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UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JANUARY 1935

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DOMESTIC QUARANTINE ON DUTCH ELM DISEASE

A quarantine on account of the Dutch elm disease (Notice of Quarantine No. 71) became effective February 25. Under the provisions of this quarantine certain areas in the States of New Jersey, New York, and Connecticut are designated as regulated, and movement therefrom of elm plants or parts thereof of all species of the genus Ulmus is prohibited, irrespective of whether nursery, forest, or privately grown, including (1) trees, plants, leaves, twigs, branches, bark, roots, trunks, cuttings, and scions of such plants; (2) logs or cordwood of such plants; and (3) lumber, crates, boxes, barrels, packing cases, and other containers manufactured in whole or in part from such plants, unless the wood is entirely free from bark.

MELROSE HIGHLANDS LABORATORY TO BE CLOSED

The advent of the Dutch elm disease brings about the closing of one of the oldest and best known laboratories of the Bureau. The Melrose Highlands, Mass., laboratory will be closed sometime during the coming summer and the greater part of the personnel will be transferred to Morristown, N. J., to work on insect vectors of the Dutch elm disease. C. W. Collins will be in charge of the new laboratory at Morristown. The work pertaining strictly to forest insects and to the liberation and recovery of parasites will be continued at the Bureau's New Haven, Conn., laboratory, in cooperation with the Northeastern Forest Experiment Station. R. C. Brown will be in charge of this new set-up. The Gypsy Moth Laboratory was established by L. O. Howard early in the present century for the purpose of studying the gypsy moth and of introducing parasites from Europe. This laboratory became world famous and the results obtained here have stimulated parasite studies in several other countries. Its visitors' register carries the names of practically all of the better known entomologists in this country and of many famous Europeans.

CUSHING MADE ASSISTANT LEADER

E. C. Cushing has been appointed to the newly established position of Assistant Leader of the Division of Insects Affecting Man and Animals. Mr. Cushing reported for duty in Washington, D. C., on February 11. He is a graduate of the Texas A. & M. College and has taken postgraduate work there and also at the Liverpool School of Tropical Medicine, and at Cornell University. He has been a member of the staff of this Division since 1928.



## FRUIT INSECT INVESTIGATIONS

Control of citrus rust mite with sulphur in cool weather.-- W. W. Yothers and M. R. Osburn report an interesting experiment conducted in December at Orlando, Fla., in the control of the citrus rust mite by the use of sulphur dust, ordinarily considered most effective at high temperatures. When the dust was applied the weather was cool and cloudy, the humidity was high, and the temperature was 67° F. The application of the dust was followed by comparatively low temperatures. There was a good kill of the mite immediately after the application, but little or no mortality during the following period of low temperatures.

Parasite readily finds isolated colony of citrus blackfly.--James Zetek, in charge of the laboratory at Balboa, Canal Zone, reports an interesting observation on Eretmocerus serius Silv., an Asiatic parasite of Aleurocanthus woglumi Ashby. The parasite was introduced into Cuba and the Canal Zone in 1930 and 1931. A planting of citrus trees was made at an isolated point that had recently been filled in about one mile from any other citrus. The trees were known to be free from the blackfly at the time they were planted, but soon became very heavily infested. A recent inspection showed that the parasite has already located this flourishing colony of the blackfly and is rapidly cleaning it up.

Parasitization of oriental fruit moth increases.--H. W. Allen and G. J. Haeussler, of the oriental fruit moth laboratory, Moorestown, N. J. report that Macrocentrus ancylivorus Roh., an important native parasite of the oriental fruit moth, has greatly increased in dominance and distribution over any previous year of record and has become, by a wide margin, the dominant parasite of twig-infesting larvae. It is now apparently established in the following counties in which liberations have been made in the past but where it had not previously been recovered: Franklin, Plymouth, and Worcester in Massachusetts; Middlesex in Connecticut; Monroe and Schuyler in New York; Beaver in Pennsylvania; Dorchester in Maryland; Rockingham in Virginia; Pickens and Spartanburg in South Carolina; Roane in Tennessee; Columbiana, Licking, and Lorain in Ohio; Marion and Massac in Illinois; and Cape Girardeau in Missouri. It has this year become the dominant parasite, showing effective parasitization in orchards in many counties outside the area of its effectiveness when colonization was started. It continues to be the most important parasite in most counties where it was found prior to the widespread liberations. This season M. ancylivorus was recovered from 16 States, 49 counties, 88 towns, and 125 properties, or 47 percent of all counties, 49 percent of all towns, and 48 percent of all properties, a far better distribution record than that of any other species.

New host records of oriental fruit moth parasites.--Macrocentrus ancylivorus was reared at Moorestown from Ancylis comptana fragariae Walsh and Riley infesting raspberry, and Epiurus indigator (Cress.) from Macrocentrus cocoons from the same host. Macrocentrus delicatus Cress. was reared from a small undetermined lepidopterous borer in a host plant believed to be Polygonum pennsylvanicum.

Raisin-insect infestations eliminated by processing and packing.--

Charles K. Fisher, of the Fresno, Calif., laboratory, reports the results of a preliminary series of tests in which two crops of raisins were sampled before packing operations began and at several points in their progress through the processing machinery, in order to determine the effectiveness of different manufacturing steps in removing infestations of Plodia, Ephestia, and the saw-toothed grain beetle. Although from 4.8 to 16.5 percent of the original infestation remained after the stemmer had been passed, all infestation was removed by the combined effects of stemmer, grader, and recleaner. Further tests will be made in warm weather, when eggs and newly hatched larvae will be more abundant. Mr. Fisher says, "It is of interest to note that the 1934 crop of raisins contained Ephestia but no Plodia, while the reverse was true of the 1933 raisins."

Relation between drop size and oil deposit of spray emulsions.--

Experiments were made by A. W. Cressman, of the Fruit Insect Division, and L. H. Dawsey, of the Insecticide Division, of the Wooster, Ohio, laboratory, to show the relation between the average drop size of the emulsions and the quantity of oil deposited on paraffine-covered mica plates. Three emulsions, prepared from petroleum oil, glue, and water, were mixed with a high-speed stirrer, the drop size being varied by changing the length of time the mixture was stirred. Counts for drop size were made from both concentrated emulsions and nozzle samples. The sprays were applied with a pressure sprayer with a modified Vermorel nozzle and operated at 50 pounds pressure. The results showed that when identical spraying conditions were maintained the oil deposit on the mica plates bore a constant ratio to the deposit on potted chrysanthemum plants. The results indicate that the average drop size was materially decreased by passage through the spray nozzle and that the amount of oil deposited on the plates increased as the drop size increased.

MEXICAN FRUIT FLY CONTROL

Trapping results along Rio Grande.--

The operation of traps on the Texas side of the Rio Grande resulted in the taking of 142 adult Mexican fruit flies on 86 premises. Eight of these flies were taken in 6 brush locations somewhat removed from bearing citrus groves. In addition to the Mexican fruit flies taken, specimens of 9 other species of fruit flies were recovered in the traps. There was a decided increase over the preceding month in all species taken. Intensive inspections in the groves in which fruit flies were taken disclosed no larvae. As soon as possible after the finding of adult flies, the State-operated power sprayer was placed in the groves and the trees were sprayed with nicotine-molasses, some 14,274 trees in 31 groves being sprayed during the month. In addition to the spraying, owners of groves in which flies were taken were urged to harvest the fruit immediately, ship the salable part north of the Cotton Belt, and dispose of the remainder through the canning plants or by burial.



DATE SCALE CONTROL

Progress in scale eradication.--In January the Reed Date Garden in the Imperial Valley, a commercial planting of 538 palms, most of them Persian varieties from 10 to 20 years old, was inspected and no scale was found. This garden was infested with *Parlatoria* date scale at the time of planting and in all probability the scale was eradicated. The garden was reinfested later, presumably from a heavily infested planting of Canary Island palms about a mile and a half distant. One moderately infested palm was found in July 1933 and repeated inspections up to and including February 1934 have disclosed 9 lightly infested palms grouped around it. Since the last scale was found in February 1934, four careful inspections have been made, the last this month (January), and no scale has been found. Since April 1933 no scale has been found except in this garden and none in any commercial garden since September 1931. In 1931 only 4 infested palms were found in commercial gardens. Clean-up work is progressing in the Yuma district in Arizona and in the Coachella Valley. Previously infested seedling palms of no value are being dug out, and the leaf bases are being removed from others. To facilitate inspection, many previously infested plantings are being pruned.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Distribution of corn borer parasites.--D. W. Jones and W. G. Bradley, Melrose Highlands, Mass., report material progress in 1934 in the distribution of the more promising imported parasites of the European corn borer over the borer-infested territory, supplementing previous releases for this purpose. Approximately 70,000 parasites became available from European and oriental importations and domestic collections, the majority including *Lydella stabulans* var. *grisescens* R. D., *Inareolata punctoria* Roman, and *Chelonus annulipes* Wesm. The value of the two first-named species in the natural control of the borer has been definitely established. At the close of 1934 *L. stabulans* had been distributed over the greater part of the more heavily infested territory, whereas extensive releases of *I. punctoria* are still required before its distribution will be comparable to that of *L. stabulans*. The emergence of all imported parasites during 1934 is summarized in the following table. The difference between the numbers of adults released and those emerged are accounted for by shipments to Canada, mortality during distribution, and retention for biological observation.

