State Entomologist.

Up to the present time practically all of the insecticides and fungicides used in Montana have been shipped in, and it is to be expected that for some time to come only comparatively small amounts will be manufactured here. Yet, as the orchard business increases and general agriculture develops, there will be a continually increasing amount of home manufacture of these products. There is already prospect that in the near future one or more lime-sulphur plants will be erected in the orchard districts.

The matter of purity and correct branding of an insecticide is of much importance. The fruit grower and the farmer should get what they buy and pay for and not an inferior or adulterated product. We have known of a number of cases in which an inferior insecticide was used and the farmer, failing to secure the desired results, lost heavily in the crop he had hoped to protect. The loss, then, was not alone through paying for a high-class product and getting an inferior one, but also through loss of the crop which the adulterated insecticide failed to protect.

It is perhaps still more unfortunate when the farmer fails to

realize that he has been defrauded and thinks that the directions he has been following are faulty or that spraying, after all, is not a protection to his crops.

The amount of insecticides and fungicides used in Montana is already large, and is increasing rapidly. Fully 100,000 pounds of Paris green and arsenate of lead are used annually. Probably twenty carloads of commercial lime-sulphur will be used in western Montana this season. In the aggregate, large amounts of other substances such as tobacco extracts and powders, soaps and oils, are sold annually for the purpose of killing insects, while large amounts of copper sulphate and formalin are used in treating seed grain and seed potatoes.

It is apparent, therefore, that it is of much importance that fraudulent and ignorant sale of inferior articles of this kind be prevented.

The following is a copy of our State Insecticide Act which became a law February 15th, 1911.

## CHAPTER 26 OF LAWS AND RESOLUTIONS OF THE TWELFTH LEGISLATIVE ASSEMBLY OF MONTANA.

An Act for preventing the manufacture, sale or transportation of adulterated insecticides and fungicides, and for regulating traffic therein and fixing penalties for the violation of this act.

Be it enacted by the Legislative Assembly of the State of Montana:

**The manufacture of adulterated insecticide, paris green, lead arsenate and fungicide forbidden**

Section 1. It shall be unlawful for any person to manufacture within the State of Montana any insecticide, Paris Green, lead arsenate, or fungicide which is adulterated or misbranded within the meaning of this act.

**Offering for shipment or delivery any adulterated or misbranded articles herein forbidden.**

Section 2. Any person who shall offer for shipment or deliver from any point in the State of Montana to any other point in the State of Montana, any insecticide, or Paris Green or lead arsenate, or fungicide which is adulterated or misbranded within the meaning of this act; or any person who shall receive, or offer to receive, any insecticide,

Receiving or offering to receive forbidden articles.

Selling or offering for sale the articles herein forbidden.

"Adulterated" defined as used in this act.

Adulterated paris green.

Adulterated lead arsenate.

Proviso.

Other adulterated insecticides or fungicides.

or Paris Green, or lead arsenate, or fungicide which is adulterated or misbranded within the meaning of this act, and having received, shall sell or deliver, or shall offer for sale or delivery, such adulterated or misbranded insecticides, or Paris Green or lead arsenate, or fungicide, shall be guilty of a violation of this act.

Section 3. For the purpose of this Act, an article shall be deemed to be "adulterated"—

In the case of Paris Green: First, if it does not contain at least fifty per centum of arsenious oxide; second, if it contains arsenic in water-soluble forms equivalent to more than three and one-half per centum of arsenious oxide; third if any substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength.

In the case of lead arsenate: First, if it contains more than fifty per centum of water; second, if it contains total arsenic equivalent to less than twelve and one-half per centum of arsenic oxide ($As_2O_5$); third, if it contains arsenic in water-soluble forms equivalent to more than seventy-five one-hundredths per centum of arsenic oxide ($As_2O_5$); fourth, if any substances have been mixed and packed with it so as to reduce, lower or injuriously affect its quality or strength; provided, however, that extra water may be added to lead arsenate (as described in this paragraph) if the resulting mixture is labeled "lead arsenate and water," the per centage of water being plainly and correctly stated on the label.

In the case of insecticides or fungicides other than Paris Green and lead arsenate: First, if its strength or purity falls five per cent or more below the professed standard or quality under which it it sold; second, if any substance has been substituted wholly or in part for the article; third, if any

valuable constituent of the article has been wholly or in part abstracted; fourth, if it is intended to use on vegetation and shall contain any substance or substances which, although preventing, destroying, repelling or mitigating insects, shall be injurious to such vegetation when used.

