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DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

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ADMINISTRATION

Stuart Pinckney Dies

John Stuart Pinckney, assistant entomologist, of the research staff, at the Carlisle, Pa., laboratory, died suddenly in that city on the afternoon of December 12. Mr. Pinckney was born at Mt. Pleasant, S. C., on September 11, 1901, and was graduated from Clemson College in 1922. He was appointed to the entomological service on July 22 of that year and was assigned to the hessian fly investigations at Wichita, Kans., under J. R. Horton. He resigned from the service in November 1927 and was engaged in private business for a time, but was reinstated on January 21, 1929, with the title of assistant entomologist, and was detailed to the hessian fly investigations at Carlisle, under C. C. Hill. After the introduced pest Bruchus brachialis Fahr. became troublesome in the Carolinas in 1934, Mr. Pinckney was assigned to the investigation of this insect. He had made excellent progress with this problem but was still engaged on it at the time of his death.

Stuart Pinckney was a valuable, energetic research worker and a man of fine character who will be greatly missed in the service. He held a captain's commission in the infantry of the United States Reserve Corps and was deeply interested in military affairs. He was a descendant of Governor Charles Pinckney, of South Carolina, of Revolutionary War fame. He is survived by his wife, his parents, and one sister.

FRUIT INSECT INVESTIGATIONS

Causes of injury to peach trees.--A 1,600-mile-trip taken in October by Oliver I. Snapp, of the Fort Valley, Ga., laboratory, through Virginia, West Virginia, Maryland, Pennsylvania, New Jersey, and Delaware, to investigate injury to peach trees revealed that winter injury, rather than the ethylene dichloride emulsion treatment for borer control, had probably been responsible for the condition of the trees in most of the orchards visited in which there were injured trees. The use of 85-percent stock emulsion of ethylene dichloride instead of the recommended 20-percent strength had definitely contributed to serious injury in 1 orchard. In 5 of the 50 orchards visited, improper manner of application of ethylene dichloride emulsion or failure to regulate the dosage may have caused injury or contributed to a condition initiated by winter injury.

Miscible ethylene dichloride unsatisfactory for peach borer control.--Mr. Snapp has reported on tests conducted this fall at Fort Valley with miscible ethylene dichloride, a commercially manufactured substitute for ethylene dichloride emulsion that recently appeared on the market. When diluted to application strength, the mixture was unstable, and layered very rapidly. Although the miscible ethylene dichloride gave very good control of the peach borer, it caused some injury to the trees. This may have been due to the rapid settling of the diluted material, which caused the last of the dose poured to be stronger than the first portion poured. The injury in most cases was to the outside bark layers, especially where there was an opening in the bark, and to crown galls. The miscible material caused very little cambium injury and, of 236 trees of various ages treated with miscible ethylene dichloride, only a stunted 3-year-old tree growing beside a hedgerow was injured sufficiently to cause death.

Fumigation of raisins in rolled paper trays.--Experimental fumigations of raisins in rolled paper trays, designed to kill infestations of the raisin moth (*Ephestia figulilella* Greg.) before larval feeding had caused much damage, were carried out by George H. Kaloostian, of the Fresno, Calif., laboratory. In former years raisins were dried on wooden trays. This method is still used extensively, especially for drying late-maturing Muscat grapes, but probably 75 percent of the leading variety, Thompson Seedless (*Sultenina*), is dried on trays of Kraft paper, 2 by 3 feet in size. After the raisins have been dried for 10 or more days the trays are rolled into bundles by folding the long edges of the paper toward the middle and then rolling the tray the long way to form a "biscuit roll." The rolls remain in the partial shade of the vines while further drying takes place. There are from $6\frac{1}{2}$ to $7\frac{1}{2}$ pounds of raisins on each tray. Both methyl bromide (2 cc. per tray) and granular paradichlorobenzene (10 g. per tray) greatly reduced the population in Zante raisins ("currants"). The reduction was apparently aided by 3 days of partial exposure to the heat of the sun. More successful were applications of about 2 cc. per tray of dichlorethyl ether absorbed in white cornmeal, applied to Thompson Seedless raisins. Treated and control rolls were left in the vineyard for 7 days. Samples taken at the end of the test indicated that living infestation in the treated rolls was zero, whereas the untreated controls averaged 72,000 per ton.

MEXICAN FRUITFLY CONTROL

Only one larval infestation found.--One larval infestation was found in the Edinburg district on November 14. In this infestation 11 fruits were found on or under 7 trees. Larval infestations in the fall of the year are somewhat rare, although in a few other seasons infested fruit has been found. As very few fruitflies have been trapped this fall, and as none of the previous fall infestations have ever been widespread, it is not believed that this one instance presages a general heavy infestation for this season. Fruit shipments for November totaled 4,325.7 equivalent carlots. The total shipment for the season, as of November 30, amounted to 7,692.2 cars. This amount is 774.7 equivalent carlots more than was shipped at the same date last season. Cold weather in the lower Rio Grande Valley, as well as in the winter-garden area, aided the maturity of citrus fruit but was damaging to tender vegetables. The Weather Bureau thermometer at Brownsville recorded a low of 38° , but unofficial thermometers at Edinburg and other places in

the western end of the valley recorded 28° for short periods of time on November 15. Rainfall for the month amounted to 2.34 inches. Although the rains were general and precipitation was recorded on 13 days, there was not sufficient rainfall in parts of the area for the growers to dispense entirely with irrigation.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Mormon cricket in Big Horn Mountains requires 2 years for development.--J. R. Parker, Bozeman, Mont., states that reports had reached the Bozeman laboratory since 1935 to the effect that Mormon crickets in the Big Horn Mountains of Wyoming exhibited a biennial life cycle and consequently became abundant only every other year. F. T. Cowan, upon investigation, found that in collections of eggs from this locality, made in the fall of 1939 and at intervals during the following summer, the contained embryos required more than 1 year to attain maturity. The experimental evidence at hand failed to indicate that temperature alone was responsible for this retardation of development.

Carbon disulfide an effective soil fumigant for white-fringed beetle.--H. C. Young, Florala, Ala., reports that tests conducted during April and May 1940, in the Florala area, of carbon disulfide as a soil fumigant for the white-fringed beetle, gave an effective kill of the insect. This fumigant applied at a dosage of 6½ pounds to 100 square feet of surface produced a drastic reduction in population but failed to effect complete mortality. The injection of the entire dosage at a depth of 2 inches was as effective as when half the dose was injected at 2 inches and the remainder at a depth of 8 inches. No apparent advantage resulted when areas that had been treated were covered with tarred building paper after fumigation occurred.

Newly hatched larvae of white-fringed beetle descend rapidly in soil.--Mr. Young also states that recent studies have shown that the newly hatched larvae of the white-fringed beetle descend in the soil at a rapid rate. On the sixth day after hatching they were found at a depth of 3 inches; at 21 days they had reached a 9-inch depth, and by 37 days they were 11 inches deep in the soil. The mortality of newly hatched larvae is great and reached 50 percent during the first week after hatching.

Effect of low moisture content in grain on certain insect species.--According to R. T. Cotton, Manhattan, Kans., experiments to determine the effect of low moisture content in stored wheat and corn on various species of insects contained in it showed that, although some species succumbed rather promptly, others survived for long periods under such conditions. The rice weevil, the flat grain beetle, and the lesser grain borer failed to reproduce in grain having a moisture content of from 7 to 8 percent and died in a short time. On the other hand, the black carpet beetle and the confused flour beetle lived for long periods in such grain, but were unable to breed freely in it.

Lygus bugs in alfalfa yield to community control action in Arizona.--V. L. Wildermuth and L. L. Stitt, Tempe, Ariz., report that serious reduction in yields of alfalfa seed, caused by feeding of Lygus bugs, in the Mohawk and Antelope Valleys of southwestern Arizona, led in 1939 to the adoption of a

community control program which has proved highly successful. This was arranged through the cooperation of the local alfalfa-seed growers, the Bureau of Entomology and Plant Quarantine, and the Extension Service of the Arizona State Experiment Station. In accordance with an outline prepared by Messrs. Wildermuth and Stitt and C. E. Blackledge, county agent of Yuma County, the growers agreed to adopt uniform cultural action throughout the year, aimed at greatly reducing the numbers of Lygus bugs early in the season, and later exposing them to maximum solar heat and starvation during harvest of the hay crop preceding the seed crop. This program consisted in a combination of clean-culture, pasturing, and irrigation schedules, together with uniform harvesting schedules so timed as to expose the bugs to maximum summer temperatures. In a seed-producing area of 4,600 acres the growers cooperated practically 100 percent in adopting this outline during the seasons of 1939 and 1940, with the result that bug populations were greatly reduced and alfalfa-seed production rose from an average of 174 pounds per acre in 1938, to 314 pounds in 1940. Some fields, having unusually excellent stands, produced from 400 to 600 pounds per acre. A check on these results was afforded by the Lygus infested but untreated south Gila seed-growing area, located some 29 miles distant. This produced in 1940 only 171 pounds of seed per acre and had a bug population per acre about five times as great as that present in the Mohawk area.

Many species of Phyllophaga captured in Japanese beetle traps.--Philip Luginbill, Lafayette, Ind., states that through the cooperation of E. G. Brewer, of the Japanese beetle control project, the trapped specimens of Coleoptera other than Japanese beetle were sent to Lafayette for study. A total of 7,103 specimens of Phyllophaga, taken from 75 points located in 28 States, were received in 1940. These comprised 58 species and 3 varieties, which was 13 species and 2 varieties more than were received in 1939. The collections in 1940 came from 10 more States than in the previous year. Through this excellent cooperation many valuable specimens and distribution records have been accumulated for inclusion in a publication on the taxonomy of Phyllophaga, which is in preparation. In addition to Phyllophaga, representatives of 25 other genera of the Scarabaeidae were included in this material.

First rearing of a little-known blind beetle.--August Balzer, Beaumont, Tex., reports the successful rearing of a little-known, blind and wingless beetle, Thaumophrastus karanisensis Blaisdell, from egg to pupal stage. This was accomplished by placing the eggs in petri dishes on mixtures of corn, wheat, and rice flour. This insect was originally described from material collected in an Egyptian tomb and its habits were previously unknown.

Dusting with rotenone for control of vetch bruchid.--According to J. S. Pinckney, Carlisle, Pa., dusting experiments with rotenone of 0.83 percent strength at the rate of 20 pounds per acre, for control of vetch bruchid, shortly after oviposition began in June and July 1940, at Arendtsville, Pa., gave encouraging results. In the plats receiving one application 82.6-percent mortality resulted. Those that received six applications showed 89.4-percent mortality. This work was done under rather unfavorable conditions, rain having retarded the applications this year until after oviposition had begun.

Cadelle in stored rice resists fumigation.--August Balzer, Beaumont, Tex., reports that in the fumigation of a rice mill and warehouse, containing 693,500 cubic feet of space, and a load of 5,500,000 pounds of clean, brewer's rice in 100-pound sacks, 525 pounds of liquid HCN was applied. This application resulted in 100-percent mortality of rice weevil adults, and 100 percent of their immature forms, but of the caddellés only 84 percent succumbed. The gas in this experiment was not artificially vaporized or circulated. In another experiment a concrete warehouse having a content of 894,200 cubic feet, and also a load of 3,989,000 pounds of clean rice, approximately nine-tenths of which was in burlap sacks and the remainder in cellophane-wrapped cartons in cases, was fumigated with methyl bromide. The dosage was 2 ounces of the fumigant to 1,000 pounds of rice, at 87° F. It resulted in killing 100 percent of the rice weevils and flour beetles in burlap bags but only 97 percent of the caddellés. An unsatisfactory kill of all insects was obtained in the rice packed in cartons.

JAPANESE BEETLE CONTROL

Perennials fumigated for Japanese beetle in Ohio and planted in Florida.--During November arrangements were made for the fumigation at one of the large Mentor, Ohio, nurseries of approximately 10,000 perennials of all varieties and the transportation of these fumigated plants to the Bureau's field laboratory at Sanford, Fla., for planting and observation as to the tolerance of the different species to methyl bromide fumigation. The Division of Control Investigations arranged for the land at Sanford, and assigned Randall Latta to cooperate with V. A. Johnson, of the Division's treating section, in conducting the tests. On November 18 about 490 varieties were fumigated, 6 plants of each variety. Because it was difficult to certify check plants for movement into Florida, it was decided to fumigate all 6 and have a larger number fumigated to compensate for the lack of check plants. The plants were packed for shipment on the 19th, left Mentor on the 20th, and arrived at Sanford on the 23d. Mr. Latta had the land prepared for planting and the plants were set in on the 25th and 26th. There was some leaf drop from foliated plants, owing to sweating in transit. This lot was fumigated at the 50° to 54° F. temperature range, 2½ pounds of methyl bromide per 1,000 cubic feet, with a 4½-hour exposure. A second lot of plants, consisting of about 430 varieties, was dug on November 27 and brought into the boiler room for preheating. They were fumigated the following day and arrived in Sanford on December 3, where they were planted the next day. In general, this lot arrived in better condition than the first truckload. At the time of the arrival of the second load, the first lot was showing strong growth, from buds to leaves 3 or 4 inches long.

Nurseryman employs variety of chemical treatments for Japanese beetle control.--Numerous treatments with carbon disulfide emulsion and paradichlorobenzene and fumigations with methyl bromide were performed at a large Maryland nursery. At this establishment carbon disulfide and paradichlorobenzene treatments have proved more satisfactory than fumigation. Part of the treated nursery stock was used to fill present orders and the remainder was heeled in in a certified plot for filling future orders. This nursery has installed a new power pump and pressure hose for use in washing nursery stock and plants which must be shipped scil-free. This is a more satisfactory and efficient method than hand washing. A nursery on the Eastern Shore of Maryland reports

that orders for fruit trees are being received faster than they can be filled. A washing room that was recently completed at this place has enabled them to wash several thousand fruit trees early in the morning and has speeded up inspection work. Owing to cold weather on the Eastern Shore it was almost impossible to dig any large orders before 10:30 in the morning. This short working day necessitated hiring of additional employees by some of the nurserymen.

Japanese beetle control activities by New Jersey growers.---During November the nursery and greenhouse business in New Jersey has been such that all inspectors have been kept busy. The greenhouse business has been good, with most of the classified establishments reporting more business than for the same period in 1939. In some cases shipments of certified stock indicated a 35-percent increase in trade. The nursery business, on the other hand, has been rather slow. A few small orders have been handled but spring orders have received more attention. Stock has been cleaned and stored for early spring shipping. A cold snap during the month stopped all digging. Azaleas continued to hold a very important place for holiday stock. One South Jersey establishment leased a range of greenhouses near Bridgeton, where they are growing thousands of azaleas.

Japanese beetle control programs at isolated infestations.---Soil treatment with lead arsenate for Japanese beetle control was carried on in 20 cities in 7 States during November, with a total of 324.4 acres covered. Treating in Chicago was concluded on November 5, a total of 107 acres having been treated since work began in that city on August 29. Work in Indianapolis, Ind., where 43.2 acres have thus far been treated, will be resumed next spring. The soil-treatment programs in Logansport and Richmond, Ind., were finished in November. Treating activities were also completed in Detroit and Melvindale, Mich.; Newark, N. Y.; Durham, Elizabeth City, Goldsboro, High Point, Raleigh, Rocky Mount, and Salisbury, N. C.; Ashtabula, Belpre, Gallipolis, and Marietta, Ohio; and Danville, Va. There still remains additional acreage to be covered in Winston-Salem, N. C.

Hedgerow certified from World's Fair grounds.---Cold and rain hampered the treatment with carbon disulfide emulsion of 260 Taxus that formed a hedge at the former Glass Center, on the New York World's Fair grounds. Two weeks were required for application of the emulsion to the entire lot. The work was finally completed and 3 large trailer trucks transported the certified stock to a nonquarantined State.

Nursery and greenhouse inspection activities.---In the Baltimore, Md., area only 1 greenhouse will handle certified Christmas stock. This firm will benefit by higher prices for this certified material, since other classified establishments must confine their purchases of stock to be taken into their houses to certified material. Inspection of chrysanthemum and gladiolus shipments, in accordance with State European corn borer quarantines, was continued at the Baltimore wholesale houses. Some shipments had as many as 60 dozen blooms each. A large hydrangea grower in the Maryland district required the services of an inspector throughout most of the month. Over 12,500 hydrangeas in 4-inch to 8-inch pots were fumigated with methyl bromide, 2 carloads of which were shipped to Canada and 1 to Chicago. Two greenhouse men in the Baltimore area completed new concrete soil-treatment

bins, and another expects to start a methyl bromide fumigation chamber in December. In the Norfolk, Va., area inspection and certification of nursery and greenhouse stock increased greatly during November. Two treatments of camellias were made with paradichlorobenzene.

Evergreen inspection for gypsy moth.--Owing to the finding of a large number of gypsy moth egg clusters on spruce-bough lots in the lightly infested area of western Massachusetts and southern Vermont, it was necessary to make actual piece-by-piece inspection of more than 160 tons of boughs. These were shipped under certification in 100-pound bales. Their principal use is for covering cemetery lots and perennial beds or for decorative purposes. No infestation was found in any of the boughs examined. Many New England nurseries are now manufacturing wreaths, sprays, and centerpieces from nursery-grown trees that are not fit for sale. In this way they are able to realize some money from their oversized stock. One nursery in central Connecticut is cutting and selling thousands of nursery-grown spruce as Christmas trees. This serves to thin out their plots to allow for increased growth of the remaining trees. Christmas tree operators report a scarcity of good, salable spruce or balsam trees in the lightly infested gypsy moth areas of Maine, New Hampshire, and Vermont. Of the two types, balsam is preferred because it does not shed the spills when placed in heated rooms.

Additional inspectors added to gypsy moth force.--Twenty-nine temporary inspectors were employed in the New England States during November to assist with the seasonal rush in connection with the inspection and certification of evergreen products. For the inspection of Christmas trees and greenery, 8 inspectors were employed in Maine, 1 in New Hampshire, 12 in Vermont, and 2 in Massachusetts. Two inspectors were added in Connecticut for the inspection of nursery stock and nursery-grown Christmas trees. To take care of inspection of lumber in carload lots, 1 inspector was added in Maine, 1 in Vermont, and 2 in New Hampshire.

Accomplishments in gypsy moth inspection.--From 45 infested shipments submitted for gypsy moth inspection and certification, 286 egg clusters were removed. In addition, 353 egg masses were removed from material inspected prior to its manufacture and shipment to various points outside the infested areas.

State Highway departments cooperate in eradication of Dutch elm disease.--A recent communication from the State Highway Commissioner of Connecticut outlined the precautions that Department is taking to cooperate in Dutch elm disease eradication work. "All of my specifications for road construction," the letter states, "are now carrying in their 'Special Provisions' the following note: 'All elm wood to be cut as a result of the contractor's operations will be confiscated by the United States Department of Agriculture or burned by the contractor at the direction of said Department. The contractor is warned that no portion of any elm tree shall be sold or removed from the premises.'" Arrangements have also been made with the State Highway Commissioner of New Jersey for similar disposal of elm wood cut as a result of contractor's operations in the State.