Species	Place of origin				Total
	Italy	Japan	United States		
	Falconara	Castelnuova	Miyakonojo		
<i>Bracon atricornis</i> (Smith)----	---	---	10	---	10
<i>Chelonus annulipes</i> -----	12,049	2	---	---	12,051
<i>Cremastus flavoorbitalis</i> Cam-	---	---	354	---	354
<i>Eulophus viridulus</i> Thos-----	---	16,050	---	---	16,050
<i>Inareolata punctoria</i> -----	3,311	310	---	5,317	8,938
<i>Lydella stabulans</i> var.	:	:	:	:	:
<i>grisescens</i> (oriental)-----	---	---	8,038	---	8,038
<i>Lydella stabulans</i> var.	:	:	:	:	:
<i>grisescens</i> (European)-----	35,654	2,252	---	1,222	39,128
<i>Zenillia roseanae</i> B. B-----	3,351	---	---	73	3,424
Total-----	54,365	18,614	8,402	6,612	87,993

Effectiveness of Trichogramma in control of sugarcane borer.--J. W. Ingram, of the Houma, La., laboratory, reports that during 1934 H. A. Jaynes and E. K. Bynum conducted 20 experiments to determine the value of releasing Trichogramma minutum Riley as a control for the sugarcane borer. These experimental plots were laid out with the assistance of a soil specialist from the Bureau of Plant Industry, a plantation scientific man, managers, and overseers. The overseers checked the areas for past similarity of treatment and equality of past yields. Each experiment consisted of a parasite-release plot, supplemented by buffer and check plots, each averaging about 5 acres. From 11,750 to 25,930 adults of Trichogramma, furnished by Dr. Herbert Spencer of the fruit-insects laboratory at Albany, Ga., were released per acre in June, July, and the first half of August. Borer egg counts, made every 3 weeks until the middle of September, showed practically no difference in the rise in parasitization between the release and check plots, the borer infestations being practically the same at harvest time. Weights and sucrose analyses of the cane grown were obtained in 18 experiments. Six experiments showed that more sugar was produced per acre in the parasite plots; 5 experiments favored the checks; and the remaining 7 showed no difference in sugar production. The average yields of sugar per acre for the 18 experimental plots harvested were as follows: Parasite plots, 2,651 pounds; buffer plots, 2,796 pounds; and check plots, 2,729 pounds. In determining beneficial results from Trichogramma releases, none of the following factors consistently favored the releases: (1) Percentage of parasitization, (2) joint infestation, (3) sugar yield per ton of cane, and (4) tons of cane produced per acre or weight of sugar per acre. It is therefore evident from data carefully accumulated over a period of 2 years that no advantage results from Trichogramma releases for borer control.

Loss caused by sugarcane beetle in southern Louisiana.--J. W. Ingram, Houma, reports that in determining the loss to sugarcane from injury by the sugarcane beetle, 100 young plants whose growing points had been killed by the beetle and 100 uninjured plants were marked by stakes last May in fields of the varieties Co. 281 and C. P. 807. Examinations and samples of stalks taken in November gave the following results:

Variety	Original : plants	Millable : canes : produced	Average : weight : each	Sugar : per ton : of cane	Average weight : of millable cane : produced per : market plant
	Number	Number	Pounds	Pounds	Pounds
C. P. 807					
Noninjured plants--	89	194	1.53	194.5	3.32
Injured plants-----	91	36	1.21	190.0	.48
Co. 281					
Noninjured plants--	92	255	1.43	186.7	3.72
Injured plants-----	94	66	1.23	180.3	.86



Second fall generation of hessian fly overwintering at Wichita, Kans.--  
J. R. Horton, Wichita, reports as follows: "The mild weather during October and November started a small second fall generation of hessian fly, which is now successfully anchored in the wheat plants and promises to survive the winter. It was estimated that approximately 5 percent of the forms now in the local wheat are of this generation. Pupation began during the last week of October, when the soil temperature averaged 62° F. Soil moisture was approximately 18 percent and continued up to the week ending November 26, with soil temperature averaging 55° for the entire period and soil moisture averaging 19.5 percent. It was estimated that pupation and emergence amounted to approximately 6 percent of the puparia. Eggs resulting from this emergence were found during November on late-sown plants. An examination of more than 400 living fly forms during the week ending February 4 showed the presence of larvae of all stages, from the recently hatched, red stage to full-grown ones. The weather in December and January was mild, with afternoon temperatures ranging from 20° to 55° F. except for brief cold spells in the last 2 weeks of January, which froze the wheat almost to the ground but did not injure the fly."

Hessian fly parasite shipped to California.--L. P. Rockwood, Forest Grove, Oreg., reports that on January 9, 1,875 hessian fly puparia obtained from wheat stubble near Forest Grove in November and December and estimated to be 13 percent parasitized by Platygaster herrickii Packard, were shipped to the Bureau's laboratory at Sacramento, Calif., for attempted introduction into that State.

Early infestation of pea aphid in San Fernando Valley.--R. A. Blanchard, Sacramento, reports that of 6 alfalfa fields examined for the pea aphid in the San Fernando Valley on January 30, 4 had small populations, 1 a population nearly large enough to cause damage, and 1 a damaging population. This is the earliest date that a population large enough to cause damage has been observed in any locality in California. The damaged field had growth from 14 to 16 inches tall, the tips of which were severely damaged by what appeared to be a combination of aphids and frost. New growth from 3 to 4 inches tall had come up below the old stems and the aphids were present in large numbers on it. A considerable percentage of this new growth was being yellowed and wilted by the aphids. The fungus Entomophthora aphidis appeared to be controlling the infestation. The fungus disease had apparently prevented damage in the other heavily populated field. On January 29 careful examination of Scotch broom in Clackamas County, Oreg., failed to reveal any pea aphid eggs. The broom has been watched for several years and this is the first time aphid eggs in numbers have not been found at this time of year.

Chinch bug population in Kansas.--W. T. Emery, Wichita, Kans., reports that on January 29, 15 stubbles of kafircorn taken from a field near Manhattan, yielded 207 living chinch bugs and 1 dead one. The ground was frozen and had previously been subjected to subzero temperatures. It was too wet to sift when thawed out, but when it was warmed and dried the chinch bugs were found to be normally active.

Say's stink bug as a predator.--O. L. Barnes, Tempe, Ariz., reports that the pentatomid Chlorochroa sayi Stal. was found feeding on the eggs of the



range caterpillar near Optimo, N. Mex., last November. The contents of the eggs had been sucked out by the bug, a characteristic feeding puncture being left on the egg shell. Eggs bearing similar punctures had been observed in previous collections made in New Mexico.

#### JAPANESE AND ASIATIC BEETLE INVESTIGATIONS

"White" disease among Japanese beetle larvae.--In January experiments were started by I. M. Hawley and S. R. Dutky, Moorestown, N. J., to determine the effect of temperature and of the size of inoculum on the time of development of the "white" disease in artificially infected third-instar grubs. Twenty healthy grubs were injected with 2,000,000 spores of the causal organism and exposed to various temperatures. The time of development at various temperatures was as follows: At 86° F., 6 days; at 77°, 9 days; at 62°, 14 days; and at 48°, the grubs were not diseased after being exposed for 28 days.

Snow cover protects Japanese beetle larvae.--In order to obtain some data on the influence of snow cover on soil temperature, report Mr. Hawley and T. N. Dobbins, the snow was removed from a plot about 15 feet square and the soil temperature at the 3-inch level was obtained with thermometers and recording thermographs. The lowest temperature in grass sod beneath the snow was 32.6° F., in bare ground covered with snow, 26°, and in bare ground with the snow removed, 15.4°. The air temperature was below zero on several nights during this period, the lowest record being -9°. From laboratory studies it is known that a temperature of 15° is fatal to all larvae of the Japanese beetle subjected to it for only a few hours. It is evident, therefore, that periods of low temperature such as experienced this year in the absence of snow will prove fatal to many larvae of the Japanese beetle, whereas with the presence of snow coverage there is little likelihood that the larvae will be affected by the low temperature.

Stickers for derris.--In the previous report on investigations being conducted by L. D. Goodhue, Moorestown, blown castor oil was shown to be a good sticker for derris. In the belief that other blown oils having similar properties should also give good results, a sample of heavy blown sardine oil was tested and found to be equal to if not better than blown castor oil. It can be obtained at about half the price of blown castor oil and possesses the advantage of a higher viscosity. When soap is used as an emulsifying agent the emulsion of this oil is very sensitive to cold hard water. It cannot be diluted without precipitation. This difficulty has been overcome by the use of casein as a dispersing agent and protective colloid. In emulsions prepared as indicated above, it will probably be necessary to use a preservative to prevent the putrefaction of the casein. Experiments employing phenol are in progress. Tests with blown castor oil show that the temperature of the water used to wash the sprayed bean leaves is an important factor. With water at 59° F. (15° C.) three determinations show 5, 5, and 10 percent removed. Two results obtained by washing at 77° F. (25° C.) show that 30 and 40 percent was removed. This is explained by the lower viscosity of the oil at the higher temperature. Since blown fish oil has a higher viscosity than blown castor oil, it gives better results when washed at the higher temperature. The order with which the spray ingredients are mixed is important in washing. Better results are obtained when the emulsion and the derris are thoroughly mixed before being added

to the hard water than when the water and emulsion are mixed and the derris added last. Using the first method only 11 percent was removed from glass plates by washing, but under the second method more than 28 percent was removed.