"Misbranded" defined as used in this act.

Section 4. The term "misbranded" as used herein shall apply to insecticides, Paris Green, lead arsenate or fungicide, or articles which enter into the composition of insecticides or fungicides, the package or label of which shall bear any statement, design or device regarding such article or the ingredients of the substances contained therein which shall be false or misleading in any particular.

When an article shall be deemed "misbranded."

Section 5. For the purpose of this act, an article shall be deemed to be "misbranded"—

In the case of insecticides, Paris Green, lead arsenate and fungicides; First, if it be an imitation or offered for sale under the name of another article; second, if it be labeled or branded so as to deceive or mislead the purchaser, or if the contents of the package as originally put up shall have been removed in whole or in part and other contents shall have been placed in such package; third, if in package form, and the contents are stated in terms of weight or measure, and they are not plainly and correctly stated on the outside of the package.

In the case of insecticides other than Paris Green and lead arsenates and fungicides: First, if they contain arsenic in any of its combinations or in the elemental form and the total amount of arsenic present (expressed as per centum of metallic arsenic) is not stated on the label; second, if it contains arsenic in any of its combinations or in the elemental form and the amount of arsenic in water soluble forms (expressed as per centum of metallic arsenic) is not stated on the label; third, if it consists partially or completely of an inert

substance or substances which do not prevent, destroy, repel or mitigate insects or fungi and does not have the names and percentage amounts of each and every one of such inert ingredients plainly and correctly stated on the label; provided, however, that in lieu of naming and stating the percentage amount of each and every inert ingredient the producer may at his discretion state plainly upon the label the correct names and percentage amount of each and every ingredient of the insecticide or fungicide having insecticidal or fungicidal properties, and make no mention of the inert ingredients, except insofar as to state the total percentage of inert ingredients present.

Duty of state entomologist.

Section 6. It shall be the duty of the State Entomologist, upon the advice and under the direction of the Director of the Experiment Station, to collect from time to time and deliver to the Director of the Experiment Station specimens of insecticides, Paris Greens, lead arsenates and fungicides in unbroken original packages, manufactured or offered for sale in the State of Montana, for the purpose of determining whether or not such insecticides, Paris Greens, lead arsenates and fungicides are adulterated or misbranded within the meaning of this act.

Any citizen may submit original packages to state entomologist.

Section 7. When any citizen of the State has reason to believe that any particular brand or lot of insecticide or Paris Green, or lead arsenate, or a fungicide, is adulterated or misbranded within the meaning of this act, he may send or deliver to the State Entomologist an original and unbroken package of the article in question. Upon receipt of such a questionable article it shall be the duty of the State Entomologist to deliver it to the Director of the Experiment Station, who shall examine or cause an investigation to be made and, at his discretion, may cause chemical examinations of

Duty of entomologist.

Duty of director of the experimental station.

such questioned articles as hereinafter provided.

Chemical analysis to be made by director of experimental station.

Section 8. Upon the receipt of specimens of insecticides, Paris Greens, lead arsenates and fungicides in unbroken original packages, as hereinbefore provided, the Director of the Experiment Station shall make, or cause to be made, a chemical analysis of such specimens for the purpose of determining whether or not they comply with the requirements of this act; Provided, that when the Director has information showing samples delivered to him for examination are out of lots of insecticides, Paris Greens, lead arsenates or fungicides that have already been examined a sufficient number of times to indicate whether or not they comply with the requirements of this act, then the Director may refuse to examine such lots and so notify the State Entomologist or citizens of the state.

Proviso.

"Insecticide" defined, as used in this act.

Section 9. The term "insecticide" as used in this act shall include any substance or mixture of substances intended to be used for preventing, destroying, repelling or mitigating any insects, mites or ticks which may infest vegetation, man or other animals, or household, or be present in any environment whatsoever. The term "Paris Green" as used in this act shall include the product sold in commerce as Paris Green and chemically known as the aceto-arsenite of copper. The term "Lead arsenate" as used in this act shall include the product or products derived from arsenic acid ($H_3AsO_4$) by replacing one or more hydrogen atoms by lead. The term "fungicide" as used in this act shall include any substance or mixture of substances intended to be used for preventing, destroying, repelling or mitigating any and all fungi that may infest vegetation or be present in any environment whatsoever.