Additional Dutch elm disease infections in isolated areas.--Four diseased elms were discovered in the detached areas in November--one each in Kirkwood Township, Broome County, N. Y., and in the towns of Canaan, Dover,

and Lodi, Athens County, Ohio. Since the discovery of first-record cases in Canaan and Dover on August 7 and 13, 1940, respectively, a total of three infected trees has been found in each locality.

Observations by scouts surveying for beetle-infested elms.--A large amount of beetle material was picked up during the course of scouting in the West Virginia area during November. Treetops and small broken trees left by timber cutters comprise a large portion of the material. Most of these trees were cut during August and September and are now suitable for beetle entrance. A few of the trees observed were infested with larvae of Scolytus multistriatus Marsh. An unusual case of Magdalis infestation was found in the Preston, New London County, Conn., area. A 5-inch hanger was so heavily infested that the larvae were only about 1/8 inch apart. A 3-inch hanger that had dropped to the ground was equally as bad. Woodpeckers had worked the entire length of the 5-inch limb that was still attached to the tree but had not attacked the limb on the ground. Both of these breaks were caused by the hurricane in September 1938. In Maryland, scouting for beetle material was mainly confined to the Town Creek Valley. This is a new area for systematic scouting and a large quantity of beetle material was tagged. The heaviest bark-beetle infestation in the Maryland work area exists in this section, and it is believed that the unexpected amount of S. multistriatus collected in the northeastern section of the regular Maryland work area was due to beetles being "fed" from this vicinity.

Workers trained to recognize bark-beetle infested material.--Training of scout and sanitation crews in the identification of elm wood infested with bark beetles, or wood likely to furnish breeding places for vectors of the Dutch elm disease fungus, was started late in November and will be continued throughout December. Last year a uniform training program was developed for the entire project, involving principally removal crews. This year each State supervisor has developed his own program. In this way, scout crews that are still in the field tagging beetle-infested or potential beetle material can be trained, as well as crews that will remove the tagged material. Reports from the several States indicate that without exception the W. P. A. foremen and scouts are keenly interested in such studies and are unusually anxious to learn more about their work. The quality of scouting for beetle material has improved considerably as a result. During the course of these studies in New Jersey it was found that a large percentage of the material previously regarded as potential beetle wood in slippery elm was actually beyond the stage suitable for beetle attack. This condition seemed to indicate that the bark of slippery elm rots much faster than does that of the American elm. Much of the material tagged in the course of the special beetle material study in New York was slash and woodpiles; however, a few interesting trees were noted. One such tree was 100-percent dead and was infested throughout. The larvae in the tree appeared to have been heavily parasitized, with a mortality of over 50 percent of the fully grown larvae. Several of the larvae in the top of the tree showed bubble-like protuberances.

FOREST INSECT INVESTIGATIONS

Parasite of European spruce sawfly utilized against native sawfly.--W. F. Sellers, New Haven, Conn., reports that early in November this Division supplied from 300,000 to 400,000 of the chalcid parasite Microplectron fuscipennis Zett. for release in pine plantations that have been severely infested by the native LeConte's pine sawfly in the vicinity of Wilson Dam, Ala. The parasites were released at 30 colony sites by G. M. Bentley, State entomologist of Tennessee, and Karl Schuster, of the Forestry Relations Department, Tennessee Valley Authority. This parasite has become successfully established in the Northeastern States on the European spruce sawfly and is fairly abundant in certain areas. It apparently will attack practically all species of Diprion and Neodiprion sawflies. LeConte's sawfly cocoons are readily attacked under laboratory conditions and the adults produced are larger than average size.

Time of year when elm hangers die governs bark beetle attack.--R. J. Kowal, Morristown, N. J., is making a study of insect attack on elm branches that are broken by wind, ice storms, and other causes. Often branches are almost completely severed at their bases, but remain in the trees and later die. They are commonly referred to as "hangers." Early in March 1940 a severe ice storm created an immense amount of such material in elm and other trees in portions of the major area affected by the Dutch elm disease. Mr. Kowal has kept some of these elm hangers under observation and has periodically created others by partially cutting through the bases of branches with a saw. He has found that those hangers created by the March storm and which died rapidly, and those hangers artificially created in June, have since been only lightly attacked by the elm bark beetles Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich. The March hangers that died in mid-summer and those which were created in midsummer and died soon after were more heavily attacked. Considering all hangers, more galleries of S. multistriatus than of H. rufipes occurred. The H. rufipes galleries were made mostly in the material of larger diameter.

S. multistriatus attack heavy in wind-broken branches.--W. C. Baker, Morristown, N. J., reports concerning an experiment begun in 1938 in eastern Pennsylvania areas, in cooperation with the Bureau's Dutch elm disease eradication unit. During the winter of 1938-39 the project involved the destruction by burning of trees known to be infected with the Dutch elm disease fungus (Ceratostomella ulmi), the destruction of dead and dying elms, and the cutting off and destruction of all dead and dying limbs of the other elm trees within a mile of known infected trees. The purpose was (1) to remove known infected trees, (2) to remove latent infections that might be present in dead and dying trees or branches, and (3) to eliminate elm material in which the bark beetles Scolytus multistriatus and Hylurgopinus rufipes, which carry the fungus, might be present or which was suitable for attack by them. During August 1939 and August 1940 the pruned trees were examined for die-back and wind-breaks and the dead and broken branches were indicated on sketches that had previously been drawn of the trees. In October 1940 all dead branches having an estimated basal diameter of 1-1/4 inches or greater were removed and examined. Smaller material was disregarded because of its lack of importance as a breeding ground for the bark beetles. After being removed the branches were stripped of their bark, measured into 2-foot

sections, the circumference of each section taken, and a record made of the various insect galleries found. Eighty-five percent of the total number of sections examined were in the diameter classes of 2 inches and less, while 69 percent were in the 1-inch and 1-1/2-inch diameter classes. There was a total of 343 square feet of bark on the sections. Only 10 H. rufipes galleries were noted. These were all in a 3 1/2-inch diameter section. The number of S. multistriatus, Magdalis, cerambycid, and buprestid galleries per square foot of bark area averaged 1.28, 0.30, 0.30, and 0.12, respectively. In the case of H. rufipes and S. multistriatus the term "gallery" as used here included the egg gallery and the larval tunnels radiating from it, while of the other insects it refers to the tunnel made by one larva only. When the number of S. multistriatus galleries in sections from branches that had been broken by the wind or by other causes was compared with the number in sections from "natural die-back" branches, it was found that the wind-broken branches were much preferred for oviposition by the beetles. In the wind-broken branches the average number of S. multistriatus galleries per square foot of bark was 14.88, whereas in the "natural die-back" branches it was only 0.27.

Concentrated sprays effective against Cylindrocopturus weevil.--C. B. Eaton, Berkeley, Calif., reports that concentrated sprays, which have proved to be effective against the white pine weevil in the Northeast, will protect young ponderosa and Jeffrey pine trees from attack by the weevil Cylindrocopturus sp. In experimental tests with potted seedlings at the Hat Creek laboratory, and with 5- and 6-year-old planted stock in the Big Springs brush field, Lassen National Forest, a lead arsenate spray effectively prevented damage to trees exposed to attack by the weevil. The spray consisted, by weight, of 1 part acid lead arsenate, 0.25 part summer Vaporol, 0.03 part Vatsol OS, and 10 parts water. It was applied at the rate of approximately 1/10 pint per tree, using a paint spray gun operated in connection with a wheelbarrow-type power compressor. Unsprayed check trees succumbed to the injuries caused by the weevil in nearly every case. No deleterious effects attributable to the chemical were evident on the treated trees 5 months after the spray was applied. Large-scale tests are necessary before accurate costs for this method of control can be determined.

Field work on forest insect hazard inventory completed.--P. C. Johnson, Berkeley, reports that with the completion in September 1940 of field work on the Tahoe National Forest, the Berkeley forest-insect laboratory is rapidly bringing to a close one of the largest and most comprehensive survey studies ever undertaken in California. The forest insect hazard inventory was begun in 1937 as an initial measure in a new and determined effort to subdue the pine-beetle infestations in the ponderosa-Jeffrey pine region of northeastern California. This region furnished annually about 630 million board feet of pine lumber and is the chief source of box shock for the many thousands of fruit growers in the State. In addition, the forest drain from insects in northeastern California has averaged nearly half this amount during the last few years, or over 300 million board feet annually. This has not only been a tremendous loss to the lumber industry, but threatens to become a continuing source of forest depletion and monetary loss unless some drastic measures are soon taken. Direct-control measures in the east-side pine stands of northeastern California have not been successful in stemming the beetle infestations and

recently the western forest-insect laboratories have advocated measures to salvage the timber values before they are destroyed and to further reduce the beetle populations by removing the favored host, i. e., those trees which, by reason of their low vigor condition, are most likely to be attacked by the beetles. These susceptible, or high-risk trees, can now be recognized with a marked degree of certainty by symptoms which even the layman soon recognizes. The hazard inventory has made available the information most needed by both private and Federal timber agencies interested in this logging method of insect control. Some 2½ million acres of pine timber have been covered by a 0.6-percent volume cruise which necessitated running approximately 1,900 miles of strip through the forests. Compilation work which will soon be completed will show for this entire area (1) maps of the distribution of the area according to insect hazard, and (2) complete statistics, by small units, of timber resources by species, cumulative insect loss for the last 15 years, and the proportion of the existing pine stand now made up of high-risk trees. This material is being received with interest by the pine industry and has already been the basis of several logging studies to test the effectiveness and practicability of this method of control. The Forest Service has also incorporated hazard inventory results on some areas into new forest-management plans now being completed.

Beetle epidemic in San Bernardino Mountains has been checked.--S. T. Carlson, Berkeley, has recently completed the fall survey of the San Bernardino National Forest and reports that the control work carried on last winter and spring has successfully checked an aggressive bark-beetle epidemic. The control area included 12,000 acres of intensively used recreational forest lands in the Lake Arrowhead and Crestline districts in San Bernardino County. During the summer of 1939, the pine cover on some 30,000 individual summer-home lots was threatened by a grouping infestation of Ips and western pine beetle (Dendroctonus brevicornis Lec.). The private owners financed control work through an assessment by the Zone 5 Flood Control District of San Bernardino County, which is authorized to conduct various projects involving watershed protection. Work on the National Forest lands was carried out by the C. C. C. organization. During the 1939 season bark beetles killed a total of 1,250 trees, of which 800 were treated during the winter control campaign. For the season of 1940, the total loss is estimated at less than 50 trees, and only a small amount of maintenance work will be necessary for the coming winter.

Abnormal season complicates beetle control.--Western pine beetle control projects now being conducted by the Fremont National Forest and Klamath Forest Protective Association are experiencing some difficulty in locating the proper trees for treatment because of the unusually wide range in foliage fade on trees containing overwintering broods. According to W. D. Bedard, of the Portland, Oreg., laboratory, broods can be found in trees with tops ranging from green to sorrel, while some slightly faded trees have been abandoned at the base but contain abundant broods above. These peculiar foliage conditions resulted from an unusually early spring in the Klamath Basin, which caused an abnormally early attack by the beetle and permitted three broods to develop during the 1940 season, instead of the usual two broods for this region. The danger of missing green-topped trees under these unusual conditions has necessitated slowing the rate of spotting in order to make a more thorough examination of the area. It was also found

necessary to mark many doubtful trees so that they could be felled and examined by the treating crews to ascertain whether beetle broods are present in the top.

First bark-beetle control project on Malheur National Forest.--The Bear Valley control project against the western pine beetle in ponderosa pine stands of the Malheur National Forest, in eastern Oregon, got under way on November 5. This is the first pine-beetle control project to be attempted on this forest, according to W. J. Buckhorn, of the Portland forest-insect laboratory, who handled the training of spotting and treating crews for this work. The area of infestation covers approximately 56 sections, consisting of equal portions of virgin stands and cut-over stands from which approximately 40 percent of the volume was removed by selective logging. The infestation ranges from 40 to 90 trees per section, which is considered as a moderate epidemic. Treating of the infested trees will be carried on jointly by the Forest Service and the Edward Hines Lumber Company of Burns, Oreg. All infested trees accessible to logging are to be salvaged by the company. Inaccessible trees are being treated by C. C. C. labor using the fell-peel-burn method of control.

Western pine beetle found in Douglas fir region.--An infestation of bark beetles in a native grove of ponderosa pines along gravel flats of the Willamette River near Corvallis, Oreg., was called to the attention of F. P. Keen, of the Portland forest-insect laboratory by W. F. McCulloch, assistant professor of forestry at Oregon State College. On visiting the area, infested bark containing western pine beetles and the usual assortment of associated species was collected. Many pines had been killed and some younger trees had been killed by Ips confusus Lec. It is of interest to find these insects following their host tree, even though isolated by 70 miles of Douglas fir forests from their typical habitat in ponderosa pine forests east of the Cascade Mountain Range.

Elm leaf beetle parasites liberated in Portland.--The Park Bureau of the city of Portland, Oreg., has been interested in getting the help of beneficial insects in the control of the elm leaf beetle, against which the city wages an intensive spray program each year. Through the cooperation of Stanley E. Flanders, of the California Citrus Experiment Station's division of beneficial insect investigations, two species of elm leaf beetle parasites have now been introduced into Portland. The hymenopterous larval and pupal parasite, Tetrastichus brevistigma Gahan, was first received at the Portland forest-insect laboratory and liberated on September 11, 1940. More recently a shipment of the tachinid parasite, Erynnia nitida R. D., was received as overwintering larvae within host adults. These will be liberated after colonization in the laboratory.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Brush burned in unfavorable scouting weather.--Scouting conditions were generally unfavorable over the entire region where gypsy moth work is performed during much of November. However, the rain and snow removed the fire hazard from the forests, and large quantities of brush and debris, accumulated in the course of selective thinning and cleaning operations, were destroyed by burning.

Gypsy moth work modified during hunting seasons.---Early in November suitable locations were selected in Vermont, Massachusetts, and Pennsylvania where gypsy moth scouting work could be done during the hunting seasons without the danger of workers being struck by stray bullets. During these periods work will be done in village areas or in open country where the tree growth is sparse and scattered. The men will not be permitted to work in woodlands, except in areas reserved as game sanctuaries or on private properties which are adequately patrolled during the hunting seasons.

Varying degrees of infestation in Vermont.---The discovery of numerous scattered gypsy moth infestations continued in the townships of Castleton and Hubbardton, Rutland County, Vt. All of these infestations are small, most of them consisting of single egg clusters. Intensive scouting recently completed in the vicinity of the single-egg-cluster infestation found several weeks ago in the southern part of the township failed to disclose further evidence of the presence of the gypsy moth, although another single-egg-cluster infestation was found about $4\frac{1}{2}$ miles away. Several days' close scouting of the vicinity of the latter infestation also produced negative results. Crews working in Eden, Lamoille County, progressed slowly while working under especially difficult conditions in the course of examining large bog and swamp areas where scrubby growths of spruce occur in almost impenetrable thickets. Only one single-egg-cluster infestation has been found in Eden during the present work. Late in November scouting work was started in the townships of Fair Haven, Pittsford, Poultney, and Sudbury, Rutland County, and in Shaftsbury, Bennington County. Two gypsy moth egg clusters were found in Pittsford Township, which was infested in 1927.

Numerous scattered infestations found in Chester.---Gypsy moth scouts working in the township of Chester, Hampden County, Mass., have found numerous scattered infestations, and much intensive scouting is needed in that area. The progress of the work was materially impeded because of the necessity of closely examining stone walls that extend long distances through the infested area. These walls furnish excellent concealment for gypsy moth egg clusters, and they cannot be readily inspected during the winter. Therefore as much of this work as possible was accomplished while the weather conditions were favorable.

Scouting of spruce wood lots completed.---The scouting of areas in the townships of Becket and Washington, Berkshire County, Mass., where spruce boughs are to be cut during the coming holiday season, was completed during the latter part of November. Eight wood lots, aggregating about 250 acres, were carefully scouted and resulted in the discovery of two gypsy moth egg clusters in one of the lots in Washington, and three egg clusters at one location and four at another in Becket. Spruce growth comprised 50 to 90 percent of the growth in these stands. Hundreds of tons of boughs are cut, baled, and shipped annually from Berkshire County towns to New York City and other large centers for use during the Christmas season.

Brush-disposal machine used in State Forest Reservation.---Rain and snow prevented substantial accomplishments by gypsy moth scouts in Massachusetts during the first 2 weeks in November. Light conditions were

unsatisfactory for the examination of tree growth during much of the time when scouting work could be performed, except in isolated spots where the growth was low. However, the conditions were favorable for burning accumulated brush and debris, and progress was good in this type of work. The brush-disposal machine owned by this activity was used in a State Forest Reservation near Pittsfield, Berkshire County, where a small gypsy moth infestation was found early in the fall. Only light thinning work was necessary to free this comparatively dense stand of the dead and defective trees and other undesirable material, and to put it in satisfactory condition for future gypsy moth control work. Much of the brush which accumulated during this work could not be burned immediately because of the fire hazard. The brush-disposal machine converted much of this brush to sawdust and small chips during the limited time when operations were possible during November.

Gypsy moth work at heavily infested site.--Intensive scouting has been completed in the center of the gypsy moth infestation in Southbury, New Haven County, Conn., where several thousand new egg clusters were found last year. No new egg clusters were found during the current examination, although about 30 old egg clusters were discovered in hidden locations. The absence of living infestation clearly indicates the effectiveness of the various types of treatment that have been applied since the gypsy moth was discovered in Southbury, and it now seems reasonable to expect that any living infestations that may exist in the area immediately surrounding this formerly heavily infested location will be exterminated during the present fiscal year.

Progress made in Connecticut despite difficult labor situation.--The unsettled weather prevalent during much of November interfered to some extent with gypsy moth scouting work in Connecticut, but provided excellent burning conditions. Large quantities of brush, waste wood, and other trash which had accumulated at various infested sites were burned. An increased demand for white or paper birchwood for fireplaces and novelties by New York City markets has added to the gypsy moth inspection work in Connecticut. Much of this wood is obtained in Litchfield County, and it must be carefully examined before shipment from the quarantined area. Most of the wood is shipped in 4-foot lengths. The problem of maintaining a full force of gypsy moth workers is becoming increasingly difficult, as production in industrial centers is speeded up to meet the demands of the National Defense program. It is especially difficult to obtain foremen, as men capable of directing crews are in demand in manufacturing plants at decidedly better wages than they could receive as W. P. A. workers. Several foremen resigned recently because they had obtained other employment, and workers in lower classifications are also resigning for the same reason.

Gypsy moth work in Pennsylvania.--Stormy weather and unsatisfactory light conditions interfered considerably with gypsy moth scouting work in Pennsylvania during much of November, but the elimination of the fire hazard by snow permitted the burning of large accumulations of brush and deadwood. The employment situation in this State improved somewhat late in the month, as the number of newly assigned workers slightly exceeded the number of resignations of W. P. A. workers. Although there has been no appreciable increase in business activity in the area where gypsy moth work is conducted, there has been a definite movement of workers to industrial centers in other

parts of the State that have been more affected by the National Defense program and this has caused a heavy turn-over, which still continues, in gypsy moth personnel. Gypsy moth extermination work in Lackawanna and Luzerne Counties done by the N. Y. A. under the supervision of this Bureau increased greatly during November. Arrangements were recently made to increase the number of enrollees available for gypsy moth work, and the men were broken up into smaller, more efficient crews, many of which were directed by experienced W. P. A. foremen. While the amount of work accomplished by W. P. A. workers is less than was expected, owing to absences of workers, the men have given satisfactory service, and their employment has released more active and experienced men for work in outlying territory. The cutting and baling of evergreen boughs increased greatly in the gypsy moth quarantined area of Pennsylvania, particularly in the Pocono Mountain region where spruce is most abundant, and it was necessary to detail additional inspectors to examine the shipments so there would be no spread of the gypsy moth from that source.