Lampblack superior to dyes in withstanding weathering.--Mr. Goodhue also states that derris with 15 percent of the following pigments were exposed to the weather: Venetian red, prussian blue, titanium dioxide, and lampblack, using agar as a sticker. After 1 week the lampblack mixture lost only 20 percent by decomposition, while the other pigments lost from 50 to 70 percent. In this experiment lampblack was much superior to titanium dioxide.

Stickers for lead arsenate.--Experiments were carried on during the past season by A. R. Rolfs and L. Koblitzky, Moorestown, to determine the value of different materials as stickers for lead arsenate on foliage. During January 510 analyses for arsenic were made on leaf samples in connection with the tests conducted to compare the value of the spray deposits left on foliage by coated lead arsenate and by ordinary lead arsenate alone and with various stickers. A statistical analysis of the data obtained on the lead arsenate residue on the foliage immediately after spraying and at intervals during the summer shows that (1) flour, or aluminum sulphate and sodium bicarbonate do not increase the initial deposit of lead arsenate but do increase its permanency; (2) lead oleate as a coating for lead arsenate did not increase the initial deposit and decreased its permanency; (3) fish oil increased the initial deposit considerably and also increased the permanency of this deposit even more effectively than did flour or aluminum sulphate.

Control of adult Japanese beetle on field-grown roses.--In January F. W. Metzger, Moorestown, completed a report on control of the Japanese beetle on field-grown roses. Sixteen materials were tested for repellency to the Japanese beetle. Preliminary data indicate that o-chlorophenol, cresol, limpid oil, and carbasota (the last two materials being coal-tar intermediates) may be of considerable value in preventing injury in small home gardens where only a few plants are under cultivation.

Effect of cool storage on field-collected Japanese beetle parasite.--M. H. Brunson, Moorestown, reports that adult females of Tiphia popilliavora Roh. as well as other Tiphia, apparently will not withstand storage in shipping containers at low temperatures over long periods of time. Females were collected in the field and a number of them were placed in separate shipping cans containing soil, food, and water and the cans were placed in refrigeration. Another series of females were placed in breeding cans to serve as checks. It was noted that at 50° F. females were able to survive for 15 days with a mortality of only 2 out of 15 parasites. In 20 days 10 were dead, and in 25 days 11 were dead out of lots of 16 each. At 42° complete mortality occurred in 10 days.

Correction.--In the February 1, 1935, News Letter (vol. 2, no. 2), lines 9-10, p. 5, under "Control of adult Japanese beetle by mechanical traps", should read: "B, 43.4 ± .87; C, 41.1 ± .87; D, 75.0 ± 1.11; E, 84.4 ± 1.16."



## JAPANESE BEETLE CONTROL

New Jersey nursery inspections reveal corn borer infestation.--Observations were made during September, October, and November 1934 for corn borer infestation in and near 54 New Jersey nurseries. About one-third of the counts were made in the northern and extreme western parts of the State. Infested stalks were found in or near 13 nurseries. Counts at these establishments varied from 1.2 to 3.2 larvae per stalk. In most instances counts were made of 100 random-selected stalks.

Increase in Christmas tree shipments from New England.--During the Christmas tree shipping season of 1934 there were certified 377 carloads of trees. In addition, 206 carloads were shipped from the 41 towns in Vermont recently released from quarantine. This total of 583 compares with a total of 459 carloads certified from the entire quarantined area in 1933. As the inspected trees all originated in the lightly infested area, only a single gypsy moth egg cluster was found.

Scattered infestations of brown-tail moth found in two Maine towns.--Observations for brown-tail moth webs by the district inspector stationed at Bangor, Maine, disclosed scattered infestations of this insect in Orono. Two small infestations were also found in Oldtown. Both of these towns are situated outside of the area regulated on account of the brown-tail moth.

Summary of chemical treatments for Japanese beetle in 1934.--During 1934 there were treated 3,264 cubic yards of pottng soil in 55 nurseries. Of this total, 2,317 cubic yards were treated with carbon disulphide, 842 sterilized with steam, 77 treated with lead arsenate, and 28 fumigated with naphthalene. Over 12 percent more soil was certified in this manner than in 1933. Heeling-in areas to the extent of 614,909 square feet were given a certified status during 1934. Nursery plots with growing stock determined as eligible for certification totaled 3,798,281 square feet. The total acreage in lead arsenate treated soil, including heeling-in areas and plots of nursery stock, amounts to 101.3 acres. While beetles were in flight in the Philadelphia market district, 247 cars containing 87,001 bunches of bananas were fumigated with hydrocyanic acid gas. A total of 1,987 crates of blueberries were fumigated with carbon disulphide.

Rapid organization of Dutch elm disease eradication work.--Organization of eradication crews and their placement in the field proceeded as rapidly as available motor vehicle and other equipment permitted. During the month 75 new stake-bodied  $1\frac{1}{2}$ -ton trucks and 4 standard sedans were delivered. Saws, axes, ropes, and other equipment for felling trees were purchased in quantities. By the end of January there were 95 P. W. A. and 25 C. C. C. eradication crews in the field. The total Federal personnel engaged in scouting for dead and dying trees, and eradicating condemned trees, numbered 1,287. Suspects confirmed as diseased since discovery of the infection in New Jersey in 1933 totaled 7,688 at the end of January. In the course of the month 720 diseased trees were removed--719 in New Jersey and 1 in Connecticut. This left 601 infected trees in New Jersey and 3 in New York. These are marked for early destruction. Scouts surveying for dead and dying elms tagged 19,288 trees in Connecticut, 43,965 in New Jersey, and 35,176 in New York. Dead and dying trees removed

numbered 6,076 in Connecticut, 2,487 in New Jersey, and 13,042 in New York. Dead and dying elms standing at the end of January totaled 137,127.

Outside assistance in Connecticut Dutch elm disease eradication.--A number of helpful instances of cooperation from municipal, State, and company officials have been reported from Connecticut. The tree warden of the town of Greenwich has agreed to remove and destroy all condemned trees along streets and roads within his jurisdiction. The town has already removed a number of such trees. The gas and light company of Stamford has requested that they be allowed to top all condemned trees that are close to power lines in the towns of Stamford and Darien. The landscape division of the State Highway Department has given blanket permission to allow our organization to remove all condemned trees along State highways. State crews are pruning highway trees in New London and Middlesex Counties. They are burning all elm material taken from trees in and near the Dutch elm disease work area.

Weed destruction combined with certification treatment.--In two instances this week, soil treatments in the Washington, D. C., district, were made in excess of the requirements for certification purposes. Ten cubic yards of potting soil were treated with carbon disulphide at the rate of  $1\frac{1}{2}$  pounds per cubic yard. The required dosage is 1 pound per cubic yard. The period of treatment was extended from 48 hours to 2 weeks. Daily treatments of soil with steam are being made for the experimental greenhouses of the Department. The average temperature runs around 200° F. Each of the described treatments is sufficient to kill any weed seeds present in the soil and more than fulfills the certification requirement.



## FOREST INSECT INVESTIGATIONS

New forest-insect laboratory established.--The Division of Forest Insects has recently established a new western laboratory with headquarters at Denver, Colo. J. A. Beal, of the Portland, Oreg., laboratory, and L. G. Baumhofer, Coeur d'Alene, Idaho, have been assigned to the new laboratory from the permanent staff. Dr. Beal will be in charge. The territory covered includes, roughly, the States of South Dakota, Nebraska, Kansas, Colorado, and Wyoming, parts of Utah and Oklahoma, and all of the proposed Shelter Belt area. Work on the Shelter Belt project will be one of the main functions of the laboratory and in connection with this set-up a temporary field station will be established in the Shelter Belt area. In addition to other work some of the forest-insect problems of Arizona and New Mexico will be handled from the Denver office. In January Messrs. Beal and Baumhofer made a trip through part of the region and then to Washington, D. C., in preparation for the establishment of the new laboratory, which, it is expected, will be functioning about March 15.

Wood borers in white pine lumber.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports that the black horned pine borer (Callidium antennatum Newm.) has done considerable damage to seasoned round-edged white pine lumber in New England during the past 2 years. Particularly, losses have resulted in stacks of resawed boards glued into squares and then piled in the mill rooms awaiting manufacture into circular pail lids. In many instances the tunnels ruin the edges of the lids and it is also not uncommon to find a tunnel paralleling the glued seam.