"Paris green" defined.

"Fungicide" defined.

When dealer shall not be prosecuted.

Section 10. No dealer shall be prosecuted under the provisions of this act when he can establish a guaranty signed by the wholesaler, jobber, manu-

Wholesaler, jobber, manufacturers and other persons amenable.

facturer or other party residing in the State of Montana from whom he purchased such articles, to the effect that the same is not adulterated or misbranded within the meaning of this act, designating it; said guaranty, to afford protection shall contain the name and address of the party or parties making the sale of such articles to such dealer, and in such case said party or parties shall be amendable to the prosecutions, fines, and other penalties which would attach in due course to the dealer under the provisions of this act.

Proceedings against forbidden articles in this act in transportation.

Section 11. Any insecticide, Paris Green, lead arsenate or fungicide that is adulterated or misbranded within the meaning of this act and is being transported from one point within the State of Montana to another point within the State of Montana to be sold, wholly or in part, or, having been transported, remains unloaded, unsold, or in original unbroken packages, or if it be sold or offered for sale in the State of Montana, shall be liable to be proceeded against in any district court of the State of Montana. If any such article is condemned as being adulterated or misbranded within the meaning of this act, the same shall be disposed of by destruction or by sale, as the said court may direct; and the proceeds thereof, if sold, less the legal costs and charges, shall become a part of the expense fund as hereinafter provided; but such goods shall not be sold in any jurisdiction contrary to the provisions of this act or the laws of the jurisdiction; provided, however, that upon the payment of the costs of such libel proceedings and the execution and delivery of a good and sufficient bond to the effect that such articles shall not be sold or otherwise disposed of contrary to the provisions of this act or the laws of this State, the court may by order direct that such articles be delivered to the owner thereof.

Destroying condemned articles, or sale thereof.

Proceeds of sale.

Provided.

When articles may be redelivered to owner.

Certificate of director of experimental station that article conforms to legal requirements.

Section 12. When any particular lot or brand of an insecticide, Paris Green, lead arsenate, or fungicide, manufactured in the State of Montana, is found to comply with all the requirements of this act, the Director of the Experiment Station shall have authority to issue certificate, and the person to whom such certificate is issued may use the same on packages of the article so certified, or in advertising matter concerning such articles; provided, however, that articles bearing such certificates shall be subject to re-examination, and if found to fail to comply with all of the requirements of this act, shall be proceeded against as in uncertified articles. Said Director of the Experiment Station shall have authority to levy a fee of from five to fifty dollars for each and every certificate issued in compliance with this section, and such fees to be placed in an expense fund as hereinafter provided.

Certified articles subject to re-examination.

Fee for issuing certificate.

Disposition of proceeds of fines.

Section 13. One-half of all the fines which shall be levied for violations of this act, as hereinafter provided, shall be retained in the treasury of the Montana Experiment Station, and these fines, together with the fees as provided for in Section 12, shall constitute an expense fund from which the Director shall pay the necessary and actual expenses incurred by the State Entomologist and the Experiment Station in carying out the provisions of this act; provided, however, that whenever such fines and fees amount, at any one time, to more than one thousand dollars, the balance above this sum shall be turned into the State Treasury.

Expense fund to consist of what.

Limitation of amount in expense fund.

Misdemeanor.

Section 14. Any person who shall violate any of the provisions of this act shall be guilty of a misdemeanor and shall, upon conviction thereof, be fined not less than twenty-five ($25.00) dollars nor more than two hundred ($200.00) dollars for the first offense and upon conviction for each subse-

Penalties.

quent offense, be fined not less than fifty ($50.00) dollars nor more than three hundred ($300.00) dollars, or sentenced to imprisonment for not more than thirty days, in the discretion of the court.

"Person" defined as used in this act.

Section 15. The word "person" as used in this act shall be construed to include both the plural and the singular, as the case may be, and shall include corporations, companies, societies and associations.

Act or omission of officer, agent or corporation, company or association, the act of principal.

When construing and enforcing the provisions of this act, the act, omission or failure of any officer, agent or other person acting for or employed by any corporation, company, society or association, within the scope of his employment or office, shall in every case be also deemed to be the act, omission or failure of such corporation, company, society or association, as well as that of the other person.

Repealing clause.

Section 16. All acts and parts of acts in conflict herewith are hereby repealed.

Section 17. This act shall take effect and be in force from and after its passage and approval.

Approved February 15th, 1911.