C. C. C. Gypsy Moth Work During November

General.--During November 5,490 6-hour man-days were used on gypsy moth work by the C. C. C., as compared with 6,462 man-days used in October. Although the amount of work accomplished was less during November, the reduction was not as great as the figures would indicate, as work was performed during 5 weeks in October and during only 4 weeks in November. The actual reduction in work was caused by a lack of sufficient man power, owing to unfilled quotas at the camps, to 2 holidays during the month, and to rains and heavy snowfalls. The treatment consisted of selective thinning of favored food plants, burning accumulated brush and forest debris, and scouting, with more emphasis placed on scouting than was the case earlier in the season. Inspections of areas treated before the hurricane to reduce the amount of favored food plants of the gypsy moth have shown generally light and scattered infestations, and many cases were noted where the reproduction of more resistant species of trees in treated areas is resulting in notable improvement in the stands from the gypsy moth control point of view. Clear cutting has been done on some State properties where the State foresters plan to follow the work with the planting of trees unfavorable to gypsy moth development, and similar work has also been done on some private properties where the owners agreed to replant with gypsy moth resistant growth. Several cases were observed where the owners of private woodlands were following the methods of treatment used by the C. C. C.

Vermont.--Gypsy moth scouts continue to find severe infestations in the eastern part of Vermont. The cost of treatment work is running higher than normal in some areas that were badly damaged by the 1938 hurricane and where no clean-up work has been done. The debris is so thick and tangled that it is impossible to do selective thinning or cleaning work in some of these areas until the fallen trees have been removed.

Massachusetts.--Gypsy moth infestation in Massachusetts is scattered and without pockets of heavy concentration except in an area in Westhampton, Hampshire County, where the egg clusters are somewhat more abundant than in other sections that have been scouted this fall. The extent of this heavier infestation has not yet been determined, but rapid scouting showed approximately 300 egg clusters per acre. This is a much lighter infestation than

was present in this area 2 or 3 years ago, but the infestation is heavier than those now present in the surrounding areas. Areas of heavier infestation, such as that in Westhampton, are marked for further treatment, particularly the reduction of favored gypsy moth food plants by selective thinning of the forest growth.

Connecticut.--Gypsy moth conditions in Connecticut are similar to those in Massachusetts, scattered infestations with no heavy concentrations of infestation. C. C. C. gypsy moth work in this State is closely coordinated with that of the State gypsy moth organization. The C. C. C. work is done in towns bordering the barrier zone, while the State work is done in areas that cannot be reached by the C. C. C. The cooperation between the two organizations permits the attainment of maximum benefits from the work of both, and is of great advantage to the gypsy moth project as a whole.

PLANT DISEASE CONTROL

Chemical tests on Ribes bushes.--H. E. Yost, in charge of blister rust control work in Maryland, reports that tests to determine the ability of different substances to kill the root systems of decapitated Ribes bushes were made in Garrett County, Md., in 1940 on the west slope of Meadow Mountain, at an elevation of approximately 2,800 feet, with northwest exposure and open hardwood type. The bushes were not measured but an attempt was made to select old plants, 5 or more years of age and from 2 to 3 feet in height. The bushes were cut off with a pocketknife at or just above the crown. Six chemicals were used--borax, sodium chlorate, diesel oil, salt, used crank-case oil, and ammonium thiocyanate. Two dosages of each chemical were applied to 11 bushes, and there were 11 checks in which no treatment was applied except decapitation. A total of 143 bushes were treated and staked on July 25, 1940. These bushes were checked on October 7. The results indicate that a mixture of 5 parts of borax to 1 part of sodium chlorate, as well as diesel oil and ammonium thiocyanate, killed the root systems, no regrowth having been observed in any bush so treated. Coarse salt, when applied at approximately 4.4 ounces per crown, resulted in no regrowth, but in 1 case when it was applied at 2.2 ounces per crown, about $\frac{1}{2}$ inch of sprout growth was observed. Where borax was applied at the rate of 1.3 ounces, 2 crowns sprouted a total of $\frac{3}{4}$ inch of growth, and where borax was applied at 2.6 ounces per crown, 1 sprout produced approximately 3 inches of growth. Crank-case oil was applied at the rate of 2 ounces and 4 ounces and in each case all of the treated crowns sprouted. The higher dosage resulted in growth of approximately twice as much live stem as did the weaker dosage. The bushes receiving no treatment produced approximately half as much live stem as did those receiving crank-case oil. The tests indicate that ammonium thiocyanate, diesel oil, and the mixture of borax and sodium chlorate are equal in their killing power. Since the diesel oil is by far the cheapest of the 3 items, it apparently should be used. Coarse salt purchased in quantity would probably be cheaper than any of the above items and when applied in a larger dosage would probably be equally effective. All of the bushes in these tests were R. rotundifolium. In each case when a bush was decapitated the stems were left lying on the ground. On October 7, 1940, 116 of the original 143 tops were found. Of these, 16, or 13.8 percent, had layered and produced tip sprouts. A total of 36 sprouts were observed. This indicates the advisability of continuing the practice of hanging up bushes during eradication work.

Ribes eradication effectively controls blister rust.--Mr. McCasland, district blister rust leader in New York State, reports that in 1932 all valuable white pine areas in the town of Cairo, Greene County, N. Y., were initially protected from blister rust by the eradication of Ribes and this fall, after a lapse of 8 years, pine-infection studies were made to determine the effectiveness of the control work. Seven areas, as nearly representative of varying conditions in the county as it was possible to obtain, were selected and strip lines 1 rod wide and 1 chain apart were run through the areas. All white pines on these strips were examined and listed as healthy or diseased, and, if diseased, the year of infection was obtained by determining the age of the wood at the point where each canker occurred. The 7 areas totaled 7.2 acres. Of the 14,192 trees examined, 1,047, or 7.4 percent, were infected with blister rust. Of the 1,047 infected trees, only 67 became infected in 1932 or later, that is, following the initial eradication of Ribes on these areas, although no reeradication of sprouts and seedlings has yet been carried out.

Blister rust notes from Rhode Island.--A. C. White, blister rust agent in Rhode Island, writes that he visited a roofing company in Rhode Island which was using 10,000 cords of wood a year--white pine, pitch pine, and soft maple--for pulp. Of this wood 75 percent is white pine, which is preferred because it has a better and longer fiber. Hurricane timber is being used in manufacturing shingles and roofing paper. The latter is another use for white pine which may increase as time goes on, as it is now in its infancy. It is also helping greatly in the forest clean-up, especially for the small property owner. A total of 811,169 pines were planted this year in Rhode Island. A good share of these trees were planted on State property where Ribes-eradication work was carried on during the summer. Nearly 19,000 currant and gooseberry bushes were destroyed in the State during the last year to protect the white pine, which is the State's most valuable timber crop. These bushes were removed from 28,864 acres by 116 employees of the Soil Conservation Service, the Civilian Conservation Corps, and the Works Progress Administration. This work was especially timely as white pine is reproducing on many areas since the hurricane, and unless protected the young trees may succumb to blister rust infection.

Salt-spray damage in Massachusetts.--C. C. Perry, in charge of blister rust control work in Massachusetts, reports that he recently visited areas in the towns of Marion, Mattapoissett, and Wareham, where pines were injured by salt spray during the 1938 hurricane. Evidence of damage persists only in the white pines in the open or in individual pines whose crowns towered above the associated forest growth. Such trees still show the effect of defoliation by the salt spray and are now characterized by the persistence of large limbs devoid of foliage and with dense groupings of dead branchlets. In closely stocked stands and, in general, in younger age classes little or no effect is apparent now, approximately 2 years after the injury occurred. Where areas near the coast line were completely submerged in salt water, the trees were completely killed. This condition is different, however, from the salt-spray situation, where complete killing rarely occurred, and then only in cases where the trees had apparently been weakened by other causes, such as defoliation by the gypsy moth.

Rye straw used in manufacture of strawboard.--The control of black stem rust is of interest to companies engaged in the manufacture of strawboard.

According to a recent letter from L. W. Melander, one firm in St. Paul purchases annually about 15,000 tons of rye straw for this purpose. Only straw that is clean, crisp, and of good length can be used. Straw that has been damaged by stem rust is not suitable for this purpose.

Barberry bushes found along Rush River, N. Dak.--Five barberry bushes, *Berberis vulgaris*, three of which were bearing fruit, were found in September along the Rush River, in Cass County, about $\frac{1}{2}$ mile from a location where planted bushes were destroyed in 1925. Considering the location of these bushes with respect to important grain-growing areas in North Dakota, an intensive survey of all uncultivated lands for a distance of several miles in all directions should be made, to insure complete eradication of any wild bushes in this area. During the period January 1 to June 30, areas given an intensive survey in Ramsey, Benson, and Wells Counties totaled 1,800 square miles. More than 100 man-months of W. P. A. labor was used. No W. P. A. labor has been used in North Dakota since July 1.

Bureau-sponsored W. P. A. project in Michigan State program.--A recently approved Bureau-sponsored project in the State W. P. A. program in Michigan provides an average of 168 security-wage earners for a period of 12 months. On October 1, 1940, the first assignments were made under this project and survey was begun in Benzie, Grand Traverse, Kent, Leelanau, Manistee, and Mecosta Counties. By the first of December, 114 men were employed. These were divided into crews of 6 to 10 men each and field work is reported as progressing smoothly under the direction of supervisors Townner, Case, Nixon, Lindy, and Stoneman. Chester F. Salisbury, assistant State leader in Michigan, has been designated as general superintendent in charge of the State project. Crew organization and field procedure follows the same general outline as in the case of the F. A. project.

Destruction of 4,000 barberry bushes in Wisconsin since September 1.--The following table briefly summarizes control work accomplished in Wisconsin during the period September 1 to November 30, and includes a report of the men employed as of December 1.

County	Area covered	Properties		Bushes destroyed	Men employed December 1	
		New	Old		F. A. project	State project
Buffalo-----	7	4	0	65	17	--
Columbia-----	3	5	9	117	(1)	(1)
Crawford-----	22	3	0	6	--	5
Dane-----	31	11	33	1,238	(1)	(1)
Dodge-----	105	7	9	74	(2)	(2)
Dunn-----	57	19	2	1,697	7	--
Eau Claire-----	44	4	2	75	7	--
Fond du Lac----	2	4	4	37	(2)	(2)
Green Lake-----	1	0	0	0	--	11
La Crosse-----	7	24	2	549	(1)	(1)
Portage-----	4	2	4	29	--	20
Sheboygan-----	56	31	26	175	--	21
Winnebago-----	104	21	17	272	(2)	(2)
Manitowoc-----	0	0	0	0	--	15
Total-----	443	135	108	4,334	31	72

1/ Work suspended.

2/ Work completed.

According to Tom Van Zanden, leader in charge, State project crews are now operating in Crawford, Green Lake, Manitowoc, Portage, and Sheboygan Counties. It is expected that F. A. crews now under assignment will complete work remaining to be done in Eau Claire and Dunn Counties shortly after January 1. F. A. funds remaining for expenditure during this fiscal year will be used in Buffalo County.

Correction.--In the November 1, 1940, issue of the News Letter (v. VII, No. 11, pp. 17-18) a brief summary of a report by R. U. Cotter, of the Federal rust laboratory, St. Paul, Minn., concerning the results of rust identifications was incorrectly quoted as stating that Race 17 of Puccinia graminis tritici is one of the few races which has, under certain conditions, caused some infection on Thatcher wheat. Race 17 has been comparatively rare until recent years and its potentialities are not fully known. It attacks most of the durum and common wheats severely, with the exception of varieties derived from Kanred, among which is Thatcher.

COTTON INSECT INVESTIGATIONS

Pink bollworm parasite releases.--L. W. Noble, of the Presidio, Tex., Laboratory, reports that during the quarter July 1 to September 30, 1940, 90,500 Chelonus blackburni Cameron, bred on the Mediterranean flour moth (Ephostia kuehniella Zell.), were released in the Presidio Valley and 30,000 in the lower Rio Grande Valley near Brownsville. Pink bollworm host larvae, which are necessary for rearing the other species of parasites

on hand, were not available until the latter part of September. One shipment of 1,974 Microbracon kirpatricki Wilk. was sent to Brownsville on September 23 and was released in nearby Mexico. One colony consisting of 2,000 adults of Microbracon nigrorufum Cush. was released in the Presidio Valley on September 19. These were from material stored since last fall. The survival in the stored material was about 43 percent. The remainder of the stored material was used for breeding in the laboratory. Three shipments of Chelonus pectinophorae Cush. were received from Japan through cooperation with the Division of Foreign Parasite Introduction. Twenty-two adults arrived alive in the first shipment on August 3, 48 in the second on August 31, and 17 in the third on September 10. Oviposition from these was obtained in eggs of the pink bollworm and the Mediterranean flour moth, with successful development in both hosts.

Bollworm control in field-plot tests.--According to K. P. Ewing and R. W. Moreland, 136 small plots (1/18 acre in size) were utilized at Waco, Tex., during 1940 in testing various insecticides against the bollworm. There were 4 randomized-block experiments, 2 of 8 and 2 of 9 treatments, each treatment replicated 4 times in each experiment, started during the latter part of July. The treated plots in all 4 tests received 3 applications of insecticide but 2 of the experiments were discontinued on August 1, owing to lack of an injurious infestation. The remaining 2 experiments, which were duplicates of those discarded, were carried through to completion. In the experiment where all the treatments were dusts, lead arsenate, cryolites containing 94.6 percent and 87.9 percent sodium fluoaluminum, respectively, and basic copper arsenate, in the order named, gave the best results with gains over the checks of 208.8, 179.4, 163.1, and 155.0 pounds per acre, respectively. These are fair gains for 3 applications, considering that most of the worms were over half grown when dusting operations were begun and that the first application was made under conditions very unfavorable for dusting. Gains from the other treatments were 144.4 pounds from calcium arsenate, 123.6 pounds from cryolite containing 66 percent Na_3AlF_6 , and 50.6 pounds from cryolite containing 50 percent Na_3AlF_6 . The bollworm injury and increase in yields were in direct proportion to the amount of sodium fluoaluminum in the cryolites with the higher percentages, but the cryolite containing only 50 percent Na_3AlF_6 gave very poor control. In the other completed bollworm experiment 4 sprays and 4 dusts were applied at approximately the same number of pounds per acre. The lead arsenate spray gave a slightly higher gain than any of the other treatments. The gains from the treatments were: 125 pounds from lead arsenate spray; 110 pounds from lead arsenate dust; 121.9 pounds from calcium arsenate dust; 61.2 pounds from calcium arsenate spray; 49.4 pounds from regular barium fluosilicate dust; 53.9 pounds from micronized barium fluosilicate dust; 27.5 pounds from micronized barium fluosilicate spray; and 17.4 pounds from cryolite spray (87.9 percent Na_3AlF_6). Calcium arsenate, lead arsenate, and micronized barium fluosilicate, applied as both dusts and sprays, produced an average gain of 95.2 pounds when applied as dusts and 71.2 pounds of seed cotton per acre when applied as sprays.

Insecticide tests for pink bollworm control.--Investigations on insecticidal control of the pink bollworm were continued this season at the Presidio, Tex., laboratory, by W. L. Lowry. Conditions were unfavorable for the tests because of the light and uneven pink bollworm infestations and

the presence of bollworms, leaf worms, stink bugs, and Texas root rot in the cotton used for the tests. In view of the fact that previous investigations had shown that arsenicals were not very effective against the pink bollworm more attention was given to fluorine insecticides and various ovicides. The results in the plot and cage tests with insecticides were based on the percentage of reduction in larvae per boll. In the laboratory tests with ovicides, the results were based on the percentage of reduction in the number of hatchable eggs. In a Latin square with 1/16-acre plots, comparing cryolite dusts composed of different particle sizes but approximately the same (85-93 %) sodium fluoaluminate content, micronized cryolite (Kryocide) caused a reduction of 55.5 percent in number of larvae per boll over the check, as compared with 46.7 percent for the regular particle size (Alorco) and 25 percent for coarse particles (Alorco Precipitate 562). The coarse-particle material was distinctly inferior to the others in dusting qualities and frequently clogged the hand dust guns. In three other field tests Alorco cryolite dust containing 33 percent Na_7AlF_6 caused 19.7 percent, 24.6 percent, and 44.8-percent reductions in number of larvae per boll. In a small series of cage tests where the cotton plants were first treated and pink bollworm moths were then released, barium fluosilicate applied as a dust caused 81.4-percent reduction in larvae per boll, as compared with 86.4 percent when applied as a concentrated spray containing an adhesive oil and a wetting agent. In a randomized-block experiment (three replications) where six applications of insecticides were made at 5-day intervals, basic copper arsenate dust caused 28-percent reduction, cuprous cyanide dust 48 percent, cryolite dust (approximately 85 percent Na_7AlF_6) 53 percent, and cryolite-oil spray (50 lb. to 50 gal. summer oil, and 50 gal. water), 59 percent reduction. Nicotine sulfate and light petroleum oils, alone and combined in various proportions with and without emulsifiers, were tested in the laboratory against several thousand eggs of the pink bollworm. In part of the tests the bracts were removed from the bolls and the calyx turned back to expose the eggs, in others the eggs were either removed to blotting paper or were allowed to remain undisturbed on the boll. Either the ovicide was applied as a spray or the bolls were dipped in the solution. Both the nicotine sulfate and the oils reduced somewhat the percentage of eggs hatching but in all cases were more effective when combined. In general the older eggs were more susceptible to the ovicides than the freshly laid eggs, especially in cases where nicotine sulfate was used. The percentages of reduction in hatch due to treatments, as calculated by Abbott's formula, ranged from 7.8 to 97.3 percent. The most effective treatment was a spray composed of two parts of 40-percent nicotine sulfate to 50 gallons of miscible oil (Vaporol) and 50 gallons of water. The results were encouraging in that a high percentage of egg mortality was obtained; however, it should be borne in mind that under ordinary field conditions incomplete coverage and other factors would doubtless influence the efficiency of the treatment.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--It is necessary to make annual inspections of gin trash in all cotton-growing areas of the United States each season in order to have definite knowledge relative to the status of pink bollworm infestation. Some gin-trash inspection is also conducted at opportune seasons in the various Mexican areas, as a result of the control program for the

suppression of the pink bollworm carried out cooperatively by this Bureau and the Mexican Department of Agriculture. Gin-trash inspection was continued in the Panhandle district throughout November, with from 9 to 11 units in operation. No worms were found in that district during the month and, except for the extremely light infestation found in Tom Green, Midland, Martin, and Howard Counties in October, inspections in all of that area were negative for the season, and no infestation was found in outside areas. Gin-trash inspection which was begun in the Salt River Valley of Arizona in October, was continued throughout November. In addition to the light pink bollworm infestation found in the Glendale area of the Salt River Valley in October, a few more specimens were found in the same field around the middle of November, and 122 additional pink bollworms were taken from this field on November 29. Results of inspection were negative in all other parts of the Salt River Valley. Inspection was also carried on in Pinal County, a considerable amount of trash being inspected in the Coolidge-Casa Grande area. One specimen was taken from a gin at Coolidge, the only specimen found in Pinal County. Examination of all trash from the gins at Marana and Sahuarita, in Pima County, where an extremely light infestation was found last season, gave negative results. A number of cottonfields in the vicinity of Vado de Cedillas, in the Juarez Valley of Mexico, across the Rio Grande from the El Paso Valley district, were found to be heavily infested with the pink bollworm during October and November. Infestation has been present in this vicinity for a number of years, but appears to have increased in intensity during the present season. Plans are being made to cooperate with the Mexican inspector in charge of that area in cleaning a limited cotton acreage in the vicinity of Vado de Cedillas in an effort to suppress the infestation. A light infestation of the pink bollworm was also found during the period in trash originating at La Ascencion. This is the first trash to be inspected from this new area planted to cotton in the northwestern part of the State of Chihuahua.