## GYPSY AND BROWN-TAIL MOTH CONTROL

Gypsy moth infests American beech.--A gypsy moth infestation, discovered recently in one of the towns in the southwestern portion of the barrier zone, in Massachusetts, is located in a stand composed almost entirely of American beech. Nearly pure stands of this northern hardwood are not at all unusual in that section of the State. The trees in the area found infested were damaged considerably by the ice storm of January 1922, when so many shade and forest trees suffered very greatly from ice that accumulated on their branches. The beech trees of the infested stand have never recovered from the tearing and breaking they were subjected to at that time and many of them have broken and badly decayed tops, which cannot be climbed to examine them for infestation. It has been found necessary to cut off from 5 to 25 feet of the tops of such trees and lower the cut portions to the ground where they can be examined in safety. A number of gypsy moth egg clusters have been found and destroyed on these lowered tops. It has been decided to conduct a special gypsy moth survey in New York, New Jersey, and Pennsylvania outside of the area now known to be infested with this pest. Arrangements have been made with the States concerned so that either Federal or State inspectors, or both, may be assigned to special scouting in sections and localities suspected of harboring infestation. Such places as tourist camps, summer resorts, parks, hotels--particularly those frequented by transients--places of amusement, freight stations, or bus terminals--especially those more or less surrounded by trees--private grounds where considerable ornamental planting has been done, and areas where road machinery or other contractors' supplies are being used, especially if these have been

moved long distances. Experienced Federal gypsy moth men have been assigned to work in towns in New York, New Jersey, and Pennsylvania, with instructions to cover as much territory as possible with thoroughness, continuing their efforts up to the time when gypsy moth eggs normally hatch. Men from the various State forces are to perform as much similar work as their other duties will permit. It is planned to have examinations made in all of the towns in New Jersey that have not been scouted previously. In Pennsylvania the Federal workers are to examine towns in an area entirely surrounding the present area of known infestation, while in the remainder of the State the State nursery inspectors are to make similar examinations in towns in their respective districts. In New York, Federal men are to work in the area in the southeastern section of the State immediately adjoining the New Jersey and Pennsylvania State lines, while the State forces are to work in towns in other sections west of the barrier zone. Arrangements have been made with the State nursery inspector of Ohio to have some of this special survey work performed in that State by the inspectors. Arrangements are also being made with the State nursery inspectors of Delaware and Maryland to have similar work performed by men working under their direction.

Labor problems in Pennsylvania.--Some difficulty was experienced in the Pennsylvania area when over a hundred men, assigned to the Works Division of the Luzerne County Emergency Relief Administration for cutting and clean-up work, struck in support of demands they had made for changes in working conditions. Mine workers, who compose the majority of the men employed on that type of gypsy moth work, have for many years been accustomed to taking short periods in the middle of the morning and afternoon for lunch. As such rest periods are not practical in gypsy moth work, they have not been granted. The men who struck demanded these rest periods, the privilege of smoking while on the work, and the privilege of warming themselves around the fires where brush and slash were being burned. Because of the fire hazard in the coal-mining sections, no smoking can be permitted while the men are working. Only a few of the men were emphatic in the demands, but they induced the others to strike with them. State officials informed the men that the demands could not be granted, and nearly all returned to work.

C. C. C. work in New England.--Gypsy moth work by C. C. C. workers was continued throughout the month in 7 camps in Connecticut, 10 in Massachusetts, and 1 in Vermont. Severe weather and heavy snowfall have slowed up the work somewhat but the largest number of men were assigned to this work since the first of July and an average of about 600 men have been used. Since the first of July 289 miles of roadside trees have been examined and 100,138 acres scouted. 213,719 individual trees in open country have been examined; and 561 acres of woodland have been cleaned, resulting in the removal and burning of over 3,000 worthless trees. A total of 330,154 gypsy moth egg clusters have been creosoted as follows: In Massachusetts, 217,536; in Connecticut, 73,225; and, in Vermont, 39,393. During the month all of the gypsy moth foremen were brought together at a centrally located camp, to discuss the work. At this meeting the foremen were encouraged to point out camp conditions that tended to retard gypsy moth work. The points developed were taken up with the proper State officials, resulting in steps being taken to correct some unsatisfactory situations. This office has had cooperation from the U. S. Forest Service, the Department of the Interior, and State officials. The gypsy moth work, however, is only one of a



great many projects under their direction and all projects have to be considered in the work programs. Arrangements have been made, through the State and Forest Service officials, to have workers in gypsy moth work clothed with woollen breeches and leggins. A regular Bureau supervisor has continued during the month in teaching the camp men in the use of ropes for climbing trees in connection with their work. The boys take readily to this method of climbing, and it will result in much less spiking of trees, which cannot be avoided when climbing irons are used. Talks on gypsy moth work have been given to the camp men and motion pictures pertaining to this work have been shown. A report of work covering the period from October 3, 1934, to January 2, 1935; and showing also the total amount of work done since July 1 was completed early in January and submitted to the proper State officials for their information.

#### PLANT DISEASE CONTROL

Effectiveness of blister rust control.--During 1934 plot and strip-line studies were made to determine the amount of blister rust infection on white pines in protected and unprotected areas in the Northeastern States. In protected areas in New Hampshire, New York, and Vermont, 27 plots, comprising 62.6 acres, were laid out in 20 towns and the white pines were examined carefully for infection. Out of a total of 14,191 pines, 2,982, or 21 percent, were infected with 4,250 cankers. However, only 139 of these cankers, or 3.3 percent, originated since the application of control measures. Infection conditions in protected areas were also determined in 23 towns in New York and New Hampshire by examining all pines under 20 feet in height on 13 miles of rod-wide strip lines. A total of 35 percent of the 15,808 pines on the strips were infected with 7,804 cankers, but only 2.4 percent of these infections had originated since the control work was performed. In unprotected areas plot studies were made in 30 towns in six States. The 36 plots comprised 35 acres. Blister rust had infected 10,230 white pines, or 49 percent of the 20,821 trees of this species. Most of the 20,584 cankers were of recent origin. In fact, 41 percent of them originated during 1930 and 1931, which shows the danger of delaying protection work.

Blister rust control in California in 1934, summary.--During the 1934 field season, extending from late in April through September, 18,177,243 Ribes bushes were eradicated from 190,935 acres of sugar pine timber land in California, using a total of 83,906 man-days of labor. This brings the total area now under protection in California to 261,963 acres. From this area have been eradicated 25,647,055 Ribes, of which 25,179,576 were removed during the initial work and 467,479 by subsequent workings of parts of the original areas. The total sugar pine area now under consideration for control treatment in California amounts to 2,000,000 acres, and at the close of 1934 the initial Ribes-eradication work was 13 percent completed. During 1934 both the Forest Service and the Bureau had allotments of P. W. A. funds for employing labor on blister rust control work in California, the funds of the Forest Service being for use on national forest lands, and those of the Bureau for use on State and private lands. Because of the generally intermingled ownerships existing in the sugar pine region, Forest Service and Bureau camps were combined for work on selected areas of sugar pine type, the ownership of which governed the ratio of funds involved. Field representatives of both the Bureau and the Forest Service believe that the joint undertaking of 1934 was not only generally satisfactory but mutually advan-

tageous to each cooperator. With the rust not yet known to exist in California, the general plan of control now followed is to give first attention to the high-value sugar pine stands in the State and later, depending on the spread of infection, to treat selected areas of less value.

Ribes eradication in the Inland Empire.--Summarization of data on Ribes-eradication in the Inland Empire shows that during 1934, 3,786,640 man-hours of labor were expended in eradication work on 672,092 acres of western white pine type. Initial working was completed on 644,995 acres, second working on 25,886 acres, third working on 1,211 acres, and 228,011 acres were placed on a maintenance basis. Nearly 13,000 men were employed in this work, 7,270 men in 42 Civilian Conservation Corps camps being engaged in blister rust control; 4,430 men were employed in 146 N. I. R. A. camps operated with funds made available to the Bureau and the Forest Service from the N. I. R. A. allotment; and 124 men in cooperative N. I. R. A. camps, the Bureau and the State of Idaho cooperating. Late in the field season 400 men were employed with funds made available to the Washington Emergency Relief Administration and 330 men with Idaho Emergency Relief Administration funds. In addition, 230 men were used throughout the field season in checking the efficiency of Ribes eradication. To date eradication work in the Inland Empire has been accomplished on 1,129,321 acres, of which 1,076,323 acres have been given initial working, 51,787 acres have been given second eradication, a third working has been necessary on 1,211 acres, and 375,515 acres are now on a maintenance basis. This work has been accomplished with 6,293,088 man-hours of labor.

Barberry eradication in Ohio, South Dakota, and Colorado.--As a result of 37,680 man-hours of local labor employed in Ohio during the past year, 1,932 square miles of territory in Ashtabula, Lorain, Mahoning, Geauga, Portage, and Trumbull Counties were given a careful inspection for barberry bushes. Ninety-eight percent of the bushes found were killed with salt. Those so situated that chemical eradication might injure valuable shrubs or trees were dug. About 140 tons of crushed rock salt were purchased in car lots direct from salt-manufacturing companies and distributed to crews as needed. The crop situation in South Dakota during the past season was by far the worst in the history of the State. Grain production in 1934 was about 8 percent of the 5-year average and approximately 32 percent of the 1933 crop, which was the smallest on record up to that time. The annual precipitation during the 3 previous years was approximately 12 inches, or 20 percent below normal. From January to August precipitation was deficient and temperatures were abnormally high. According to R. O. Bulger, Brookings, S. Dak., some rust developed in a few areas in the State where there was considerable rain during the latter part of June and the early part of July, but was not sufficient to cause noticeable damage. In Colorado during the 1934 field season, 28,212 barberry bushes were destroyed. Six crews of 6 men each, employed with P. W. A. funds, began work early in May and continued through the early part of December. Eradication was conducted in counties where extensive areas of infestation were known to exist. In the San Luis Valley (southwestern Colorado) approximately 2,000,000 bushels of small grains are produced annually. Berberis fendleri is native in the hill areas of this part of the State. It is one of the few districts in the barberry eradication area where a barberry susceptible to the stem rust fungus is native. Owing to the extent of the eradication problem in this area, various methods of treating bushes were tested. Although salt is considered an effective killing agent and otherwise suitable for treating bushes in most of the barberry eradication area,



it did not prove particularly adaptable in the larger patches of B. fendleri growing on the uncultivated lands adjacent to the Valley. A commercial mixture of  $1\frac{1}{2}$  pounds of sodium chlorate and calcium chloride with 3 gallons of water, applied to 1 square rod of barberry bushes, apparently gave an effective kill at a cost of approximately 12 cents per square rod. During the 1934 season 414 illustrated talks were given before approximately 10,000 people in Colorado and Wyoming, consisting of school children and adults. As a result of this educational campaign, 288 scattered barberry bushes have been reported. Often the report of a single bush has led to the eradication of many found growing in surrounding territory.