Destruction of sprout and volunteer cotton.--For the last several years a stalk-destruction campaign has been conducted in south Texas immediately after the harvesting of the cotton crop as a control measure looking to the eradication of the pink bollworm from that area. In the lower Rio Grande Valley climatic conditions are favorable to the growth and fruiting of cotton throughout practically all of the year, therefore it is necessary to enter into a second phase of field clean-up operations immediately following completion of the initial stalk-destruction program. This consists in preventing sprout cotton, which develops from roots and other parts of the cotton plant left in the ground after plowing out the stalks, from maturing fruit on which the pink bollworm may maintain itself. A vigorous campaign was therefore begun in an effort to get the farmers back into the fields and, on the whole, cooperation has been good. In addition to approximately 95,000 acres of cotton land that has been replowed by the farmers, between 29 and 35 grubbing crews operated intermittently during November, removing scattered sprout and seedling cotton that had not been killed through plowing operations or had developed after the land had been replowed. Plants on abandoned acreage or growing in out-of-the-way places are also being removed. The grubbing crews spread out over the area systematically, taking out all the fruiting cotton as they come to it. At the end of November almost all of the 220,000-acre area had been covered by the crews; notwithstanding, the objective of this Division, to bring about a

complete host-free period for the pink bollworm, had not been realized, as in some areas a limited quantity of fruiting cotton still remained. This condition is attributed principally to the fact that the sprout-destruction work was hindered to a considerable extent throughout November on account of excessive rains, preventing farmers and grubbing crews from reworking the fields. The amount of sprout cotton in the lower Rio Grande Valley of Mexico was reduced considerably during the last part of November, and at the end of the period there was very little acreage on which there were any fruiting plants. In all of this lower valley area, on both the Mexican and American sides of the Rio Grande, there is much less sprout cotton than ever before at this time of the year. New growth will, of course, continue to appear, and all of this area must be continually watched throughout the season in order to maintain a starvation period for the pink bollworm until the fruiting of the 1941 crop. Only about 3 weeks are required from the time some sprouts first appear until fruit is formed.

Stalk destruction.--Excessive rain during October prevented the completion of the original stalk-destruction program in the Coastal Bend district, and on account of intermittent rains and misty weather throughout most of November, approximately 600 acres of cotton stalks remained standing at the close of the period; also, some sprout plants and seedlings have developed. Most of the farmers in that area are anxious to complete the stalk-destruction work and replot their land in order to conserve the moisture and destroy any sprout or seedling plants. Consequently, it is expected that field clean-up in that area will be completed as soon as weather conditions will permit.

Wild-cotton eradication.--Pink bollworm infestation was found in domestic cotton plantings in northern Florida in 1932. Following the determination that the source of this destructive cotton insect was infested wild cotton plants growing in southern Florida and on adjacent keys, a campaign was begun to eradicate the pink bollworm by destroying its host plant. This undertaking has been continued to the present time with outstanding results. Twelve W. P. A. crews, aggregating an average of 90 workers, were engaged throughout November in wild-cotton-eradication work. Two Bureau crews, consisting of 8 men, started eradication work around the middle of November. These crews live on houseboats and work in remote areas. In the Bradenton-Fort Myers subdistrict first cleanings of the season were completed during the month in Pinellas, Hillsborough, Manatee, and Sarasota Counties. In addition to the destruction of all wild cotton plants, the crews have been engaged in clearing vegetation from wild-cotton colonies in this area in order to stimulate the germination of wild cottonseed. The first cleaning of the Key Largo, Matecumbe, and Long Key sections was completed the latter part of November. Work in these areas was accelerated during the first cleaning of this season, owing to the presence of numerous work- and turn-trails which were completed last season. In other sections of the Bradenton-Fort Myers and Keys subdistricts first cleanings of the season were still in progress. The 2 houseboat crews are operating on the Dade County mainland immediately to the east and to the west of the main Cape Sable area. Considerably fewer wild-cotton plants are being found in most of these areas than were present last season. In all of the above area only 139 plants with mature bolls were found in November. A total of 91,160 seedling and 127 sprout plants were destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Curly-top damage to tomatoes decreased by use of cheesecloth covers.— H. E. Dorst, of the Logan, Utah, laboratory, reports the results of an experiment conducted during the summer of 1940 on replicated small plots of tomatoes to determine the protection afforded early and late transplanted tomatoes from curly top, a virus disease transmitted by the beet leafhopper (*Eutettix tenellus* (Bak.)), by covering the plants with cheesecloth protectors during the early part of the season to prevent the incoming leafhoppers from feeding on them. He found that this protection materially reduced the percentage of tomato plants infected with curly top at the close of the season on September 17, and it also increased the yield of tomatoes. The results from this study are summarized as follows:

Period of plant protection by cheesecloth covers	Plants having :		Yield per acre
	curly top	September 17	
	Percent		Tons
Early planting date (April 25):			
Apr. 25 to June 17 (all influxes of leafhoppers)-----	23.3	:	7.9
Apr. 25 to June 3 (early influxes of leafhoppers)-----	48.3	:	7.9
May 17 to June 17 (late influxes of leafhoppers)-----	33.0	:	6.6
No cheesecloth covers used-----	65.2	:	5.7
Late planting date (May 10):			
May 10 to June 17 (all influxes of leafhoppers)-----	16.3	:	8.0
May 10 to June 3 (early influxes of leafhoppers)-----	37.1	:	7.9
May 17 to June 17 (late influxes of leafhoppers)-----	26.9	:	7.2
No cheesecloth covers used-----	60.0	:	4.3

These data show that considerable protection from curly-top infection and damage was afforded both early and late transplanted tomatoes from the use of cheesecloth protectors when the tomatoes were covered from the time of transplanting until influx from migration by the leafhopper was completed on June 17. They also indicate that the protection from curly-top infection was greater on those plants covered during the late influxes of leafhoppers, but that the yield was greater on those covered during the early influxes. The data indicate further that the yield of unprotected tomatoes was greater for those transplanted early than for those transplanted late, even though curly-top infection was most prevalent at the end of the season on the early tomatoes. The protector used consisted of 1 square yard of cheesecloth supported over the tomato plant by 2 galvanized wire loops 42 inches long, placed at right angles to each other, so that the cloth formed a hot cap over the plant. Each of the 8 treatments was replicated on 8 plots, there being a total of 64 plots arranged in a systematic square. Each plot was 24.5 feet

by 28.0 feet, and comprised 7 rows of 8 plants each, the distance between rows and hills being 42 inches.

Ingredients of "dynamite" spray less effective than complete mixture against narcissus bulb fly.--Ralph Schopp, P. M. Eide, and E. S. Bonn, of the Summer, Wash., laboratory, conducted 2 series of tests on small replicated plots of narcissus to determine the effectiveness of the various ingredients of the "dynamite" spray in preventing infestation of narcissus bulbs by *Merodon equestris* (F.). They report that, although the various ingredients of this treatment have some effectiveness, none was so effective as the complete spray formula. "Dynamite" is an oil emulsion-in-water spray to which lead arsenate has been added at the rate of 6 pounds to 100 gallons of finished spray. The stock emulsion, by volume, consists of 76 percent light summer oil, 18.76 percent water, 3.8 percent oleic acid, and 1.44 percent triethanalamine; and the finished spray contains 5,000 cc., or 1.32 gallons, of the emulsion to each 100 gallons of water. In these tests the ingredients of the "dynamite" spray were tested singly and in various combinations at the same concentrations as used in the complete formula, with the following results.

Treatment	Bulbs	Reduction of
	infested:	infested bulbs
	Number	Percent
Series I:		
Complete dynamite spray-----	49	71.2
With lead arsenate omitted-----	95	44.1
With oil omitted-----	131	22.9
With oleic acid and triethanalamine omitted-----	82	51.8
Untreated-----	170	-----
Series II:		
Complete dynamite spray-----	88	56.0
Spray containing mineral oil only ^{1/} -----	150	25.0
Spray containing oleic acid and triethanalamine only	172	14.0
Spray containing lead arsenate only-----	226	-13.0
Untreated-----	200	-----

^{1/} Emulsified by mixing 100 gm. of a sodium salt of alkyl ester of sulfosuccinic acid for each 1,520 cc. of raw oil.

These data show that infestation of narcissus bulbs by the narcissus bulb fly was less when the complete "dynamite" spray mixture was used than when the individual ingredients of the mixture were used or when the ingredients were used in various combinations. The treatments of each series were compared in 2 localities on a randomized-block arrangement of plots, there being 5 replications of each treatment at each locality. A plot consisted of a 200-foot-long row of bulbs. There was but 1 application of each treatment, made with a power sprayer at a rate of 35 gallons of spray to 1,000 feet of row. Application of all treatments was made during the period May 3 to 7, and the counts of infested bulbs were made when the bulbs were dug in the fall. The numbers of narcissus bulbs infested by the narcissus bulb fly were determined at digging time by examining 3 samples of 100 bulbs in each plot, 1 sample dug from the middle and 1 toward each end of the plot.

Natural mortality of young wireworm larva.--K. E. Gibson, of the Walla Walla, Wash., laboratory, from quantitative sampling of the soil designed to determine the amount of natural reduction in infestation of wireworm larvae, principally Limonium canus L., reports that natural mortality was very high under field conditions during the first few months after hatching. The reduction varied greatly in soil planted to different crops. The percentages of reduction in numbers of the young, living larvae, during a 2½-month period for various crops were: Lima beans, 100; carrots, 88; potatoes, 74; clover, 72; onions, 68; sugar beets, 54; corn, 46; fallow, 39; alfalfa, 32; and wheat, 13. These percentages were obtained by comparing the infestations of young larvae soon after hatching, early in July, with those found in the same plots late in September. The sample in each plot for each sampling period consisted of 20 units of soil 1/16 square foot in area and 12 inches deep, the numbers of young wireworm larvae in each being determined by means of a soil-sample washer. At Walla Walla there were 3 plot replicates of each of the 10 crop conditions, while at Prosser there were 8 plot replicates of alfalfa, corn, potatoes, sugar beets, and wheat, making a total of 70 plots.

Psyllid yellows probably not caused by feeding of adult psyllid.--The indications obtained from a series of tests conducted by R. L. Wallis, of the Scottsbluff, Nebr., laboratory, are that the psyllid yellows symptoms of tomato and potato probably did not result from feeding by adults of the tomato psyllid (Paratrioza cockerelli Sulc.). During the period July 1 to August 16 a total of 15 tomato and 10 potato plants were exposed individually in indoor cages for periods of 4 to 8 days. In each cage there were from 300 to 400 adults of the potato psyllid. After exposure the plants were removed, half of them thoroughly dusted with sulfur, and all were set outside for further observation. No symptoms of psyllid yellows developed on those plants which, after being fed upon by the adult psyllids, had been dusted with sulfur; but slight symptoms developed on the untreated plants that had been fed upon by the adult psyllids and later by nymphs, which had developed from eggs laid by the adults.

Unusual infestation of cabbage aphid.--R. E. Campbell, of the Alhambra, Calif., laboratory, recently reported an unusual infestation of Brevicoryne brassicae (L.), observed during the last summer on cabbage near San Juan Capistrano, Calif. Although it was an extremely heavy infestation, the outward appearance of the cabbage was very good. The aphids were established not only on the heads but also underneath several layers of the white, tightly fitting leaves of the cabbage heads. The entire surface of the head between these two or three layers of leaves was a mass of the aphids. In an attempt to control the aphids, the grower had stripped back the infested layers and applied a spray; however, the infestation was so far within the heads that poor control was obtained and most of the heads were not marketable. Four dust applications had been made during the growing period but, because of winds blowing most of the time, they had not been sufficiently effective; consequently, the aphids worked inside the cabbage heads, where neither sprays nor dusts could reach them.

Toxicity of insecticide to pepper weevil.--Mr. Campbell has reported the results of small-scale toxicity tests in which a large number of materials were used as dusts against Anthonomus eugenii Cano. on caged pepper plants in

the field. Of the dusts tested none proved so effective as calcium arsenate and cryolite. From a large number of replications the percentages of weevil mortality resulting from treatment with calcium arsenate, from cryolite containing 70 percent sodium fluoaluminate, and cryolite containing 50 percent sodium fluoaluminate were 90, 87, and 80, respectively. Of the other dusts used in these tests the only one showing much promise was one of the coded materials, which gave 77 percent of weevil mortality. Using a precision duster 1 gram of insecticide was applied to each pepper plant, which during application was covered with a large cone to confine the dust to a single plant. After a few minutes the cone was removed, a screen cage placed over the plant, and 10 living weevils per cage were introduced. The soil at the base of each plant was covered with cloth to prevent the escape of test insects and to aid in their recovery.

Parasite of asparagus beetle abundant.--C. W. Getzendaner and R. S. Wright, of the Puyallup, Wash., laboratory, report that the parasite Tetrastichus asparagi Crawford was very abundant late in August and early in September in fields infested with Crioceris asparagi (L.). This parasite, which was first released near Puyallup in 1936, has become established and appears to be generally distributed throughout the Puyallup-Summer district. About 1,550 adults of the parasite were collected from 1 field on August 22 in about 3½ hours. In this field there was considerable new growth of young asparagus and the asparagus beetles were congregating on it and ovipositing. The parasites were present in greater numbers and were destroying the beetle eggs as fast as they appeared. No fields were found where the beetle larvae were sufficiently abundant for rearing the parasite where the parasite was known to be present. The low host infestation during much of the season appears to be due in a large part to the efficiency of the parasite. A survey of asparagus fields outside of the Puyallup-Summer district in which parasites were released in 1939 showed them to be present at Kent and Orting.

INSECTS AFFECTING MAN AND ANIMALS

Small yellow jacket feeding on stableflies.--W. E. Dove and his associates at the Panama City, Fla., laboratory, report that Vespula squamosa Drury has been feeding on dog flies (stableflies) about cattle. As many as 15 to 20 were noted hovering about a group of 4 animals. There has been a noticeable decrease in the stablefly population about these animals and, according to Mr. Dove, part of this is undoubtedly due to these predators.

Stableflies in South Carolina.--Mr. Dove and S. W. Simmons visited several points along the South Carolina coast in the vicinities of Charleston and Georgetown, where an outbreak of dog flies was reported last season. The marine grasses commonly found in the vicinity of Panama City did not occur in this area. It is evident that the dog fly problem in this area is entirely different from that encountered on the west coast of Florida. According to Mr. Dove, the indications suggest that the moist areas which receive seepages of salt water during high tides may be concerned in the production of the Carolina outbreaks.

Stableflies along Florida coast line.--During the first week in November Mr. Simmons made a survey of the littoral territory along the Gulf and Atlantic coasts of Florida. The purpose was to determine the limits of the

area infested by dog flies, the extent of breeding, the materials in which breeding occurs, and the factors responsible for greater or lesser fly outbreaks. It was found that dog fly outbreaks occur along the Florida Gulf coast as far south as Homosassa. With this point as the eastward limit, and Mobile, Ala., as the westward limit, there is an infested area along the Gulf coast of about 400 miles. The greatest breeding is found along the 200-mile shore line between Pensacola and Carabelle, Fla. South of Homosassa dog flies present no problem. According to Mr. Simmons, the principal limitation to dog fly breeding along the southwestern Gulf coast and the Atlantic coast of Florida is the lack of suitable bay beaches for tide-drift deposits of bay grasses.

Mosquito survey of naval air base at Cocoa, Fla.--At the request of Commander Tollefson, of the Naval Air Base at Cocoa, Fla., Mr. Dove and W. V. King met with the naval authorities at the Base early in November for the purpose of discussing mosquito control at that point.

Mosquito conference at New Smyrna, Fla.--At the request of Mr. Dove, the following personnel met at the New Smyrna Beach laboratory, where a 2-day conference was held on problems of mosquito biology: W. V. King, G. H. Bradley, B. V. Travis, S. W. Simmons, J. B. Hull, and S. E. Shields. Methods for obtaining samples of marsh soil for flooding samples to obtain hatching of eggs were demonstrated to the group by G. H. Bradley and B. V. Travis. Arrangements were made for Mr. Travis to introduce this method in Dade County so that needed surveys can be made by the county mosquito-control official.

Mansonia mosquitoes in South Carolina.--In answer to requests, W. V. King, of the Orlando, Fla., laboratory, visited health officials in South Carolina during the week beginning November 25 to locate the breeding places of Mansonia mosquitoes. Concentrated breeding was found in a small lake. As control measures, Mr. King advised the cutting of certain types of vegetation beneath the surface of the water and an application of an oil during the period when the mosquitoes were emerging.

Incidence of screwworms in Florida.--According to Mr. W. E. Dove, there were only a few cases in the western and northern counties of Florida during September. In correspondence directed to Mr. Dove, the county agents agreed that the incidence of screwworms was lower than at any time since this pest established itself in the Southeast.

New larvicide for control of goat lice.--O. G. Babcock, Roy Melvin, and C. L. Smith, of the Menard, Tex., laboratory, report that results from recent experiments indicate a new, practical dip may soon be developed which will kill 100 percent of the lice within a few hours, and all eggs with one treatment.

Ranch management in screwworm-prevention program.--E. C. Cushing, Menard, reports that the ranch-management program is well under way and that four district meetings of county agents were held at Uvalde, Beeville, Boerne, and Gonzales, Tex., on November 12, 13, 14, and 15, respectively. The proposed plan and its purpose were explained by Messrs. Cushing and W. L. Barrett, Jr. The meetings were well attended, and in addition to the county agents, a number of leading ranchmen and others were present. There

were enough immature stages of the fly in the ground during December to develop a rather severe outbreak of the fly over the entire overwintering area should there be a considerable period of warm weather during the month of January. The essential recommendations included in the program include avoiding all wounds and dropping no young from October 1 to January 31; perform surgical operations, drop young, and shear as soon as possible after February first, when flies are few in number; avoid all wounds and drop no young during May, June, and July; and fall shear and emergency operations only in August and September. The peak of fly abundance is reached late in December in the overwintering area. If there are no wounds during this period the largest crop of flies of the year will die without a suitable place for oviposition.

Biological studies of horn flies.--According to W. G. Bruce, of the Dallas, Tex., laboratory, adult horn flies emerged from infested droppings placed in overwintering cages on October 7, 14, and 18, but none emerged since November 21. Records of 475 pupae, kept at a constant temperature of $85^{\circ}\text{F.} \pm 2^{\circ}$, showed the pupal period to be 127 hours, correct within 1 hour. An elephant dropping was infested with 100 newly emerged horn fly larvae and was kept in a room at $85^{\circ}\text{F.} \pm 2^{\circ}$, but no flies emerged.

FOREIGN PLANT QUARANTINES

More insects in crating.--Live scolytid larvae were found in elm wood used in open structure crates for earthenware arriving at New York during the latter part of October. The larvae were determined by W. H. Anderson as probably Scolytus scolytus F., based on determinations of associated adults made by M. W. Blackman. Cerambycid larvae, determined by Mr. Anderson as Clytus arietus L., were also found. This species is recorded by Sorauer as feeding on the larvae of bark beetles (Scolytidae) in fig trees and grapevines in southern France.

Entomological interceptions of interest.--The living adults of the bruchid Bruchus tristiculus Fahr. were intercepted at New Orleans on September 11 in sweet pea seeds in mail from Portugal. Two living larvae of the melonfly (Dacus cucurbitae (Coq.)) were taken at San Diego, Calif., on November 5 in string beans in stores from Hawaii. A living adult of the scolytid Gnathotrichus consentaneus Bldfd. was found at El Paso, Tex., on October 23 with sour lines in cargo from Mexico. Seven living larvae of the celery fly (Philophylla heraclei (L.)), were found at New York on October 1 in celery in stores from England. Ten living larvae of the Mediterranean fruitfly (Ceratitidis capitata Wied.) were taken at San Pedro, Calif., on October 9 in coffee berries in baggage from Hawaii. A living adult of the curculionid Ceratopus bisignatus Boh. was taken at New Orleans on October 30 on banana in cargo from Mexico. One living adult each of the coreids Agonosoma flavolineata (Lap.) and Plunentis porosus Stal was intercepted at Hoboken, N. J., on October 29 in bromeliad leaves in baggage from Brazil. A living adult of the lygaeid Acroleucus tullus (Stal) was intercepted at Laredo, Tex., on October 28 on gardenia in cargo from Mexico. Living and dead specimens of the olethreutid Laspeyresia splendana (Hbn.) were taken at Philadelphia on November 13 in a bag of chestnuts in stores from Spain.

Pathological interceptions of interest.--Alternaria curcurbitae Let. was found September 25 at Seattle on squash (Cucurbita maxima) from Japan. Aphelenchus avenae Bastian was intercepted on November 19 at New York in Xanthosoma sp. roots from Cuba. Aspergillus ochraceus Wilhelm, intercepted on October 16 at New York, appeared to be responsible for a dry rot which was destroying a gladiolus corm from Turkey. Cercospora sp. was intercepted on October 20 at Laredo on husk tomatoes from Mexico. Cylindrosporium chrysanthemi All. was unusually prevalent at Brownsville on chrysanthemums being brought from Mexico during October and November, a total of 18 interceptions being made. Peronospora pisi (DeBy.) Syd. and Septoria pisi West. were found on November 24 at New York on peas from Chile. An undescribed species of Pratylenchus was intercepted on October 30 at New York in Lilium longiflorum bulbs from Cuba. Sclerotinia gladioli Drayton was intercepted on October 22 at San Francisco in gladiolus corms from Japan. Sphaeropsis sp., closely resembling S. malorum Pk., was intercepted on August 31 at Brownsville on pine cones from Mexico.

DOMESTIC PLANT QUARANTINES

Survey of Parlatoria chinensis.--A Federal-State survey is under way in Missouri to determine the extent of spread of a diaspine scale new to this country, specimens of which were submitted earlier in the year by Missouri inspectors and identified as Parlatoria chinensis, Marlatt (see News Letter, dated June 1, 1940, v. VII, No. 6, p. 35). Investigations conducted by the Missouri Department of Agriculture during the summer resulted in finding a number of infested properties in the vicinity of the Missouri Botanic Gardens and Tower Grove Park in St. Louis. As this appears to be the first record of the occurrence of the scale in the United States and it is therefore not known to what extent it may become a pest of economic importance on ornamental and fruit plants, the State requested Federal assistance in making the survey. Eight Federal inspectors were assigned to the work early in December, under the supervision of William Dickison.

Grasshopper control, estimated savings and losses in crops.--From reports of State leaders in grasshopper control and from Bureau records it is estimated that the 1940 control program conducted in 22 States saved crops valued at more than 42 million dollars. These savings represent a net benefit of more than \$22 for each Federal dollar expended. On the other hand, it is estimated that more than 22 million dollars of grasshopper damage was done to crops in these States. The comparison of savings and losses is encouraging, the ratio being more favorable than might be expected, considering the wide areas involved and the many factors concerned in control.

Grasshopper baiting in November.--Grasshopper baiting was continued to an unusually late date extending into the early days of November in the second-generation Melanoplus mexicanus Sauss. area of the southern Great Plains in the vicinity of the Panhandles of Texas and Oklahoma. Subsequent extreme low temperatures, however, dropped to 5° above zero at Amarillo, Tex. This condition, together with parasitization and other natural causes, resulted in almost complete destruction of live grasshoppers in the second-generation area.

Grasshopper and Mormon cricket control conference.--A conference was held in Denver on December 7-8 of Bureau representatives, State directors

or commissioners of agriculture, directors of extension, State leaders, and representatives of the Extension staff from Washington. The conference heard discussions of recent research in grasshopper control and a historical resume of grasshopper outbreaks. A suggested outline of procedure and plan of operation for hopper and cricket control for the crop year 1941 was presented for discussion and met with approval.

Grasshopper and Mormon cricket egg survey.--Information obtained from egg surveys for both these pests in the autumn of 1940 indicates a general downward trend in the probabilities of infestation for 1941. The serious grasshopper outbreak of 1939 was materially reduced to a much less difficult problem in 1940 and the work of that year appears to have effected a corresponding reduction both as to areas and intensity.

Fall inspections of peach trees.--In cooperation with the States concerned, the predefoliation inspection as required under the provisions of the standard State quarantines on account of the peach mosaic was completed early in the month. Mosaic-infected peach trees were found in this inspection in New Mexico, Oklahoma, and Texas. At the request of and in cooperation with the Louisiana State officials, several nurseries that had not been inspected in the spring for the phony peach disease were inspected in the fall, and with one exception were found eligible for certification, as no phony trees were found in their environs nor in the nursery stock. Of the nearly 700 nurseries inspected during the year in the entire region infected with the phony or mosaic disease, only 18 were found to be ineligible for certification. These are located in six States.

Tree-removal work on peach projects.--Tree-removal work was conducted during the month in California, Colorado, Georgia, New Mexico, Tennessee, and Texas, with the main activities in California and Georgia. Eight thousand mosaic-infected trees were removed in California, leaving slightly more than 4,000 and the work continues to go forward in that area. Good cooperation is being received from the growers, with few exceptions. In Georgia more than 11,500 phony trees were removed during November and every effort is being made to complete the removal of the diseased trees prior to the arrival of severe weather. In the States mentioned from 400 to 500 W. P. A. certified workers were employed in the removal of diseased, escaped, and abandoned peach trees during the month.

Chinch-bug survey.--The Federal-State survey begun early in November, to determine the full status of the chinch bug infestations, was terminated at the close of the month in Missouri, Nebraska, and South Dakota, and continued into December in Indiana, Iowa, and Oklahoma. Surveys in Kansas, Ohio, and Illinois have been made by the departments of agriculture of those States.

Mole cricket damage subsiding.--Unusually dry weather throughout November in those parts of Florida in which mole cricket operations have been

conducted, has minimized the damage resulting from the cricket infestations. Furthermore, most of the crops needing protection from the crickets have reached an advanced stage and it is felt that the seriousness of the situation which recently created an emergency requiring Bureau participation has greatly diminished. The demands for bait were light during the month, averaging approximately 105,000 tons of mixed bait per week, less than one-fifth the quantity distributed during the first week of operations. Bait was distributed in November in 12 counties. Mixing stations at Wauchula and Plant City were kept in operation during the entire month and a plant was set up at Palatka on November 8. The mixing plant located at Lakeland was discontinued on November 15.

Sweetpotato weevil eradication areas extended in Mississippi.--A cooperative observational survey of conditions affecting the sweetpotato weevil situation was conducted in November in the Gulf coast counties of Mississippi, at the request of Clay Lyle, State entomologist, and for consideration at the meeting of the State Plant Board held at State College on November 22-23. With the information obtained from the survey it was considered advisable to extend the eradication activities to these Gulf coast counties for the protection of the areas where cooperative eradication measures have been carried out in the commercial sweetpotato-growing areas of the State since 1937. Accordingly, arrangements are being concluded to start cooperative eradication work in the northern portion of these counties.

White-fringed beetle control work.--The November activities of the white-fringed beetle control project consisted mainly of repairing and overhauling field equipment, preparing individual records of premises concerned in the 1941 control program, and enforcing Federal and State quarantine regulations.

Pests intercepted by transit inspectors.--Three Japanese beetle larvae were recently found in a shipment of soil consigned from Alexandria, Va., to a point in Ohio outside the regulated area. The shipment was intercepted at Pittsburgh.

Transit-inspection facilities increased for Christmas shipping.--Transit inspection was recently resumed at Detroit through the cooperation of the Michigan State Department of Agriculture in the assignment of an inspector at this point. At Birmingham the assistance of an Alabama State inspector, working with the regular transit inspector, makes possible the inspection of all trunk lines, operating out of the white-fringed beetle area, which move materials into or through Birmingham.

CONTROL INVESTIGATIONS

The application of the aerosol to fumigation.--W. N. Sullivan and J. H. Fales, of the Beltsville, Md., laboratory, in cooperation with L. D. Goodhue, of the Division of Insecticide Investigations, are making studies on the application of the aerosol to fumigation. It has been shown by toxicity tests against the housefly that the effective period of dispersed naphthalene can be greatly increased by vaporization in the presence of an inert aerosol. It is apparent that absorption occurs and the insecticide is

held in an effective form for a longer period. The presence of the inert particles changes the character of the deposit. The rate of crystallization is greatly retarded and the size of the crystal is reduced. Instead of the most of the naphthalene collecting on the floor, it was more uniformly deposited on all surfaces regardless of position.

Turf treatments with methyl bromide solution against Japanese beetle grubs.--H. C. Donohoe, White Horse, N. J., reports on the application by sprinkling of methyl bromide and alcohol (either methyl or ethyl) in aqueous solutions to lawn turf for the control of Japanese beetle grubs. Mr. Donohoe was assisted by G. F. Kerbey and H. A. Messersmith, of the Division of Japanese Beetle Control. Greatest survival was found in the top inch of soil. Mortality was greater in marginal dosages followed by a water cover than without this cover where used with solutions of 0.15 percent methyl bromide or over, and was lower with solutions of 0.10 percent or less followed by a water supplement than where none was added. Soil temperatures ranged from 53° to 63° F. at treatment application. Mortality within a schedule was generally less at higher than at lower temperatures where any difference occurred. At comparable schedules mortality was less in light sandy soil than in heavier loams.

INSECTICIDE INVESTIGATIONS

Dihydrorotenone.--Among the numerous derivatives of rotenone thus far studied, only dihydrorotenone retains the high insecticidal action of the parent compound. The apparently greater stability of this derivative has led to its commercial production. Catalytic hydrogenation of rotenone produces, in addition to dihydrorotenone, the nontoxic hydrogenation products--rotenonic acid, dihydrorotenonic acid, and dihydrorotenol. To develop a method for the determination of dihydrorotenone in the mixture of hydrogenation products, some of the physical and chemical properties of these compounds were examined. A combination of physical properties will give some information as to the amount of dihydrorotenone present, but a better method is based on the observation that this is the only reduction product giving an appreciable red color by the Goodhue test. L. D. Goodhue and H. L. Haller, of the Division of Insecticide Investigations, have proposed a method based on this test which is described in Industrial and Engineering Chemistry (Analyt. Ed., v. 12, No. 11, pp. 652-654, November 1940).

Laboratories moved to Beltsville, Md.--During October and November the laboratories of the Division of Insecticide Investigations, which, since the summer of 1935, had been located on the first floor of the first wing of the Department's South Building, were moved to a new building in Beltsville, Md., known as the South Laboratory Building. This building, planned to house the pharmacological and vitamin units of the Food and Drug Administration before it was transferred from the Department of Agriculture to the Federal Security Agency, is now occupied by the various units of the Department of Agriculture. The Division of Insecticide Investigations is located on the first floor of this building, where the laboratories of the Insecticide Division of the Agricultural Marketing Service will also be located shortly. The new quarters in the South Laboratory Building afford more space to each chemist than was available in Washington, D. C. Moreover, the new location, being only 1 mile from the Entomology Building of this Bureau, will enable the chemists and entomologists to confer frequently on problems that are being attacked jointly.

BEE CULTURE

Carbohydrate metabolism of developing honeybee.--R. M. Melampy, of University, La., reports: "During the larval feeding stage of the worker honeybee (Apis mellifera L.), the total carbohydrate and the glycogen increase. The total carbohydrate includes free reducing sugar of the tissues, unassimilated carbohydrate of the alimentary tract, glucose produced by the hydrolysis of glycogen, and other carbohydrates convertible by acid hydrolysis into reducing sugar. The maximum storage of total carbohydrate and glycogen occurs between the fifth and sixth days, which is approximately the end of the larval feeding period and the time the cell is sealed. The total carbohydrate at this time is 100 mg. and the glycogen 68 mg. per gram of tissue; however, 12 days later the total carbohydrate has decreased to 9 mg. and the glycogen to 0.9 mg. per gram. If it may be assumed that the daily rate of utilization is constant, the total carbohydrate decreases at the rate of 8 mg. and the glycogen at the rate of 6 mg. per gram per day. It is of interest that the synthesis and utilization of total carbohydrate and glycogen parallel each other throughout the life cycle. However, the glucose due to the hydrolysis of glycogen varies at different stages of development. For example, at the 3-4 day stage it comprises 42 percent of the total carbohydrate, at the 5-6 day stage 68 percent, and at the 17-18 day stage 10 percent. At no time does the free reducing sugar make up the difference existing between the total carbohydrate and glycogen. The greatest difference is 32 mg. per gram of tissue at the 5-6 day stage, but at this time the free reducing sugar is only 1.0 mg. per gram. The free reducing sugar decreases to 0.3 mg. per gram at the 6-7 day stage, rises to 2.0 mg. per gram by the 16-17 day stage, and decreases before emergence. It is clearly shown, from the results presented here, that some other form of carbohydrate other than glycogen and free reducing sugar must be present in the developing honeybee. This carbohydrate is convertible, by acid hydrolysis, to reducing sugar."

Home-made beeswax candles.--A revival of the art of making beeswax candles at home in old-fashioned molds is evidenced, as these hand-molded candles are in demand among persons interested in antiques. Beeswax is also extensively used in high-grade commercial candles. Such candles have sufficient rigidity to stand up well in the heat of summer, a quality not possessed by ordinary candles made of parawax. Beeswax candles are made commercially by dipping, rolling, or pouring. The beeswax must be very clean and quite clear, when in the liquid phase, to be satisfactory for candle making. Mr. Vansell, of the Pacific States Bee Culture Field Laboratory, has studied candle making and has found that careful attention must be given to temperature control when molding beeswax candles. The temperature of the liquid wax should not exceed 155° F. when placed in the mold. Beeswax is adhesive and must be very slowly cooled to prevent it from sticking too tightly, or from cracking through shrinkage. When candles are only slightly stuck to the mold they may be satisfactorily removed after thorough chilling by a dash of boiling water applied along the metal tube wall. Commercial wicks are recommended.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A cerambycid destroying pricklypear in Colorado.--Specimens of a cerambycid beetle, identified by W. S. Fisher as Moneilema annulatum Say, were recently received from the Colorado State College accompanied by the report: "This insect is completely wiping out stands of pricklypear in pasture land in the vicinity of Fountain, Colo." Cactus stands in other parts of the State, however, appear not to be severely attacked.

A European moth in North America.---In the course of making identifications of moths associated with studies on the Dutch elm disease, the apparent similarity between English specimens of Oecophora lunaris (Haworth) and a series of two males and three females from the State of Washington was noted. Further investigation and a comparison of the male genitalia of these with the English specimens and other European material proved them to be identical. The Washington specimens were collected at Bonneville and Vancouver, Clark County, from June 26 to July 7, 1931, by J. F. Gates Clarke. It is possible that this species has been present in the vicinity of Vancouver since early in the days of the settlement of the English on the Columbia River. Apparently this is the first record of this species in North America. Probably the insect is of no economic importance, for, like several related forms, its larval stage feeds under loose bark; presumably as a scavenger.

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NEWS LETTER

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ADMINISTRATION

F. A. Johnston Dies

Frederick Andrew Johnston, plant quarantine inspector of the Division of Foreign Plant Quarantines, passed away in a hospital in Mayaguez, P. R., at 2:30 p. m. on January 22, 1941, following a brief illness.

Mr. Johnston, the son of Andrew and Lydia A. (McCorkle) Johnston, was born at Westford, Mass., on May 25, 1887. He attended grammar school and academy at Westford, and in 1908 graduated from the Massachusetts Agricultural College at Amherst with a degree of Bachelor of Science, having majored in entomology. He did postgraduate work at the same institution from 1908 to March 1910. During these years he served as deputy State nursery inspector of Massachusetts.

He was appointed to the Bureau of Entomology on March 1, 1910, as agent and expert and later as an entomological assistant with the Division of Truck Crop and Stored-product Insects. On October 16, 1920, he was transferred to the Federal Horticultural Board as plant quarantine inspector, with headquarters at Nogales, Ariz., where he served in various capacities. On August 1, 1926, he was called to Washington to assist the entomologist and executive officer of the Federal Horticultural Board in the administration of the work of the Mexican Border Inspection Service. Following a reorganization, on October 1, 1928, he was placed in charge of the Port and Mexican Border Inspection Service. On March 21, 1940, he was transferred to Puerto Rico as Inspector in Charge at San Juan, with the direction of all the Federal plant quarantine activities on the Island.

During his career as research entomologist Mr. Johnston published the following: Arsenite of Lead and Lead Chromate as Remedies against the Colorado Potato Beetle (Bul. 109, Part V); The Life History of Tetrastichus asparagi Crawford. (Journ. Econ. Ent. v. 5); Feeding Habits of Pimpla (Ito-plectis) conquisitor, Say with H. M. Russell (Journ. Econ. Ent. v. 6); Asparagus Beetle Egg Parasite (Journ. Agr. Research, v. 4).

Mr. Johnston is survived by his wife Cornelia G. (Havens) Johnston, whom he married in 1915, and two children, Doris H. (Mrs. W. C. Clark of Buffalo) and Frederick A. Jr., who is now with the Federal Bureau of Plant Industry at Gainesville, Fla.