#### COTTON INSECT INVESTIGATIONS

Toxicity tests with the cotton flea hopper.--K. P. Ewing and R. L. McGarr have reported on cage toxicity tests with the cotton flea hopper, conducted at Port Lavaca, Tex., during 1933. From July 15 to September 11 a total of 417 cage tests were conducted, using 50 insects in each test. Little difference in the mortality was caused by the four different brands or fineness of the sulphurs used and all were more effective against the nymphs than against the adults. Wet mixtures of 25 percent paris green and 75 percent calcium arsenate killed from 81 to 91 percent, respectively, of the adults, and the dry mixtures of the same materials killed 8 to 10 percent less than did the wet mixtures. Home-made dry mixtures were from 10 to 20 percent less effective than factory mixtures of the same materials. The kill from all the mixtures made of a special air-floating paris green were consistently higher than those made of regular commercial paris green. Increasing the amount of regular paris green to 50 percent in mixtures with calcium arsenate and lime and to 80 percent in mixtures with lime did not increase effectiveness. All of these mixtures killed from two to three times as many adults as nymphs. The substitution of from 25 to 50 percent lime for equal quantities of calcium arsenate in the mixtures of paris green considerably reduced the kill. Sodium fluosilicate gave the highest kill of any insecticide tested in the cages, killing 87 percent of the adults and 83 percent of the nymphs. However, in field tests this material gave practically no control, owing to its poor dusting qualities and the burning of plants under certain conditions. The mortality from derris containing 4 percent rotenone was again very low. Copper arsenite (20, 25, and 50 percent) in factory and home-made mixtures with calcium arsenate gave good control of both adults and nymphs. Again the factory mixtures were more effective than the home-made mixtures. The substitution of lime for the calcium arsenate in the copper arsenite mixtures considerably reduced its effectiveness. Copper arsenite has very poor dusting qualities and also burns the foliage.

Biology of Microbracon mellitor (Say) in relation to the boll weevil.--Reporting on observations at Tallulah, La., during 1934, J. W. Folsom and Perry A. Glick state that when a healthy boll weevil larva is placed in an artificial cell, made by splitting a sound cotton square, removing the contents, and pinning the halves together again, the parasite M. mellitor will oviposit on the weevil larva just as usual, preferring to insert its ovipositor through the slit that it finds already made. This parasite is not likely to deposit its eggs on boll weevil pupae. Of 30 pupae placed in these artificial cells on only one was a parasite egg deposited. The parasites did not lay their eggs on or pay any attention to naked boll weevil larvae placed in the cages with them.

The M. mollitor female usually begins to lay eggs on the second day after emerging but sometimes not until the third day. She first stings and paralyzes the weevil larva and then lays an egg on or near it. The time required for oviposition ranged from 3 to 90 minutes. Usually 1 or 2 eggs were laid each day during the summer. One female laid 48 eggs in 37 days. Usually only 1 egg was found with each weevil larva, rarely 2, but in one instance 4 eggs were found. After the weevil grub is paralyzed it remains alive but motionless in the square and the pulsations of its dorsal vessel are reduced from about 50 to about 25 per minute. During August the eggs usually hatched in less than 24 hours, but after frost in November and December the eggs required from 4 to 12 days to hatch. During the summer the growth of the larva is rapid. In about three days it becomes full grown, stops feeding, and spins a cocoon. It remains in the cocoon as a larva for about 6 days and as a pupa for about 3 days. Although the normal period from hatching to eclosion was 12 days, this developmental period ranged from 7 to 16 days, chiefly according to the temperature, with a few late individuals taking even longer to reach the adult stage. The eggs from mated females produced both males and females. Parthenogenesis occurs among these parasites as among many of their relatives and, as expected, all the eggs from unmated females produced only males. Females mated with these parthenogenetic males produced normal offspring of both sexes. M. mellitor probably passes the winter as larvae in cocoons.

Spread of Fusarium wilt by insects.--A report on the second season's work on dissemination of Fusarium wilt has been submitted by L. D. Christenson, College Station, Tex., working in cooperation with J. J. Taubenhaus, Plant Pathologist of the Texas Experiment Station. In these studies the insects found in cotton fields were divided into three categories: (1) Aerial forms that feed on cotton; (2) miscellaneous insects not feeding on cotton and which may transport spores by adherence to their appendages; (3) soil-inhabiting organisms. Representatives of each group were studied to determine their relative importance as disseminators of the fungus-causing wilt. Among the aerial cotton feeders, 15 species of Orthoptera, the boll weevil, and the cotton leaf worm were selected for study. Specimens were collected from wilt-infested fields at College Station, Beaumont, and in Caldwell County, Tex. After external sterilization in a solution of bichloride of mercury, either the entire insects or their stomach contents were cultured in sterile agar plates to determine whether they contained viable Fusarium fungi. Eight hundred and fifty grasshoppers (chiefly Locustidae) were cultured. On the basis of population counts made the previous season, this represents all grasshoppers on 2.32 acres of cotton. Twenty-three percent of the whole insects and 12.5 percent of the stomach contents cultured showed Fusarium growth, indicating that the external sterilization was not entirely effective in reaching all parts of the body. There was little difference in the percentage of positive cultures from the different species, and the importance of the species in disseminating wilt depends upon their abundance. There was no way of determining whether the grasshoppers were infective in a direct ratio to the percentage of plants infected with wilt, as all fields ultimately had three-fourths or more of the plants diseased. Tests with leaf worm and boll weevil were largely to determine whether the fungi in the larvae remained viable during larval transformation. Only a small percentage of pupae and adults from leaf worm larvae fed on leaves containing an abundance of spores produced Fusarium growth when cultured. These few cases may have been due to noneffectiveness of



external sterilization and apparently in most cases the fungus is expelled in the final evacuation of the alimentary tract or is killed during histolysis. A small percentage of boll weevil larvae, pupae, and adults collected from within squares and bolls on wilted plants also produced Fusarium growth. However, as cultures of plant portions from the inside of bolls from diseased plants did not result in a growth of wilt fungus, it cannot be concluded from these experiments that pupation of the weevil is equivalent to elimination or destruction of the fungus. In the second group of miscellaneous insects not feeding on cotton tests were made for carriers of externally adhering spores of Fusarium. Adults of Lepidoptera, Orthoptera, Hymenoptera, and Odonata were knocked down with swatters or picked up with sterile forceps in badly wilted fields. Pedal appendages were detached and cultured without sterilization. About one-third of the 92 adults tested were found to be carriers of wilt. The third group of smaller soil animals, mostly Collembola and Acarina, were cultured with and without sterilization. With the one exception of an unsterilized check, all cultures of Collembola resulted negatively. At the same time these organisms showed marked avidity for Fusarium vasinfectum material in pure slant cultures, eating and existing for long periods of time. These forms, which are mainly saprophytic, have apparently become adapted so as to digest the elements of which fungi, and spores in particular, consist. It is also remarkable that Collembola do not often carry the fungus adhering to their bodies. Other smaller soil animals also apparently have no marked proclivities for transporting fungus material, either internally or externally. Experiments in 1933 showed that the fecal pellets of a number of insects contained viable Fusarium material. Further experiments were conducted this year to determine how long the fungus would remain viable and whether cotton plants could be inoculated by means of pellets. Infective pellets of Melanoplus differentialis Thos., dried and stored in a dry place, remained infective for at least 9 months. Pellets from other Locustidae left exposed on the soil out of doors, exposed to temperatures of 65° C., also remained viable for several months. Cotton growing in both sterilized and unsterilized soil was infected with wilt by placing considerable quantities of infective fecal pellets near the tap roots. Only two or three pellets were required to produce infection when placed in a slot cut in the tap root 1 inch below the soil surface. Large quantities of inoculum are necessary to bring about wilt infection under laboratory conditions. As insects continuously defecate infective pellets, they may be important in intensifying the fungitic elements in the soil.

#### PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Control work in Florida.--The eradication of wild cotton in southern Florida has continued to make good progress. Most of the old colonies along the west coast have again been recleaned, and the inspectors are now devoting some time to scouting for new colonies. Several new colonies, most of them less than an acre in extent, have been located on shell ridges back in the swamps and on very small keys. Several crews are now working on the keys crossed by the Overseas Highway. At Cape Sable most of the area covered during the last clean-up has again been recleaned. During this recleaning the crews are cutting trails crossing at right angles those cut during the previous cleaning, and this procedure is resulting in readily finding mature plants that were missed when the old trails were used. The inspectors have continued the practice of examining wild cotton bolls from time to time, and on January 5 a specimen of the pink bollworm was found at Cape Sable, the first specimen found since the work was resumed last November.



Clean-up and trap-plot work in Texas.--Field clean-up in the Big Bend of Texas was completed on January 12, making the third consecutive year this work has been carried on. A total of 3,891 acres was cleaned, 110 of which were in Brewster County and the remainder in Presidio County. Generally speaking, the fields were harder to clean this year than ever before, because the cotton began opening very rapidly after the last irrigation, the farmers did not give the fields any further cultivation, and grass and weeds made considerable growth. Excellent cooperation was received from the farmers and they have already signified their intention of again observing the uniform planting date of April 15 or later. Plans are being made to carry on trap-plot work also. These tentative plans call for two half-acre plots in Brewster County and 8 plots of one-fourth acre each in Presidio County. Such good results were obtained by using field-planted plots in Brewster County last year that all of the plots will be planted in the field this year instead of growing the cotton in hotbeds and later transferring it to the fields. All of the work in connection with the plots--preparation, plating, irrigation, and cultivation--will be done by the farmers without any expense to the Department, and our work will start when the blooms begin to open, which will probably be the latter part of May. The Marfa, Tex., road station was discontinued on January 4, as field cleaning had progressed to a point where there was no danger of infested material being taken from the Big Bend. This season only 6 interceptions were found to be infested with the pink bollworm, 41 living and 25 dead specimens being taken, whereas last season 20 infested interceptions containing 122 living and 34 dead specimens were made. This is due principally to a reduction of the infestation by the control program, and also to the fact that the people living in the Big Bend have learned the necessity of thoroughly cleaning their cars before leaving the area.

Thurberia weevil in Arizona.--Early last December an infestation of *Thurberia weevil* was found in a 200-acre cotton field at Sahuarita, about 18 miles south of Tucson, Ariz. Another infestation was found in cotton about 3 miles north of Tubac, which is about 38 miles south of Tucson. The latter infestation was the heaviest, one half-acre plot showing 9.75 percent and a 4-acre plot 2 percent, while a third small plot did not show any infestation. The cotton was planted very late in the season, which accounts for its having been missed when an acreage survey was made last fall. This cotton has just been ginned, and close inspection of the trash and of some 10 bushels of seed gave negative results. This infestation undoubtedly occurred late in the season, so that the open cotton would hardly be infested, whereas infestation in the unopened bolls, which did not reach the gin, was fairly heavy.

#### TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Celery leaf tier populations low in Florida.--C. F. Stahl, of the Sanford, Fla., laboratory, reports that field examinations in the Sanford district the middle of January indicated a decided scarcity of *Phlyctaenia rubigalis* Guen. throughout the district. Evidence of the active presence of the insect was found only at one farm directly south of Lake Monroe. This district had suffered slightly from the December freeze. An average of approximately one larva per plant was found on the largest celery in the district, although all stages of the insect were present. However, the cold weather has delayed development of the larvae so that the celery will be harvested without any appreciable injury from the leaf tier. It is anticipated that the harvesting of this crop



(which incidentally removes the small larvae), combined with the cold weather, should effectually check any possibility of an outbreak in the Sanford district in the immediate future.

Small quantity of pyrethrum kills celery leaf tier.--In computing the amount of pyrethrum dust applied to an individual celery plant in dusting for the control of Phlyctaenia rubigalis Guen., C. B. Wisecup, Sanford, has estimated that each plant is contacted by approximately 0.226 grain, or 0.0079 ounce of dust. This amount of dust corresponds to the quantity that can be lifted easily on the blade of an ordinary pocket knife. Rough calculations following the measurement of representative leaves from different portions of a medium-sized celery plant demonstrated that such a plant possesses an average of approximately 9 square feet of leaf area on each of its surfaces (upper and lower), or a total of approximately 18 square feet of leaf surface to be contacted by the pyrethrum dust in order to combat the celery leaf tier successfully. As approximately 25 pounds of pyrethrum dust per acre is applied for celery leaf tier control, and as such dust contains equal quantities of pyrethrum and tobacco dust, it is evident that a very small quantity of the active ingredient of pyrethrum is lethal to the leaf tier.

Temperature changes affect food consumption by beet wireworm larvae.---M. W. Stone, of the Alhambra, Calif., laboratory, reports that the amount of food consumed by larvae of Pheletes californicus Mann. varies with the changes in temperature, according to results obtained in cage tests. At a temperature above 70° F. the larvae of this species were exceedingly active, eating an average of from 6 to 15 kernels of wheat per month per individual, whereas when the temperatures were 60° or lower an average of less than 2 kernels per month per individual were eaten. In the course of these experiments, newly hatched larvae were confined in individual containers and were furnished 6 kernels of wheat weekly. Inspection of the wheat at such frequent intervals rendered it possible to determine accurately the food requirements of the larvae. It was noted that the greatest number of kernels were eaten by the larvae when they were 3, 4, and 5 months old. Previously it was believed that first-year larvae, on account of their small size, were incapable of inflicting any great amount of injury to their host plants. However, these cage results indicate that such larvae are undoubtedly responsible for an appreciable share of the damage inflicted to late summer and fall vegetable crops in the Alhambra district.

Low temperatures kill hibernating pea weevils in Idaho.---T. A. Brindley, Moscow, Idaho, reports that the low temperatures in January, during which a minimum of -20° F. was recorded at Moscow, have resulted in a heavy mortality of the hibernating pea weevils. This mortality included the individuals hibernating under the bark of the ponderosa pine. Previous studies have indicated that such a location provides very effective hibernating quarters for the weevil, resulting in a minimum percentage of winter mortality, in comparison with other hibernation quarters. At the close of January the field observations indicated that approximately 33 percent of the pea weevils hibernating under the bark of ponderosa pine were dead. Complete mortality occurred among weevils in prepared hibernation cages used in studies of winter mortality.

Notes on the lime bean vine borer.--In summarizing the results of field observations on Monoptilota pergratialis Hulst. on the Eastern Shore of Maryland during the 1934 season, L. W. Brannon, of the Norfolk, Va., laboratory, reports that probably two broods of this insect develop during a season and that the winter is passed in the pupal stage just below the soil surface. In certain parts of some of the fields under observation this insect caused appreciable damage. In field control experiments, utilizing barium fluosilicate, cryolite, magnesium arsenate, potassium hexafluoroaluminate, and derris as sprays and dusts, no conclusive results were obtained as the infestation was comparatively light on the experimental plots.

Early blooming of wild host plant may reduce lima bean pod borer infestation.--Rodney Cecil, Ventura, Calif., reports that common lupine (Lupinus succulentus Dougl.), one of the most important wild host plants of the lima bean pod borer (Etiella zinckenella Treit.), began blooming on January 5 and was in full bloom by January 31 in the mountainous region adjacent to the lima bean section of the Ventura district. Ordinarily this plant begins blooming the middle of March, and in the past a large crop of lupines has indicated that a large brood of E. zinckenella will emerge from this wild host plant and infest the cultivated lima beans. As the lupine is blooming so early this year, it is likely that the plants may mature before the adults of E. zinckenella emerge from hibernation in the lima bean fields. In this event the wild-host brood will be materially reduced in number, therefore there will be very few adult borers to migrate to the cultivated lima beans.

Soil conditions affecting infestation by narcissus bulb fly.--Ralph Schop of the Sumner, Wash., laboratory, in determining the effect of the type of soil and the depth of planting (4, 6, and 8 inches) on the degree of infestation by the narcissus fly (Merodon equestris Fab.) found a greater survival of larvae in peat soil than in silt and the greatest survival at a depth of 6 inches.

#### INSECTS AFFECTING MAN AND ANIMALS

Screw worm activity.--W. E. Dove, of the Savannah, Ga., laboratory, reports as follows: "On several occasions screw worms were reported in wounds in the open-range sections of Georgia, but we have been unable to collect specimens and rear the larvae from animals in this State. In each case the stockman reported that the wound had a bloody discharge, characteristic of true screw worms. When such farms were visited our F. E. R. A. men invariably found that the wound had been treated with benzol and pine-tar oil. Some larvae from an untreated hog sent to us from Fernandina, Fla., were reared and identified as Cochliomyia americana Cushing and Patton. Even though screw worms are active in January, we contend that this is the season for surgical operations and we recommend pine-tar oil as a healing agent."

Effect of woods burning on screw worm and gulf coast tick.--Mr. Dove also reports: "Last fall the cattle entered the swamps where they spent most of the winter. In such places they browse on canes, evergreens, and grass protected by trees. These cattle are in very good condition. It is the custom of the stockmen to burn over the higher woods land in January and February. When the new grass begins to grow the cattle migrate from the swamps to the cut-over lands. It is estimated that one-third of the higher lands were burned by the end of January. As most of the woods burning usually takes place in February, we can expect



a very high percentage of burning for the season. During the past 3 years burning was curtailed by forest workers in their efforts to preserve forest seedlings. On account of the accumulations of leaves and pine needles, some of the present fires are very destructive to young trees. The actual burning of the woods would have little or no effect on screw worm larvae and pupae in the soil, but the heat of the fires would be sufficient to kill most of the larvae of the gulf coast tick (Amblyomma maculatum Koch.). It is not too early to predict that the gulf coast tick will be less abundant in Georgia this summer and that because of this and the use of better animal management, screw worms will be less numerous this year."

Screw worm activity in Florida not stopped by December freeze.--Numerous screw worm cases in livestock are reported to have occurred in northern Florida in January. Larvae from several cases sent to W. V. King have been reared and proved to be C. americana. The second cold wave, which struck the northern part of Florida on January 23-29, checked the activity of the flies and permitted the healing of many previously infested wounds in livestock.