1942 Budget Estimates for Appropriations to Bureau

The regular Budget estimates for appropriations for the fiscal year 1942 recently submitted to Congress include the following changes in amounts appropriated to the Bureau for the current fiscal year:

Increases

Mexican Fruitfly Control-----	\$ 7,500
Barberry Eradication-----	20,000
Insecticide and Fungicide Investigations-----	5,000
Foreign Plant Quarantines-----	20,000

Decreases

Citrus Canker Eradication (item eliminated)-----	\$13,485
Dutch Elm Disease Eradication-----	100,000

To conform with general authorizing legislation approved April 26, 1940, the Bureau's appropriation item for Blister Rust Control is transferred to and made a part of a special new appropriation which relates specifically to White Pine Blister Rust Control and provides appropriations for the Bureau of Entomology and Plant Quarantine and the Forest Service in the Department of Agriculture and for land-managing agencies in the Interior Department. The amount estimated for work to be carried on under the direction of the Bureau is increased by \$100,000 in the combined estimate.

EDITORIAL OFFICE

Preparation of Manuscripts

The work of the Editorial Office would be greatly expedited if authors would follow the instructions available to them for the preparation of manuscripts. For practically all types of manuscripts to be published by the Department the instructions given on the inside of the back cover of each issue of the Journal of Agricultural Research may be followed. Similar instructions may be found in the same place in the Journal of Economic Entomology. For papers intended for publication in other outside journals the style for the particular journal should be followed, so far as that can be ascertained, but in the absence of such specific information the approved style of the Department of Agriculture should be used. If such specific policy has been followed, a statement to that effect should be made in the letter of submittal.

Miscellaneous Publication 337, entitled "Abbreviations Used in the Department of Agriculture for Titles of Publications," should be followed in citing literature in Department publications and also in papers for outside publications, unless the specific style used in the outside journal can be ascertained. Another (unnumbered) publication of the Department, "Citations to Literature in the Journal of Agricultural Research, Technical Bulletins, Circulars, and Miscellaneous Publications (Other than Bibliographies)," compiled by Carolyn Whitlock, gives further directions for citing literature in the Department publications.

FRUIT INSECT INVESTIGATIONS

More on ethylene dichloride emulsion against peach borer.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that while at Beltsville, Md., early in the fall he had an opportunity to make observations on the results obtained by F. P. Cullinan and D. F. Scott, of the Bureau of Plant Industry, from treating 1-year-old peach trees in a variety planting at the United States Horticultural Station with ethylene dichloride emulsion for control of the peach borer (*Conopia exitiosa* (Say)). Each tree in this planting had been treated with 2 liquid ounces of 7½-percent emulsion 6 days prior to these observations. Not a single live borer was found, although the trees had been unusually heavily infested with the insect. There was no tree injury whatever from the treatment, which was of the strength and quantity of ethylene dichloride emulsion recommended for the control of the peach borer in 1-year-old peach trees.

Feeding injury on Muscat raisins.--Data concerning feeding injury by larvae of the raisin moth (*Ephestia figulilella* Greg.) on raisins of the Muscat variety have been obtained by George H. Kaloostian, of the Fresno, Calif., laboratory. At the end of the period of sun-drying on wooden trays, some of the raisins were placed in paper bags and fumigated (with incomplete success) while the infestation in the unfumigated lots was allowed to develop unchecked. Part of the unfumigated raisins were enclosed in paper bags at the end of sun-drying and the rest were exposed to further infestation during shade-drying on stacked trays. In the examination of samples for feeding injury all of the unfumigated raisins were grouped together. After the samples had been held for 38 days, 1,000 raisins from the fumigated lots and the same number from the unfumigated samples were examined under a microscope. The results were as follows.

Raisins	Injury at--			
	Capstem:	Capstem:	Surface:	Total
	alone	and surface:	alone	
	Percent	Percent	Percent	Percent
Fumigated----	15.6	1.0	1.1	17.7
Unfumigated--	39.6	12.7	7.4	59.7

The data indicate that the greater part of the feeding was in the pulp around the capstem, and that bagging and fumigation at the end of sun-drying considerably reduced feeding injury.

MEXICAN FRUITFLY CONTROL

Conditions and trapping results in December.--In December, 12 *Anastrepha ludens* Loew were trapped on 11 premises in 6 districts in the regulated area. In addition to these flies there were trapped 304 specimens embracing 8 other species in the family Trypetidae. This list includes specimens of *A. serpentina* Wied., *A. distincta* Greene, *A. mombinpraeoptans* Sein, *A. chiclayae* Greene, *A. sp. "Y"*, *Anastrepha sp.*, *A. pallens* Coq., and *T. curvicauda* Gerst. On the Mexican side of the river 22 *A. ludens* were

trapped in Nuevo Laredo and 23 at Matamoros. Very beneficial heavy rains fell in December. A total of 6.95 inches was recorded at Brownsville throughout the month, but amounts considerably in excess of this figure were unofficially recorded at various points in the valley. The rains occurred over a period of several days and fell so slowly as to permit the soil to absorb most of it. High winds on December 26 and 27 reached a recorded velocity of 43 miles an hour at Brownsville. These winds continued for such a long period and at such a high rate that they caused an estimated 25 percent of the remaining grapefruit crop to fall. Much of the fruit remaining on the trees was severely damaged and a considerable portion of this is expected to fall in the near future. At the close of December 12, 064.6 equivalent carlots of fruit had been moved from the regulated area. This amount is 652 equivalent carlots in excess of the movement for December 1939.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Methyl bromide unsuccessful as grain fumigant in elevator bins.--

R. T. Cotton, Geo. B. Wagner, and T. F. Winburn, Manhattan, Kans., report that the fumigation of stored grain in elevator bins with methyl bromide has not proved successful, although several methods of applying the fumigant have been tested. One method of application consisted of introducing the liquid through a $\frac{1}{2}$ -inch metal pipe running from top to bottom in the center of a bin 80 feet deep, supplied with openings at every 10 feet of depth. A second method consisted of applying the entire dosage at the top of the bin but just below the surface of the grain. The third method consisted of introducing the fumigant in 1-pound cans that were tossed into the grain stream as the bin was being filled. Although dosages up to 3 pounds per 1,000 bushels of grain were applied, the kill of insects was incomplete in all cases. In order to overcome difficulties of distribution due to the low boiling point of methyl bromide, arrangements were made to obtain a 15-percent mixture of methyl bromide in the commonly used ethylene dichloride-carbon tetrachloride mixture. Preliminary tests made with this mixture in bins of shelled corn containing 2,000 bushels indicated that a dosage of $1\frac{1}{2}$ gallons per 1,000 bushels applied to the surface gave excellent results.

Multi-walled paper bags vulnerable to stored grain insects.--Messrs.

Cotton and Wagner also report that in an extensive test of multi-wall paper bags for protecting flour from insects it was found that, although the paper acts as an efficient barrier against flour-infesting insects with the exception of the cadelle, the prevailing method of closing the bottom of these bags defeats the purpose of their multi walls. The bottoms of most of these bags are closed by stitching, and the newly hatched larvae of flour-infesting insects were observed to enter the bags through the small holes made by the needle. An additional avenue of entry was afforded when the top of the bag was closed by sewing. Covering the sewed strip at top and bottom of the bag with a gum-latex tape eliminated this point of entry.

Chloroethyl formate as a stored-grain fumigant.--Mr. Cotton and J. C. Frankenfeld, Manhattan, state that preliminary tests with chloroethyl formate indicate that this fumigant has good insecticidal properties and may prove useful in connection with stored-grain fumigation. Germination tests with wheat of 12-percent moisture content showed that no injury to germination resulted from dosages required to kill stored-grain insects. This material has a boiling range of 127° to 140° C. and a flash point of 61° C.

Second generation of corn borer in Indiana and Ohio.--A. M. Vance, Toledo, Ohio, reports that data on midsummer pupation, indicative of a second generation of the European corn borer, were obtained during the fall infestation survey in August and September 1940 in 35 counties of Indiana and 43 counties of Ohio. Live or emerged pupae were found in 32, or 91.4 percent, of the Indiana counties and in 30, or 69.8 percent, of the Ohio counties. In Indiana in 1940, among 7,255 specimens of the borer observed, the pupation was 7.2 percent, which was significantly higher than that of 2.6 and 0.6 percent in 1939 and 1938, respectively, in the same group of counties. In Ohio in 1940, pupation averaged 6.4 percent among 2,207 individuals examined, being most pronounced in 8 counties in the southwestern corner of Ohio, where 29.6 percent of 152 specimens were found as live or emerged pupae in the fall.

Field status of European corn borer parasites in Lake States.--W. G. Bradley, Toledo, Ohio, reports on surveys made in October to obtain data relative to the status of parasites in the Lake States area at the close of the 1941 active season. Collections of ectophagous parasites and the puparial remains of those which issued from their host prior to the time of collection, together with living borers which might harbor ectophagous forms were collected at 6 points in the area. The total parasitization obtained at these points will not be determined until development is completed in the spring; however, from a cursory examination of the field-collected material, it seems evident that parasitization by the tachinid Lydella stabulans var. grisescens R. D. shows a tendency toward an increase at the 2 points where observations have been made annually to determine its status. At each of these points parasitization by the fall-emerging individuals was higher than by the total number of parasites at the close of 1939. In Perkins Township, Erie County, Ohio, the average parasitization within a radius of $1\frac{1}{2}$ miles of the release point was 40.7 percent and 2 of the collections showed over 70-percent parasitization. The total number of borers observed at the 6 points was 2,648. In addition to the collections at release points, observations to obtain data on the dispersion of the exotic chalcid Eulophus viridulus Thoms. were made in the following 6 counties in Ohio: Sandusky, Seneca, Hardin, Auglaize, Logan, and Allen. Only 1 observation per township was made and only a few townships in some of the counties were included; however, E. viridulus was recovered at 1 or more points in each of the counties. Because of the method utilized in making this study, the chief objective of which was to check dispersion over as great an area as possible, no accurate data on the abundance of Eulophus were obtained, but it was indicated that at some points this parasite may be present in encouraging numbers. One colony was found over 50 miles from the nearest release point. The farthest limits of dispersion were not defined by this survey.

Severe tests imposed on hessian fly resistant wheats under greenhouse conditions.--W. B. Cartwright, D. W. LaHue, and C. Benton report that mass production of hessian flies in the greenhouses at Lafayette, Ind., has made practicable extended and critical tests on wheat varieties and strains not attainable in the field. Daily production of flies for experiments has often exceeded 5,000 adults which were confined in oviposition cages for infesting wheats. Under severe tests, individual varieties are infested with from several hundred to 1,000 or more fly eggs per plant and then subjected to contrasting environmental conditions with respect to temperature, light, and other factors. Under adverse conditions in the tests to date, several durum varieties and strains

retain a resistance that approaches immunity. Most common wheats have not retained this high rate of resistance. The variability of results in the tests with common wheats has not been definitely attributed to any single factor or combination of factors but more extensive studies are now being made which include those of inheritance, environmental modifications, and variability of the fly populations. Included in the varietal tests, exclusive of hybrid lines, have been highly resistant plant selections from the durum varieties, as Branco, Aza de Corvo, Cascalvo, Monjil No. 2, Durazio rijo, Tremez preto, Tremez rijo, Tremez molle, and a few unnamed strains; and from the common wheats as Java, Dixon, Illinois No. 1-W38, Marvel, Beirao, Portugez, Ribeiro, Trijo roji, Rafael Triunfo, and several unnamed strains including some especially promising winter wheats from Turkey.

Fly-resistant wheat makes good showing in field test.--W. B. Noble, Sacramento, Calif., reports that in 1940 about 30 acres of Big Club 38 (Dawson X Big Club³) fly-resistant wheat was grown for field test in Solano County, Calif. This wheat showed a 96-percent reduction of plant infestation and a 30-percent increase of yield, as compared with adjacent regular Big Club variety.

Insecticidal control of chinch bugs on corn.--E. V. Walter and Curtis Benton, Lafayette, Ind., state that numerous tests made during the summers of 1938-40 indicate that chinch bugs can be safely and effectively controlled on corn at a cost of approximately \$2.50 per acre for materials, by means of a spray consisting of an emulsion of highly refined white mineral oil fortified with a small amount of either nicotine sulfate or derris extract. Such a spray is too expensive for use on corn grown for feed but is cheap enough for use on specialized crops, such as inbred or hybrid seed and market sweet corn. The spray is not recommended as a substitute for the creosote barrier but rather to kill any chinch bugs that may reach the corn, despite the barrier or before it is constructed. The oils used in these tests were highly refined water white mineral oils having an unsulfonatable residue of at least 96 percent and ranged in viscosity between 85 and 210 seconds Saybolt at 100° F. No difference in effectiveness was observed between the different oils used, owing to viscosity. Since the lighter oils are cheaper they are recommended for this purpose. An emulsion was easily prepared by adding 1 gallon of oil to 1 pound of potash laundry soap dissolved in $\frac{1}{2}$ gallon of hot water, and agitating until emulsification was complete. Ready-prepared emulsions were found effective but higher in cost. The cheapest mixture that gave satisfactory results contained 2 percent oil and 1/8 ounce of 40-percent nicotine sulfate, or derris extract containing 5 percent rotenone, per gallon. Oil emulsions of this type were found safe for use on corn 12 inches and more in height at much greater than the recommended strength. Occasional injury was observed on very small corn, especially when the spray was allowed to collect in the tops of the plants. Serious injury has been observed where commercial miscible or summer-spray oils were substituted for the mineral-oil emulsion. A man using a knapsack type sprayer can spray slightly less than 1 acre of corn in an 8-hour day.

JAPANESE BEETLE CONTROL

Open weather permits longer shipping season.--Mild weather during December permitted many nurseries in central and southern New Jersey to clean and obtain certification for dormant stock to be placed in storage for early spring shipment. Quantities of azaleas were treated with methyl bromide and paradichloro-

benzene and were shipped under certification for forcing for the Easter trade. Certification of pansy plants indicates that an excellent market for these plants has opened up in the Southern States. Two central Jersey establishments found it difficult to keep up with their orders for pansies. Increasing demand for azaleas resulted in 1 New Jersey establishment equipping a separate building for treating plants. Controlled ventilation and adequate heating facilities were installed. Another establishment in the State is planning a special room for paradichlorobenzene treatments throughout the winter months. A series of electric heating cables will be evenly spaced on a concrete floor and covered with cinders. The treatment of the plants will be performed on the surface of the cinders. The temperature is not expected to vary more than 1° during the entire treatment. Another grower has decided to discontinue methyl bromide fumigation of azaleas, except those of the variety Hinodigiri. Treatment with paradichlorobenzene will be substituted. At another plant in the State 14 methyl bromide fumigations were made during the month, involving a total of 7,000 plants mostly azaleas. Shipments of dahlias to foreign ports still continues from Long Island, N. Y. Inquiries are also being received from foreign countries on these items. Two of the biggest growers in the Philadelphia area claim that in 1940 they experienced their best and largest shipping season in years. The largest pansy grower in this area claims that business during 1940 was the best he had ever had.

Nurserymen and greenhousemen found 1940 a good year.--During December a large Maryland grower of hydrangeas treated with methyl bromide 12,016 hydrangeas for shipment to nonquarantined States. Classified nurserymen in the vicinity of Washington, D. C., had a very good fall business. Judging from certificates issued, shipments of fruit trees from the Eastern Shore of Maryland, especially to North Carolina and South Carolina, are much heavier than usual.

New packing sheds to speed Japanese beetle certification work.--An eastern Maryland nursery engaged in the large-scale production of strawberry plants has just completed the erection of a packing shed to be used for the cleaning, washing, counting, and packing of strawberry plants. The shed is of frame construction with cement flooring. It has good light to facilitate the inspection operations and is equipped with a large heater. This building will enable the nursery to ship practically all of its strawberry plants directly from the farm where they are grown and will permit the nursery to get out its shipments irrespective of outside weather conditions. Owing to heavy receipt of orders for spring shipments, it is anticipated that under favorable weather conditions spring inspection work on the Eastern Shore of Maryland and Virginia will be very heavy. Another Maryland nursery has started the erection of a new and improved packing shed with facilities for grading, storing, treating, and washing plants and nursery stock. One room of this shed will be set aside exclusively for chemical-treating purposes. Present plans call for the installation of a new methyl bromide fumigation chamber larger than the one now in use. The new addition will be completed and ready for use before the spring shipping season opens.

Experimental fumigation of perennials continued.--Perennials representing 186 varieties were fumigated experimentally at the Division's district office at White Horse, N. J., on December 27. These plants had been donated by three New Jersey growers. The material was taken to Sanford, Fla., by government truck and arrived in good condition. Early observations of the growth made by

these fumigated perennials will be made long before spring shipments are started in the North. Severely injured varieties will be omitted from commercial fumigations this spring. As was the case with the other two lots of plants taken to Florida during November, the plant-growing and injury check will be performed by members of the staff of the Division of Control Investigations.

All potting soil in a class III establishment to be treated for Japanese beetle.--A greenhouseman in the New York City area, who has been obliged to treat with carbon disulfide potted soil to be used in producing certified plants, has been so pleased with results that he has extended this practice to all potting soil used throughout both his certified and uncertified greenhouses. At this establishment 28 cubic yards of potting soil were recently fumigated under the supervision of an inspector. The owner claims that the soil is not only freed from all insect life but that the treatment apparently stimulates plant growth.

Grower to force azaleas to disprove alleged fumigation injury.--A grower in the New York City area had some potted azaleas returned because of alleged injury from fumigation with methyl bromide and treatment with paradichlorobenzene. These plants were checked in by an inspector for forcing in a certified greenhouse, as the shipper is convinced that the apparent injury is not due to the fumigation. The plants will be reshipped as soon as they bloom, as evidence that they would have responded to proper growing methods.

Seasonal gypsy moth certification activities.--Inspection and certification of evergreen boughs, the cutting of which was confined to the lightly infested area of southern Vermont and western Massachusetts, amounted to over 900 tons. Work was completed on December 23. Because of increased gypsy moth infestation it was necessary in some localities to abandon the method of bough-lot inspection and resort to actual piece-by-piece examination. Increased gypsy moth infestation in the lightly infested area of Vermont resulted in the finding of 7 gypsy moth egg clusters on Christmas trees inspected there during December. District inspectors engaged in routine inspection activities during December were responsible for the removal of 502 egg masses. Of this number, 240 were taken from forest products, nursery stock, and evergreen material inspected for immediate movement to nonregulated points. An additional 262 egg clusters were removed from materials inspected prior to their manufacture into novelties and subsequent shipment to outside points.

Elms killed by changing water level are heavily infested with bark beetles.--In a swamp area in New Milford Township, Litchfield County, Conn., a very heavy infestation of Hylurgopinus rufipes Eich. and Scolytus multi-striatus Marsh. has been found in about 500 elms. It appears that the principal reason for the creation of this situation is the comparatively sudden change in water level caused by beavers constructing a dam in the swamp. Apparently this abundance of suitable beetle material resulted in such an increase in beetle population as to force beetles into living trees. There are now numerous trees with diameters of 4, 5, and 6 inches with dried foliage of this past season indicating that the trees were recently alive. These trees now show woodpecker injury from the base of the tree

through every part of it to the 1-inch material. This extensive wood-pecker work has resulted in a pile of bark approximately 2 inches deep accumulating at the base of the tree. The woodpeckers apparently attacked the thousands of beetles attempting to enter and prepare galleries in this living wood. In practically all cases only a contact with the wood was made. In numerous instances, however, galleries from $\frac{1}{4}$ to $\frac{1}{2}$ inch have been tunneled in the live wood.

Scouting for beetle material in Wilkes-Barre, Pa., area.--Systematic scouting for potential beetle material in the circle within a 5-mile radius of the center of Wilkes-Barre has been completed. Within a 2-mile circle all the elms have been top sampled for discoloration as well as inspected for beetle infestation or the presence of potential beetle wood. This coverage has been thorough and will be of material aid in controlling the disease in this district. Many elms have been tagged as Dutch elm disease suspects and many tagged as containing beetle wood. There have been no cases noted of Hylurgopinus infestation, and only a few instances where old galleries of this species have been observed. Of the numerous trees tagged as suspects in the 5-mile circle, eight of them have been confirmed as infected with the fungus causing the Dutch elm disease.

Permission required for Dutch elm disease scouting in restricted areas.--Before scouting may be performed in areas where firms are engaged in the manufacture of materials for National Defense, special permission must be obtained and arrangements made with the authorities concerned for entrance on their properties. By cooperating with the manufacturers, very little time is lost or additional work involved. Prior to the entrance of scout crews on United States Army reservations, it is necessary to contact the range officer. This is necessary as rifle and gun ranges are located at various points on the reservations and in some locations the danger of accidental shooting is great.

Bark-beetle observations in New York.--Exceptionally heavy beetle infestations were recently discovered in two swamp areas in Dutchess County, N. Y. The trees in both locations had died as a result of changing water level. One location is in the northeastern corner of the county, within approximately 1 mile of the Massachusetts line. The other is in the southern part of the county in the town of East Fishkill. At the time the first survey was made for beetle-infested material, the water was too deep to permit examination of the trees. Since the swamps have frozen over it has been found that a major portion of the trees are very heavily infested with both Hylurgopinus and Scolytus beetles. Inspection of dead and dying trees, as well as healthy trees, in the Binghamton, N. Y., area has shown literally thousands of adult H. rufipes hibernating in the outer bark of many elms. This condition is most common in areas where there is considerable old beetle wood. Trees of this type in the vicinity of Dutch elm disease locations will be removed as part of the sanitation program.

Factors in the development of bark-beetle infestations.--On the basis of field reports and general observations, it is believed that a high percentage of the current selective work on Dutch elm disease eradication, especially the pruning now under way, involves the removal of beetle material created by the heavy ice storm in March 1940. Some of the work in Connecticut can still be associated with the severe hurricane of September

1938. Considerable of the remainder of the work is the result of beaver dams or of road-building operations. Once an area is rid of dead and dying elms the development of beetle material would be almost negligible were it not for the above situations. Inasmuch as the extent, intensity, and time of such damage is unpredictable, it is frequently necessary to make drastic revisions in work plans and to introduce into the field work as much flexibility as possible.

Logging operations in Morris County, N. J.--During scouting in Morris County considerable beetle material was found that had resulted from logging operations. A logging firm had been operating in the area and had cut a number of large elms, using only the butt pieces, leaving the remainder scattered over the area. Upon inspection it was found that most of the wood on the ground was beetle-infested. An investigation is being made to determine the points to which the butt pieces have been shipped.

FOREST INSECT INVESTIGATIONS

Powder-post beetle damages stored apple wood.--Apple wood stored for fuel and home wood-working purposes in the basement of a residence at Burley, Idaho, was found by J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, to be severely infested with the southern lyctus (Lyctus planicollis Lec.). This infestation, which had reduced many of the larger sections to a mass of powder, is believed to have been in the material at the time of its storage. Although one could not be sure that the under side of the hardwood floors of the residence had not been attacked, no evidence of such injury was observed and it is thought that damage had been confined to the apple wood. It was recommended that this material be removed from the residence and destroyed.

Douglas fir beetle infestation in Cody Canyon greatly reduced.--According to D. A. Hester, of the Portland, Oreg., laboratory, the infestation of Dendroctonus pseudotsugae Hopk., which has been present for nearly 10 years in scenic Cody Canyon near the east entrance to Yellowstone National Park has at last yielded to control. Efforts at controlling this outbreak have been complicated by an outbreak of the spruce budworm (Archips fumiferana Clem.) running concurrently with that of the Douglas fir beetle. Defoliation by the budworm weakened the trees, causing them to be more susceptible to bark-beetle attack. With a decline in budworm population brought about by natural control factors and a consequent improvement in tree growth, it has been possible through direct control to reduce the Douglas fir beetle infestation to a point where control is no longer necessary. Current infestation on 12,000 acres, surveyed in the fall of 1940, is estimated at 400 trees, or approximately 21 trees per section.

Beetle-infested ponderosa pines salvaged.--Salvage logging operations on the Bear Valley pine beetle control project on the Malheur National Forest, Oreg., were begun during the second week of December, according to W. J. Buckhorn, of the Portland, Oreg., laboratory. The work is being done by a lumber company in cooperation with the Forest Service. In addition to salvaging beetle-infested trees, abandoned trees of high quality and a few green trees of very poor thrift are also being removed from the

stand. This operation is being carried on in ponderosa pine stands selectively logged 3 years ago under a system whereby 40 percent of the volume was removed from the stand.

Low winter temperature field study continued.--J. M. Whiteside, Portland, reports that during the last three winters really low temperatures in Oregon and Washington--those lethal to overwintering western pine beetles (Dendroctonus brevicomis Lec.)--have been absent. However, in the hope that the law of averages will shortly apply and that the current winter will be a cold one, minimum recording thermometers have again been distributed over a wide area in the ponderosa pine region of eastern and central Oregon. These thermometers have been placed on many pine-beetle-survey plots in order to obtain a simple correlation between minimum forest-air temperatures and pine-beetle mortality and losses.

Direct-current voltage gradients an index to physiological condition of tree.--T. J. Parr, of the New Haven, Conn., laboratory, reports as follows concerning investigations on direct-current voltage gradients: "From the first of June, when the portable vacuum tube direct-current voltage gradient equipment was completed, readings were taken on a considerable number of trees at intervals of a few days up to October 24. In general, healthy conifers showed a higher gradient early in June than was the case at the end of the season, the trend being downward as growth activity became slower. There was a slight rise in gradient when secondary growth occurred. In normal trees in the spring and early summer the gradient in the cambial region was oriented with the top of the tree positive to the base. This condition became reversed in August. One physiological activity of the trees with which the reversal of gradient was correlated was that of fat storage in trees that were going into a winter condition. With the electrodes placed longitudinally on the trunks in the cambial region, and the distance between them standardized at 1 inch, there was little deviation in voltage gradient between individual trees. Where subnormal trees were concerned, conditions were entirely different. If the voltage gradient in the spring was oriented in the same direction as that in normal trees, it was much lower in magnitude and fell rapidly until it became oriented in the opposite direction, i.e., with the base positive to the top. The gradient on subnormal trees remained oriented in that direction until August, when it reversed again as the gradient in normal trees was reversing. Thus the gradient in subnormal trees was oppositely oriented to the gradient in normal trees over most of the year. Ordinarily, normal trees had approximately the same gradient on all sides. On an experimental plot near Alfred, Maine, readings were taken on white pines that had been exposed to full sunlight in sunscald experiments conducted by personnel of the Northeastern Forest Experiment Station. Gradients on the shaded side of the trees were normal, but on the exposed side were oriented in the opposite direction. Spruce trees in southern Vermont, which had been heavily defoliated by the European spruce sawfly, showed voltage gradients on September 26 and 27 which were, if not oppositely oriented, entirely different from those of undefoliated trees. Voltage gradients on less heavily defoliated trees approached the normal; that is, varied with degree of defoliation."

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Weather conditions hamper gypsy moth work.--The progress of gypsy moth work was generally satisfactory during December, although some re-arrangement of plans was necessary in many sections because of frequent unfavorable weather conditions. Snowstorms rendered secondary roads temporarily impassable in many areas, and blocked wood roads used to transport the men as close as possible to the scenes of their labor. Sleet storms slowed transportation at times by coating the roads with ice, necessitated the withdrawal of workers from rugged elevations to relatively level country at lower elevations as a precaution against injury by falls, and hampered scouting operations by covering the trees with ice.

New brush-disposal machine ready for field tests.--The construction of a new brush-disposal machine has been completed at the gypsy moth storehouse in Greenfield, Mass. The new machine is generally similar to the machine which has been demonstrating the usefulness of this method of brush disposal in the field for a considerable period of time, but embodies several refinements, such as the lowering of the feeding mechanism in order that the brush can be more easily inserted. The new machine is now ready for field tests, after which it will be put into regular service. This type of brush-disposal work is especially valuable at locations where burning would injure living trees or where it is inadvisable for other reasons, and at all locations when ground conditions are such that the burning of the brush piles would be dangerous.

Scattered small gypsy moth infestations found in Vermont.--Several of the gypsy moth crews, which were withdrawn from the forests during the deer-hunting season in Vermont, were assigned to scouting work in the residential section of Rutland, Rutland County. These men found and destroyed numerous scattered egg clusters on fruit and shade trees. The distribution of the colonies indicated that the primary cause of the infestation was the wind spread of small caterpillars from other infestations. Rutland has been free of the gypsy moth for several years, the last infestations recorded having been found during the fiscal year 1927. A gypsy moth infestation consisting of four egg clusters was discovered in a woodland block containing approximately 400 acres in Manchester, Bennington County. Two of the egg clusters were located comparatively close to each other on one side of the wood lot, while the other two clusters were about $\frac{1}{2}$ mile distant. The western half of Manchester is mountainous, heavily wooded, and traversed only by a few scarcely discernible logging roads.

Gypsy moth colony in hawthorn brush difficult to clean up.--Three gypsy moth infestations were located, late in December, in Lanesboro Township, Berkshire County, Mass. One of the infestations centers in a thicket of wild scrub apple trees and hawthorns, all of which must be chopped out and burned. The workers handle the hawthorn brush with long-handled forks for protection against injury from the long sharp thorns, the points of which are brittle, frequently break off after penetrating the flesh, and are painful to remove.

Small infestations found on Mount Greylock.--A crew of gypsy moth scouts working on the west slope of Mount Greylock, which lies partly in New Ashford Township, Berkshire County, Mass., recently located several small

infestations of widely scattered egg clusters, all of which were immediately destroyed by creosoting. The lower slopes of Mount Greylock are heavily wooded and support a substantial percentage of trees favored as food by the gypsy moth. Considerable thinning and cleaning work is necessary in the vicinity of gypsy moth infestations in this region.

Birch logs inspected before movement to mills.--A crew detailed to conduct special scouting work in a white birch timber lot through which the New York-Massachusetts State line passes, in the vicinity of Williamstown, Berkshire County, Mass., found and destroyed several gypsy moth egg clusters. Logs cut from this wood lot are transported over the road to wood-working mills in Berlin, N. Y., and Bennington, Vt.

Wood lots examined before movement of Christmas greenery.--Early in December large quantities of Christmas trees and greenery began to move daily from various points in the Massachusetts section of the barrier zone. The points of origin of practically all of this material had been examined earlier in the season to insure against the transportation of gypsy moth egg clusters.

Gypsy moth work in Connecticut.--Scouting work was recently completed in several areas in Connecticut, which were found to be infested by the gypsy moth last year and which received treatment work, including spraying. The absence of new egg clusters at the sites of these old infestations is indicative of the thorough work done last year. A small infestation was found in the northern part of Canaan Township, and a small number of scattered egg clusters were found and creosoted in a heavily wooded section in the northeastern corner of the adjoining town of Salisbury. Four small infestations were discovered in Washington Township, none of them near any of the infestations discovered and treated last year. All three of the above towns are in Litchfield County. Chopping work continued at infested locations, and ideal burning conditions permitted the destruction of considerable quantities of accumulated brush and waste wood. The recent shifting of livestock from pastures to winter quarters removed the necessity of fencing the sections where gypsy moth spraying work was done last season, and a large amount of government-owned barbwire was removed during December. This work was completed late in the month in the northwestern section of Litchfield County and is progressing rapidly in other sections.

Late Christmas-tree inspection in Connecticut.--It was necessary to continue the examination of Christmas trees cut from a spruce plantation in Litchfield Township, Litchfield County, Conn., until the morning of December 24. Although most of the trees were cut for local use, the presence of gypsy moth infestations in nearby wood lots made it advisable to inspect all of the trees removed so there would be no possibility of transporting gypsy moth egg clusters to uninfested areas. No egg clusters were found on the trees inspected.

Few gypsy moth infestations found in residential sections of Pennsylvania.--All gypsy moth workers were transferred from wooded areas in Pennsylvania during the deer-hunting season, which comprised the first 2 weeks in December, in order to avoid the possibility of injury by stray bullets. An unusually large number of hunters were in the woods this year, and State

game wardens estimated that no fewer than 1,000 cars were parked along a 10-mile stretch of road traversing a heavily wooded section in the mountains east of Wilkes-Barre where gypsy moth work is ordinarily conducted. The men were assigned to scouting residential and open sections and to burning brush during the danger period. The results of the residential scouting indicate that many gypsy moth infestations have been eliminated from sections of Luzerne and Lackawanna Counties that were formerly heavily infested and where intensive extermination work has been conducted annually since the gypsy moth was first discovered in Pennsylvania. A few small infestations were found in the residential sections of Kingston and Wilkes-Barre, Luzerne County.

Report of C. C. C. gypsy moth work for first half of fiscal year 1941.--There was a substantial increase in the amount of time used by the C. C. C. on gypsy moth work east of the barrier zone during the first half of the present fiscal year, as compared with the similar period of the fiscal year 1940. Approximately 36,000 6-hour man-days were used in the 1941 period, while only about 25,000 man-days were available in the corresponding period in 1940. This large increase was due to the return to gypsy moth work of crews that had been engaged in fire-hazard-reduction work since the hurricane of 1938. Work was performed on a total of 30,707 acres; however, it was necessary to cover 669 of these acres twice as additional treatment work was necessary, leaving a net total of 30,038 acres treated. Gypsy moth thinning work was done on 1,162 acres of woodland, and sprouts of favorable gypsy moth food plants were removed from an additional 1,517 acres that had previously been thinned in order that gypsy moth resistant sprouts would have a better opportunity to develop. All of this work resulted in the destruction of 135,819 new gypsy moth egg clusters. Seasonal burlapping work, begun toward the end of the fiscal year 1940 and extended into the 1941 fiscal year, resulted in the destruction of 294,435 additional gypsy moth caterpillars and pupae. Spraying work, which was also done in parts of the two fiscal years, resulted in the coverage of 2,816 acres.

C. C. C. gypsy moth work reduced during December.--A total of 4,650 6-hour man-days were used on C. C. C. gypsy moth work during December. From 1,400 to 1,533 man-days per week were used during the first part of the month, but the time dropped to a low of 193 man-days used during the week ended December 28. This extreme reduction was due to storms, to two holidays during the week, and to the ending of an enrollment period. The amount of work accomplished each week was less than had been anticipated, as the quotas of the camps were considerably below the maximum during the entire period. While C. C. C. gypsy moth work consisted principally of selective thinning work during the first 4 months of the present fiscal year, more emphasis has been placed on scouting work since the dropping of the foliage in order to determine infestation conditions and to locate the sites of heaviest infestation so that further thinning and intensive work can be done at the most advantageous locations. It was necessary to interrupt the scouting work for short periods during the deer-hunting seasons and also on days when conditions were unfavorable for scouting, and to assign the men to thinning and burning operations.

Economy stressed in C. C. C. gypsy moth work.--Gypsy moth foremen have been instructed to conduct the thinning work as economically as possible,

consistent with obtaining the desired results. One method of reducing the cost of operations is to scatter the cut brush so that it will rot and disintegrate rather than to assemble and burn the debris. The use of this method where conditions are favorable has resulted in a gradual reduction in the cost per acre and has permitted the treatment of a larger acreage with the man-power available. This type of work has been considerably more costly in Vermont than in Massachusetts and Connecticut, as large areas in Vermont have not been cleaned up since the hurricane and are covered with a tangle of blown-down trees which must be treated.

Infestation conditions east of barrier zone.--C. C. C. gypsy moth scouting work east of the barrier zone in Massachusetts and Connecticut indicates that the egg depositions are not as heavy as they have been during the last few years, but that a generally scattered infestation is present. The situation is different in certain parts of Vermont, where very heavy infestations have been found in Westminster, Rockingham, and Springfield, and scattered but annually increasing colonies exist in the towns of Chester, Ludlow, Grafton, and Plymouth.

Property owners apply approved gypsy moth methods to woodlands.--Property owners are showing an increasing interest in C. C. C. gypsy moth work. Many of them have consulted C. C. C. gypsy moth foremen regarding proper methods for treating their properties, and have treated their woodland blocks in accordance with good gypsy moth practice. Some have followed up their thinning and cleaning work with the planting of species of trees resistant to gypsy moth. Similar cooperation has also been found in the treatment of some public lands. The superintendent of a large water board property in Massachusetts has agreed to follow the C. C. C. thinning work with the removal of large white oaks, thereby improving the work and sharing in the cost. Such cooperation results in improvements in the stands of the property owners and is of great assistance to the gypsy moth work as a whole.

PLANT DISEASE CONTROL

Barberry bushes destroyed on 31 properties in Ohio in December.--Crews working in Ashtabula, Champaign, Columbiana, Fulton, Lorain, and Muskingum Counties covered areas totaling 115 square miles during the month, and 608 barberry bushes were destroyed on 31 properties, 10 of which were new locations. The crews assigned to Fulton County conducted some resurvey in adjoining townships in Henry County, and 145 barberry bushes were found and destroyed on 6 of 127 old properties visited. Henry County was given an intensive survey in 1936 and no clean-up work has been done since. The results of this resurvey, therefore, indicate that substantial progress has been made toward putting this county on a maintenance basis.

Eleven million barberry bushes destroyed in Pennsylvania since 1935.--In 1939 Pennsylvania produced more than 50 million bushels of wheat, oats, barley, and rye. The State ranks about ninth in the production of winter wheat, with an average yield of 21 bushels per acre. Prior to 1935 repeated crop failures resulting from black stem rust had forced many farmers to abandon the growing of small grain crops in localities heavily infested with barberry bushes. Farm operators were compelled to buy feed which

ordinarily would have been produced on their own farms, were it not for the rust hazard. Since 1935 more than 11 million barberry bushes have been destroyed on 7,500 different properties distributed throughout 17 counties. It is estimated that initial control work has been accomplished in areas totaling approximately 17 percent of the State.

Benefits from control work in Pennsylvania.--Since completing the initial survey in Lackawanna and Susquehanna Counties in 1935 and 1936, there has been an increase in the production of small grains in these counties amounting to 30.7 and 33.3 percent, respectively. Similar increases in production are recorded in other counties where barberry bushes have been removed, while in counties where no control work has been done there was no appreciable increase in either acreage or production. Based on 5 years of observations, L. K. Wright, in charge of control work in Pennsylvania, estimates that losses from stem rust in that State have been reduced by 90 percent where barberry bushes were eliminated. Grain growers are advised, however, that their crops will escape damage from rust only if surrounding woods and fence rows are kept free from barberry bushes. In many communities organized groups of farmers are making annual inspections of their own farms and destroying bushes that develop from seed. There are, however, extensive wooded areas where one or more systematic resurveys will be needed before maintenance work can be turned over to local groups.