#### FOREIGN PARASITE INTRODUCTION

European field laboratories consolidated.--The Budapest, Hungary, laboratory, concerned with the study of forest-insect parasites, has been discontinued and W. F. Sellers has been transferred to Hyeres, France. The Hyeres laboratory, with H. L. Parker in charge, assisted by H. D. Smith and Mr. Sellers, will hereafter conduct parasite work of the division in Europe and the Mediterranean region.

Alfalfa weevil parasites sent to California.--Two consignments of adult Peridesmia phytonomi Gahan, an egg parasite of the alfalfa weevil, were forwarded by H. L. Parker to H. S. Smith, Berkeley, Calif. They were forwarded by ordinary mail to New York and by air mail from New York to California. The first consignment arrived at Berkeley on February 2 and, according to Mr. Smith, the parasites were in excellent condition, the survival being 95 percent.

Pink bollworm parasites from Egypt.--In January two shipments of Microbracon brevicornis Wesm. were forwarded by H. L. Parker from Europe. The shipments comprised 89 adults and 237 cocoons and arrived at Presidio, Tex., in excellent condition, adult survival being 63 percent. A 90 percent emergence was obtained from the cocoon material. This is the "strain" or "race" obtained from the pink bollworm in Egypt and is intended to replace the corn borer strain, which has been unsuccessfully colonized during the past 2 years. In the rearing work at Hyeres this strain could not be reared satisfactorily on corn borer larvae.

Larch sawfly parasites shipped to Canada.--R. W. Burrell, of the Yokohama, Japan, laboratory, has recently forwarded 48,000 field-collected cocoons of the larch sawfly from Hokkaido to the Dominion Parasite Laboratory at Belleville, Ontario. A. B. Baird reports that the shipment arrived in excellent condition and shows a high percentage of parasitization by species of Tachinidae. The work on sawfly parasites in Japan and Korea is a cooperative activity with the Canadian Department of Agriculture.

Light gypsy moth infestation in Hungary.--Observations by W. F. Sellers during the past season reveal a very light egg population carrying over the winter of 1934-35. Of the areas scouted, 74 percent showed no infestation, 26 percent showed scattered or scarce infestation, a few showed medium infestation, and there were no heavy infestations. This decline has been taking place for several years and the situation offers a striking contrast to that of 1931, when only 2 percent of the areas showed no infestation and 50 percent were heavily infested.

#### FOREIGN PLANT QUARANTINES

Recent entomological interceptions of interest.--Twenty-five living larvae of the Mediterranean fruit fly were intercepted last October at San Francisco in three avocado fruits in stores from Hawaii. Larvae of this fruit fly were also taken at New York on November 21, 1934, in apples, persimmons, pricklypears, tangerines, and oranges in baggage from Italy. A larva of the European corn borer was intercepted at Philadelphia in a broomcorn stem in the mail from Italy. Living specimens of the Philippine orange moth (Prays citri Miller) arrived at San Pedro, Calif., in 38 lemons in ship's stores from the Philippines. A scale insect, Pseudodiaspis yuccae (Ckll.), was found last June at Nogales, Ariz., on Pedilanthus macrocarpus in cargo from Mexico. A living specimen of Nysius ementitus Dist. (Lygaeidae) was taken at New Orleans in banana debris in cargo from Honduras. Living specimens of Laspeyresia splendana Hbn. (Olethreutidae) were intercepted last October at New York in chestnuts in the mail from Germany. A living weevil, Madarus distigma Boh., was taken at Mobile, Ala., in banana debris in cargo from Honduras. Living larvae of the weevil Curculio nucum L. were intercepted at Philadelphia in hazelnuts in the mail from Lithuania.<sup>1/</sup> Living specimens of the weevil Lechriops psidii Marshall were found at Del Rio, Tex., in guavas in baggage from Mexico. Larvae of Ereunetis minuscula Walsm. and Opogona omoscopa (Meyr.) (Tineidae) arrived at San Francisco on pineapples in cargo from Hawaii. A living specimen of the citrus leaf miner (Phyllocnistis citrella Stainton) was intercepted at Seattle, Wash., in a kumquat leaf in ship's quarters from Japan. The larvae of this tineid mine the leaves of young nursery stock in the Orient. The cocoon is usually placed at the edge of the leaf, which is rolled up.

Recent pathological interceptions of interest.--Our second interception of Cercospora capsici Heald and Wolf was made at New York on a pepper from Cuba. Coniothyrium sp. was intercepted at Seattle on January 3 on Cornus mas from Bulgaria. The only previous disease interception on Cornus was Botrytis sp. Dermatium pullulans De Bary was intercepted on plums from Chile on January 16 at New York, our first interception of this genus. Ceratostomella (Graphium) ulmi (Schwarz) Buisman was found in elm logs from France on November 20 at Baltimore, according to a report from the culture laboratory. Walnut logs from Turkey examined December 31 at Baltimore were discolored by Hemitrichia vesporium (Batsch) Macbride (a myxomycete), our first interception of the genus. Our first interception of Heterodera marioni (Cornu) Goodey on Kalanchoe sp. and on Euphorbia punctata were made at New York on January 29 in plants from South Africa. Our first interception of Marsonia potentillae var. fragariae

<sup>1/</sup> Correction.--In the Bureau of Plant Quarantine News Letter dated December 1, 1933, p. 1, line 18, Curculio micum should read Curculio nucum.



Sacc. was made at Seattle November 28 on leaves of Fragaria fukuba from Japan. Our first interception of Microdiplodia wistariae Grove was made at Seattle on December 12 on stems of Wisteria multijuga from Japan. Tulip bulbs from Holland intercepted at New York on January 15 bore masses of red "dust" in addition to Penicillium sp. spore masses, this red dust consisting of the spore balls of Papulospora parasitica (Eid) Harz, our first interception of this disease. Some workers do not consider the warty globose bodies to be actual spores, but the manner of production and distribution is similar to that of some spores. Our first interception of Phoma camelliae Pass. was made at Seattle December 15 on several named varieties of Camellia japonica from Japan. Our second interception of Phyllosticta cynarae West was made at New York on globe artichokes from France. A Phyllosticta sp. with spores smaller than any found described as occurring on Camellia was intercepted at Seattle on December 13 on Camellia japonica from Japan. A leaf spot of croton intercepted at New York on December 5 on croton from Bermuda was caused by Phyllosticta sp., perhaps the undescribed species mentioned in the Report of the Bermuda Department of Agriculture for 1927. Phyllosticta sp. was intercepted at Seattle on November 30 on scales of lily bulbs from China, our first interception of a Phyllosticta on lily. Polythrincium trifolii Kze. was intercepted January 14 at the Washington Inspection House on hop clover leaves from Turkey. The only previous interception of this genus was the same disease on clover from British East Africa. Sclerotia of Sclerotinia sclerotiorum (Lib.) Mass. were found on radish seed from Turkey at the Washington Inspection House January 15, our first interception of this species on radish. Our first interception of Schizophyllum commune Fr. from Turkey was made at Baltimore December 31 on walnut logs. Our first interceptions of Sclerotopsis testudinea Dearness were made at Seattle on December 12 and 18 on peonies from Japan. Septoria citri Pass. was intercepted January 16 at Portland on a lemon from India, our first interception of this disease from Asia. Our first interception of Sphacelotheca sorghi (Lk.) Clint. from South America was made at New York on January 11 in broomcorn from Argentina. Cones of Picea abies from Norway intercepted December 26 at Philadelphia bore numerous rust sori of Thecopsora padi (K & S) Grove, our first interception of the genus.

New names for lima bean fungi.--Attention is called to the article by S. C. Bruner and Anna E. Jenkins, "Identity and Host Relations of the Elsinoe of Lima Bean" (Jour. Agr. Research 47:783-789, Nov. 15, 1933). In accordance with this article records of Elsinoe canavaliae Rac. on lima bean should be changed to E. phaseoli Jenkins. The disease of lima beans discussed on page 24 of the News Letter for January 1, 1935, is the subject of an article entitled, "Colletotrichum truncatum (Schw.) n. comb. on Garden and Lima Beans", by C. F. Andrus and W. D. Moore (Phytopath. 25:121-125, Jan. 1935).

Insect on leek.--The occurrence of a leaf-boring larva of Acrolepia assectella Zell. in imported leeks was reported in the Plant Quarantine News Letter dated February 1, 1934. This record from the Netherlands is now supplemented by the finding of the insect in New York on January 23 in leaves of leek in ship's stores from Italy. It is said to damage garlic and leeks in France and to be a pest of onions in Russia.

Praying mantis causes flurry.--An inspector looking for stowaway insects in the debris in the hold of a ship unloading bananas at Galveston, Tex., noticed a considerable commotion and found a laborer out of the carrying line trying to jar something loose from his bunch of bananas. Meanwhile the other laborers were calling for the "bug doctor" or the "leaf man", as they term the inspector, because of his interest in examining the leafy trash in such shipments. The excited laborer finally shook out on the deck a huge praying mantis. The Mexican laborers regard this as a very poisonous insect, calling it the "cow-killer" or "mule killer", believing that if it is eaten by an animal feeding on grass where it is hiding the animal will sicken and die. There appears to be no scientific basis for this popular belief.

Mangoes refused entry.--The importation of mangoes is generally prohibited on account of the outstanding susceptibility of this fruit to fruit-fly infestation. Twenty-five cases of fresh mangoes arriving at Seattle, Wash., from Singapore January 22, each fruit lightly wrapped in netting and dipped in paraffin, were refused entry and taken out to sea to be destroyed.

Inspecting ocean liner a huge task.--Some idea of the magnitude of the work involved in inspecting one of the large passenger vessels arriving at our ports in constant succession throughout the year is given by the following records obtained while inspecting one of these huge floating cities, the Conte di Savoia, which arrived in New York on November 21, 1934. This boat carried a crew of 841 and a passenger list of 1,053, that came aboard at four different ports in three countries, Italy, France, and Spain. Seventy-four customs inspectors were on hand to examine the passengers' baggage, and five plant quarantine inspectors were present to deal with the plants and plant products found in the examination. These passengers carried a miscellaneous assortment, consisting of 134 plants, cuttings, small trees, etc., of 16 different kinds, and 1,090 fruits of 16 kinds, in addition to 10 pounds of green olives, these plant materials coming from Italy, France, Spain, Greece, and Austria. The stores of this vessel contained 5,125 pounds of 16 different vegetables, practically all from Italy, and several crates of artichokes, kale, and peppers, in addition to 40 cases of lemons, 60 melons, and 15 cases of Spanish grapes. Several hundred decorative plants were scattered in various salons, cabins, and promenades, and a special detail of inspectors was assigned to these stores and plants, and to accompany the 26 customs inspectors who searched the hundreds of places in cabins, lockers, and crews quarters where contraband might be concealed. This record does not include inspection of the sizable cargo also carried aboard this vessel, which was subsequently inspected on the dock. The inspection in all cases had to be prompt, in order to facilitate the landing of the passengers and the discharge of cargo, for the ship sailed again within 50 hours from the time of arrival. The contraband plants and fruit taken from baggage were examined to some extent before they were burned in the city incinerator, and this partial examination disclosed the presence of 24 plant diseases and 76 insects. The latter included the Mediterranean fruit fly in five different kinds of fruit from Italy (prickly-pear, tangerine, orange, apple, and persimmon). By far the greatest proportion of the plants, fruits, etc., found in passengers' baggage came from Italy, and 80 percent of such seizures were found in the effects of the third-class passengers.



## DOMESTIC PLANT QUARANTINES

Transit inspection at southern points.--Taking advantage of the dull nursery-stock shipping season, inspectors are making limited inspections of shipments in transit at Memphis, Dallas, and Fort Worth, and are obtaining information on the volume of nursery stock and restricted products that may be available for inspection at these points. St. Louis will also be included in the tour.

Bus line to carry more express.--One of the interstate bus lines operating between New York and Chicago is increasing its equipment for a more extensive express business, and transit inspectors at these points are looking into the possibility of nursery stock being transported in this manner, and are considering the advisability of including the bus terminals in their inspection tours.

Citrus canker inspection.--In January inspections were made of 325 properties in 7 counties in Texas, and 138 properties in Beauregard and Vernon Parishes, La., the work being carried on cooperatively with these States. Arrangements are being completed with State officers of Alabama and Mississippi for limited winter inspections of from 6 to 12 weeks on a cooperative cost basis. No inspection for citrus canker, other than regular State inspections of nursery stock, has been done recently in these two States.

Citrus canker recurring in Galveston area.--Citrus canker was found recently at three new points in the Galveston, Tex., area, where the disease has been outcropping in recent years. Each of these infections was on Citrus trifoliata, one tree being near League City, one near Alta Loma, and two near Arcadia. The infected trees and all other citrus on the properties concerned were, with the cooperation of the owners, destroyed. The fact that all of these were abandoned or wild trees shows the necessity for the intensive inspections now being carried on in this area. These findings do not necessarily mean that the disease is spreading, but probably represent old infections on previously undiscovered trees. Intensive inspection is being made of all wild or abandoned citrus in wooded bayous, fence rows, ditch banks, and abandoned plantings. Such trees are destroyed when found, if practicable, and all remaining citrus trees are plotted at the close of each day on a U. S. Geological Survey quadrangle for use in future eradication. At Dickinson, where a severe epidemic occurred a year ago, inspections are being made of elaborate home plantings, as well as of woodlands, and no additional infection has thus far been found in this immediate area. Recent freezing weather has caused defoliation and the killing of some citrus trees in this area.

Narcissus bulb quarantine revoked.--Secretary Wallace has announced that Federal domestic quarantine No. 62, which relates to the interstate movement of narcissus bulbs, will be revoked, effective April 1, 1935. "Attempts at general eradication have not been successful", the announcement states, "the pests occurring year after year in most areas where such attempts have been made. Furthermore, both the eelworm and the greater bulb fly have become more widespread, now being established in commercial narcissus-bulb plantings in many States in addition to the ones in which they were known to occur at the time the quarantine was established. \* \* \* The removal of this quarantine

leaves to interested States freedom of action in the establishment of such State restrictions as they may deem advisable."

Stock infested with peach borer culled.--Nurserymen in several States were assisted in January by Federal inspectors in culling out peach stock infested with the peach root borer (*Aegeria exitiosa* Say). This work is in cooperation with States which require such culling, tree by tree at digging time, as a condition of shipment of peach and nectarine stock from areas infected with the phony peach disease.

#### CONTROL INVESTIGATIONS

Standard insecticide found for tests of fly sprays.--There has long been need for a synthetic crystalline organic compound that would be sufficiently toxic in kerosene solution to serve as a standard of comparison in tests of kerosene extracts of pyrethrum and other materials against house flies. Phenothioxin, a compound made by L. E. Smith of the Insecticide Division, was found by F. L. Campbell and W. N. Sullivan, Takoma Park, Md., to be suitable for this purpose in their turntable method.

Old samples of pyrethrum may be less toxic than pyrethrin.--Tests made by W. N. Sullivan, Takoma Park, Md., and G. D. Reynolds, Food and Drug Administration, Beltsville, Md., of six samples of alcoholic extracts of pyrethrum against house flies, showed that the oldest samples were not as toxic as their pyrethrin content indicated. The extracts were prepared and analyzed by J. J. T. Graham, of the Food and Drug Administration.

Technique for injecting insects with poisons.--N. E. McIndoo, Takoma Park, Md., having finished his bibliography on tobacco and nicotine, has begun a study of methods for the quantitative injection of poisons into insects. As a starting point in this work, he is using Trevan's micrometer syringe.

#### BEE CULTURE

Travel incident to honey production.--Statistically minded writers have figured out that in preparing a pound of honey, bees fly about 40,000 miles. So far no one has determined how many miles by truck and automobile the modern beekeeper must travel in producing and marketing his pound of honey. F. E. Todd, Davis, Calif., reports that a survey by the Pacific States Bee Culture Field Laboratory, in cooperation with the University of California, including 225 California beekeepers who produced in 1933 a honey crop of 6,130,181 pounds, has shown that these beekeepers traveled 1,493,628 miles, which is equivalent to 0.24 mile per pound of honey. At this rate the entire crop of that year must have caused the California beekeepers to travel 2,887,000 miles. Use of automobiles varies with the type of apiary. In Oregon and Intermountain States, where beekeeping is nonmigratory for the most part, about 10 percent of the cost per pound of honey is due to transportation, whereas in the migratory apiaries in California transportation accounts for from 20 to 25 percent of the cost. While the raw materials for honey come from nearby plants, the production of honey under modern conditions is



aided by rubber, iron, gasoline, and other materials obtained from many distant parts of the world, another demonstration of the complexity of modern civilization.

#### IDENTIFICATION AND CLASSIFICATION OF INSECTS

Rare cerambycid received.--W. S. Fisher states that he has received from Dr. Emanuel Ducasse, Port-au-Prince, Haiti, a specimen of the very rare cerambycid beetle Derancistrus (Prosternodes) obenthuri Gahan for deposit in the national collection.

Parasites of Parlatoria blanchardi Targ. in the United States.--Parasitized specimens of Parlatoria blanchardi, collected in the Coachella and Imperial Valleys in California by F. S. Stickney, were recently examined by A. B. Gahan and the parasites tentatively identified as Prospaltella ? aurantii Howard and (Signiphor) Thysanus ? flavopalliata Ashmead. The parasite material was not entirely mature and hence it is impossible to identify them positively to species. The record is interesting as being apparently the first identification of a parasite of this scale insect in America.

The sugarcane mite (Tarsonemus spinipes Hirst) in the United States.--H. E. Ewing reports that the first record in the United States of the sugarcane mite (Tarsonemus spinipes Hirst) comes from a quarantine greenhouse at Arlington Farm, Va. Since the discovery of the infestation all the sugarcane in the vicinity of the infested house has been destroyed and the house has been fumigated.

First North American records for two European leafhoppers.--In connection with recent determination work for correspondents, P. W. Oman has had occasion to refer to and identify certain leafhoppers he collected in New England in August 1934. Of these, two are well-known European species, but apparently represent new records for North America. These are Athysanus argentatus Fab. and Macropsis tiliae Burm. The first is apparently a grass feeder, as are closely related species of the genus, while the second, as the name suggests, lives on Tilia sp. The latter species is commonly referred to by European workers as Pediopsis tiliae Burm. M. tiliae was collected at New Haven, Conn., and A. argentatus in the White Mountains of New Hampshire.