Scanty Ribes regeneration around white pine shelterbelts in Iowa.--In Blackhawk County, Iowa, Ribes eradication was performed in 1940 for the second time around 45 shelterbelts initially worked in 1934. An interesting and encouraging comparison in numbers of Ribes pulled in each of these workings, 6 years apart, follows:

Working	:Ribes per area		: Ribes destroyed:		Total bushes found	
	:Wild	:Cultivated:	Wild	:Cultivated:	Wild	: Cultivated
	:Number:	Number	:Number:	Number	:Percent	: Percent
Initial, 1934---	: 452.4:	12.5	:20,356:	563	: --	: --
Second, 1940----	: 41.6:	0.4	: 1,874:	17	: 8.4	: 2.9

An "area" in this table relates to a single shelterbelt and the protective zone of about 80 acres surrounding it. The wild Ribes pulled were almost entirely Ribes missouriense growing in and near shelterbelts. Red currants and gooseberries made up the cultivated Ribes destroyed. Labor in 1934 was employed on N. R. A. funds, and in 1940 on W. P. A. funds under an efficient foreman. It will be noted that in 1940 the proportion of total bushes found was only 8.4 percent for wild Ribes and 2.9 percent for cultivated Ribes. These findings are most encouraging as an indication of the effectiveness of eradication measures in suppressing Ribes. It is equally encouraging to analyze the number of jobs from the standpoint of the presence or absence of Ribes at each eradication, as follows: (1) Wild Ribes present first eradication, present second eradication, 22 jobs; present first eradication, absent second eradication, 11 jobs; absent first eradication, present second eradication, 7 jobs; absent first eradication, absent second eradication, 5 jobs; total, 45 jobs. (2) Cultivated Ribes present first eradication, present second eradication, no jobs; present first eradication, absent second eradication, 22 jobs; absent first eradication, present

second eradication, 5 jobs; absent first eradication, absent second eradication, 18 jobs; total, 45 jobs. It appears from this record that one-third of the 33 areas on which wild Ribes were found in 1934 were successfully and completely freed from them at that time, but that Ribes were either overlooked on 7 of the 12 areas reported as Ribes-free in 1934 or have since developed there from seed brought in by birds. Considering cultivated Ribes, none of the 22 areas where bushes were found and destroyed in 1934 showed any Ribes in 1940. This is largely due to the low regenerative ability of cultivated bushes. On 5 of the areas cultivated bushes had either been planted between 1934 and 1940, or the workers overlooked them in 1934. On a fairly substantial basis of 45 areas, all of these data show decidedly encouraging results in the establishment of control around Iowa shelterbelts.

Cultivated Ribes in Tennessee.--R. D. Tanksley, in charge of blister rust control work in Tennessee, reports that 255,622 cultivated Ribes were removed from 1,601 locations during the period 1934 to 1940, inclusive, and that 17,116 cultivated bushes are still growing at 991 locations. Of 20 counties known to be growing white pine, cultivated bushes have been discovered in 13 counties. The total number of recorded cultivated Ribes in the State, including those destroyed and those still living, amounts to 272,738 bushes. Of this number, over 93 percent already have been destroyed. The work in Tennessee has been based on education and persuasion, rather than on law enforcement.

Spread of white pine blister rust in 1940, summary.--During the calendar year 1940, blister rust was found for the first time on either white pine or Ribes in 16 counties of the Eastern States and 1 county in the West. Ten of these counties are in the North Central region, 6 in the Southern Appalachian region, and 1 in the sugar pine region. In 2 counties, namely, Jackson County, Mich., and Hampshire County, W. Va., infection was found for the first time on both Ribes and pine; while, of the remaining 15 counties, infection was found on Ribes in 9 counties, and on pine in 6 counties. The rust is generally distributed throughout the Northeastern States on both host plants and in many sections damage to large pines is becoming increasingly noticeable in unprotected areas. Observations show that the disease continues to spread unchecked in areas where Ribes are present and that effective control has been accomplished on those tracts from which these bushes have been removed. In the western white pine region of eastern Washington, northern Idaho, and western Montana, the known infected area remains the same as at the end of the calendar year 1939. With pine infection scattered over all of the white pine belt of the Inland Empire, infection may be found on Ribes each year in all parts of this area where these bushes occur in any number. Consequently, the rust is intensifying to some extent in those parts of the white pine type from which the Ribes have not yet been removed, and at a greatly increased rate in those unprotected drainages where the disease has been present for several years, particularly in the younger stands. Scouting on the Gallatin National Forest at a point 19 miles from Yellowstone National Park, where Ribes infection was found in 1937, revealed negative results on both the Ribes and the limber pines. Additional scouting in and adjacent to both Yellowstone and Grand Teton National Parks also failed to show any evidence of blister rust. In the sugar pine region an important development in the spread of the rust was the

discovery of 2 infected sugar pines in California, along Bailey Creek near Viola (Shasta County), on the Lassen National Forest in the general vicinity of Ribes infections found there in 1938. This infection places the known southern limits of pine infection in California about 107 miles south of the Oregon border and is the first record on pine in Shasta County. Scouting in the Shasta and Klamath National Forests in California from late in August through September was directed primarily toward determining the extent to which infection had become established on pines as a result of previous years' spread of the rust to Ribes, especially from the wave of Ribes infection which blanketed the Klamath National Forest and extended more lightly over the Shasta National Forest in 1937. Results on the Shasta National Forest were negative. Over the moister regions of the Klamath National Forest, however, it was found that a widespread return of infection to sugar pines which were situated near Ribes that were infected in 1937 had taken place. The negative results obtained in scouting for the rust on Ribes in California in 1940 indicates that this year, like last, was unfavorable for long-distance spread of the rust from the pine infection centers in the north to Ribes in that State.

Ribes eradication 20 years ago still controls blister rust.--N. H. Harpp reports that Ribes were destroyed on several thousand acres of forest land in Warren County, N. Y., in 1918 and 1919 in the towns of Caldwell and Chester. When compared with unworked areas in the same localities, the effectiveness of the early Ribes-eradication work is readily apparent. In the town of Caldwell, situated along Lake George between Lake George Village and Bolton landing, many acres of white pine are practically free from rust infection, except for very old cankers. In the town of Chester, near Chester-town and Loon Lake, the area on the east side of Highway No. 9, which was worked in 1918, shows little or no infection, while on the west side of this highway in the vicinity of Igera, where no Ribes-eradication work was done prior to 1936, infection on pine is very heavy. A 1-acre plot was examined in this unprotected section in October 1940, and it showed that 40 percent of all trees over 6 inches in diameter breastheight were dead or will die from stem cankers established before 1936. During the fall of 1940 a study of 26 unprotected plots in Warren and Essex Counties, N. Y., showed infection ranging from 30 to 70 percent. All diseased trees inspected were 6 inches d.b.h. or larger and had stem cankers. No Ribes eradication was done on any of the areas on which these plots were located in the early years of the control program. On those that have been worked in recent years, very little new infection has taken place. In the town of Lewis, Essex County, the Ribes were removed from about 400 acres in 1919, 1920, and 1921. In different locations on these areas, the trees with old cankers originating in 1919 or earlier range from 30 to 45 percent. In the town of Elizabethtown, Essex County, 100 acres were worked in 1924, and here in places 70 percent of the pines show infection that took place before Ribes eradication, while very little infection originating since 1924 can be found. On and near the areas which were worked some years ago prolific white pine reproduction practically free from infection is very noticeable. The destruction of some 12,000,000 Ribes in Warren and Essex Counties since the beginning of control work has brought about this marked improvement over early rust infection conditions.

COTTON INSECT INVESTIGATIONS

Early freezes cause high mortality of pink bollworm.--A. J. Chapman, of the Presidio, Tex., laboratory, reports that the first freezing temperatures in the Big Bend caused a high mortality of pink bollworms in green bolls. Temperatures of 30°, 24°, 24°, 29°, and 33° F. were recorded for November 14, 15, 16, 17, and 18, respectively. At the beginning of the cold spell cotton was growing. Examination on November 18 of 200 green bolls that had been killed by the freeze showed that of the 273 pink bollworms found in this environment, 11 were alive and 262 were dead, or a mortality of 95.97 percent caused by the cold weather. The pink bollworms in the succulent bolls were the only ones affected by the low temperatures, as no mortality was found to occur among larvae in open bolls, in cocoons in surface trash, or in the soil. According to the last several years' records, overwintering larvae in the last three environments would not be affected by the temperatures listed above.

Small and large boll weevil control plots compared.--During 1940 boll weevils caused serious damage in the Waco, Tex., area. Studies conducted by K. P. Ewing and associates in fields and large plots showed considerable gains in yield of dusted over undusted cotton, whereas in the small plots differences between cotton yields from treated and untreated plots were much less marked. Control experiments were conducted on 36 plots of 1/18 acre each, in a compact 2-acre area within a 27-acre field. The cotton within the experimental area and throughout the entire field was unusually uniform and, exclusive of the fact of boll weevil control, it was believed that the potential production was practically the same in any part of the field. Large plots of 1 acre or more were used in control experiments in 5 other fields in the Waco area.

Plots	Yield of dusted cotton	Yield of undusted cotton
	Pounds	Pounds
Small-----	1,445	1,336
General yield, (same field as above)-	--	582
Large (average, 5 other fields)-----	840	382

It will be observed that untreated small plots yielded much nearer the level of treated cotton than did large plots or fields. While some of this apparent gain may be due to random variation or insecticidal action of drifted dust, it is believed that most of it is due to decrease of weevil population in the compact plot area. Thomas and Reinhard (Tex. Bul. 475, 1933) have shown that weevils are very migratory, and it is probable that many weevils from the small check plots get into dusted plots and are killed. Infestation records in general agree with yield records and support this belief. In the check plots within the 2-acre experimental area the peak infestation was 32.1 percent, while the peak infestation in the rest of the field reached 90 percent.

Effects of calcium arsenate on reproduction of cotton aphid.--The effects of calcium arsenate on the reproduction of the cotton aphid was studied by E. W. Dunnam and J. C. Clark at Stoneville, Miss. Plots of the same variety of cotton were dusted during the period July 18 to August 19 with 9 applications of 8 pounds per acre of calcium arsenate containing 13.9 percent and 0.7 percent water-soluble arsenic, respectively, by the Geneva method. Colonies of aphids occurring naturally on the plots receiving the high and low water-soluble calcium arsenate and the untreated checks were encaged in organdy bags and left undisturbed for 12 days to note the reproduction. Sixty-one aphids in 5 colonies were used for each treatment. One series of each treatment was started before the date of the last application of calcium arsenate, 1 series was started 10 days after the last application, and 1 series 20 days after the last application. In each series the rate of reproduction was higher on the plants dusted with high water-soluble calcium arsenate than on the plants dusted with the low water-soluble calcium arsenate or the checks. The number of young produced in the 3 series were 1,620, 1,367, and 1,029, respectively, on the plants dusted with high water-soluble, low water-soluble, calcium arsenate, and untreated. Another series of tests was started on September 18, or 30 days after dusting was discontinued, by placing 10 newly born aphids in individual organdy bags on the fourth leaf from the tops of plants receiving the different treatments. In another plot dusted with the low water-soluble calcium arsenate, all of the fruiting forms were removed at weekly intervals through August 12 and newly born aphids were caged individually as above. In all tests the young aphids were removed daily after reproduction started. The average reproduction and longevity is shown in the following table. All squares were removed through August 12.

Calcium arsenate	: Average days :prereproductive: period	: Aphids born: in 12 : days	: Total aphids: born in 40 : days	: Average longevity : of aphids
	: Number	: Number	: Number	: Days
High As ₂ O ₅ ---	: 4.2	: 96	: 232	: 25.3
Low As ₂ O ₅ ----:	: 5.2	: 80	: 320	: 32.6
None-----:	: 6.9	: 40	: 127	: 22.6
Low As ₂ O ₅ -----:	: 5.7	: 74	: 143	: 20.5
None-----:	: 6.8	: 68	: 201	: 25.1

On the normal plants, where the squares were not removed, the average prereproductive period was shorter and reproduction was faster during the first week on the plants dusted with calcium arsenate containing high water-soluble arsenic than on those dusted with low water-soluble calcium arsenate, or on the checks. After the first week there was little difference in the rate, but reproduction continued longer and the total number of young was greater on the plants dusted with low water-soluble calcium arsenate than on the high water-soluble calcium arsenate or the checks. The average longevity was also greater. On the plants where squares were removed the prereproductive period was $\frac{1}{2}$ day longer on the plants dusted with low water-soluble calcium arsenate than on plants receiving similar treatment with the squares not removed. However, on plants where the squares had been removed,

the total reproduction and longevity was greater in the checks than on the plants dusted with low water-soluble calcium arsenate, which is a reversal of conditions on the normal plants. The prereproductive period in the untreated checks was practically the same for the two series, but in both cases was longer than where calcium arsenate had been applied. With the influence of parasites and predators eliminated by the organdy bags, these data offer strong evidence that nine applications of calcium arsenate affected the food value of the cell sap and accelerated aphid maturity and reproduction.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--Gin-trash inspection of the 1940 cotton crop was concluded about December 15. At the time inspection was terminated machines were operating in the Arizona district and in Mexico at Mexicali, Baja California. For the season a total of 136 pink bollworms were found in Maricopa County, Ariz., most of these coming from the Glendale area, where infestation existed last year. None were found in the Gilbert area, which was infested last season. Two specimens were found at Coolidge, in Pinal County, the same number found in that county last year. Large volumes of trash were inspected in the cotton-growing areas of Pima County, with negative results for the season. Last season 2 specimens of the pink bollworm were found in that county. During December, 3 Thurberia weevils were taken through the inspection of gin trash in Pima County. Results of all inspection in the Mexicali area of Mexico were negative. Field inspection of cotton forms found on random plants in the lower Rio Grande Valley district, incidental to grubbing operations for the purpose of creating a host-free period during the fall and winter months, was continued throughout December. A total of 225 green bolls found and inspected during the period yielded 13 specimens of the pink bollworm, 12 of which came from Cameron County and 1 from Hidalgo County.

Destruction of sprout and volunteer cotton.--One of the principal control measures for the suppression of the pink bollworm in the lower Rio Grande Valley calls for the destruction of all live cotton plants immediately after the harvesting of the crop and not later than October 1, each season. However, on account of very favorable soil and climatic conditions in that region it is necessary to carry on during the fall and winter months an intensive campaign against developing sprout cotton in the fields and random plants growing in out-of-the-way places to prevent fruiting of these plants and the consequent build-up of infestation to attack the spring crop. The campaign for the creation of a host-free period in the lower valley area was continued during December, with 35 grubbing crews operating throughout the greater part of the period. Although this campaign has been prosecuted vigorously since the completion of the main stalk-destruction program, it is not believed that a complete host-free period was established until the latter part of December. Farmer cooperation in the accomplishment of a host-free condition has been very satisfactory, and it is believed that there was less fruiting cotton after October 1 this season than at any other comparative period since control measures have been in effect in that area.

Field clean-up in Presidio area of Big Bend.--Since a special control program was put into effect in the Presidio area of the Big Bend of Texas in the fall of 1938 the heavy pink bollworm damage to the cotton crop in that

area has been reduced to a negligible degree. One of the principal control measures followed in that area calls for the cutting, piling, and burning of stalks immediately after the cotton crop is picked out. Clean-up for the present season got well under way around December 1, and was nearing completion at the end of the month. During the last two seasons it has been necessary to resort to hand-picking of cotton debris in many of the heavily infested fields in an effort to further reduce the winter carryover but, owing to the present light infestation, it has been necessary to hand-pick only a comparatively few fields this season. Through the cooperation of the Cotton Insects Division, fields have been located showing sufficient surface and soil population to justify winter cultural practices, consisting of plowing followed by irrigation. With the incentive of further reducing the pink bollworm infestation for the 1941 crop, all farmers have evinced considerable interest in such cultural practices, and at the end of December plowing and irrigation were under way in a number of fields where the degree of infestation warranted such measures, and plans were being made by other farmers to start such work. Other control measures for this section restrain farmers from planting cotton prior to April 20, and no sprout cotton is allowed to fruit prior to the fruiting of the spring crop. The manipulation of the planting date in relation to spring moth emergence results in most of the overwintering pink bollworms emerging as moths in the spring and dying before the cotton comes into fruit. The effects of the complete control program for the pink bollworm carried out on both sides of the river were reflected in cotton production. Production of cotton in Presidio County in 1938 was 622 bales; in 1939, 1,466 bales; and in 1940, 1,948 bales. The greater part of this increase in production is undoubtedly due to the control of the pink bollworm; however, some 200 or 300 bales were destroyed in 1938 by a flood.

Control measures in lower end of Juarez Valley, Mexico.---The Mexican and United States Departments of Agriculture make inspections annually on both sides of the boundary. There is a place in Mexico in the vicinity of Vado de Cedillas considered as part of the Juarez Valley, but which is really the upper end of the Big Bend area, and its climatic conditions more nearly resemble those prevailing in the Big Bend. On account of the isolation of this area, and its being attached to the Juarez Valley district, the control measures heretofore applied in the Big Bend area were not applied; consequently, the pink bollworm increased here enormously. One sample of trash from seed cotton originating in that locality revealed a total of some 10,000 pink bollworms in the fall of 1940. The control program of the Big Bend is being carried out here. By the end of December it was estimated that 75 percent of the fields had been cleaned and plowing was well under way. The delay in planting will be carried into effect in that region for the year 1941; therefore, we can expect a substantial reduction in the infestation in this area in 1941.

Wild-cotton eradication.---For years efforts have been under way to eradicate the pink bollworm from southern Florida and adjacent keys by destroying one of its principal hosts, the wild-cotton plant. This action was considered necessary when it was found that the pink bollworm was spreading from this area northward to domestic cotton plantings. From the beginning of the present season up to the middle of December, W. P. A. crews have handled all of the wild-cotton-eradication work, except that being done by 2 Bureau crews operating from house boats. At the beginning of December

the W. P. A. quota of 90 workers was increased to 102. As a result of previous arrangements made by this Department with Army and Forest Service officials, a C. C. C. Camp was established at Cape Sable during the first half of December to aid the Bureau in the eradication of wild-cotton plants from that region. Enrollees of this camp, approximately 180, reported for duty with this Bureau around December 16. At the end of the period the Bureau W. P. A. and C. C. C. work had become well coordinated, and good progress was being made in all areas. During the month a total of 4,261 acres was recleaned, from which were removed 3,267 plants with mature bolls, 166,332 seedlings, and 289 sprout plants.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tests of hornworm insecticides.--An experiment conducted by L. B. Scott and Joe Milam, of the Clarksville, Tenn., laboratory, during the summer of 1940 on replicated small plots of dark fire-cured tobacco showed that cryolite was more effective against larvae of the hornworms Protoparce sexta (Johan.) and P. quinquemaculata (Haw.) than was paris green at the dilutions and rates of application compared. Following are the results obtained.

Treatment	:Application : :rate per acre:	: Reduction in--	
		48 hours	72 hours
		:Percent	:Percent
Spray mixture:	:	:	:
Cryolite and water (6 lb.-50 gal.)-	70 gal.:	84	93
Dusts:	:	:	:
Cryolite undiluted-----	20 lb. :	63	81
Paris green and hydrated lime	:	:	:
(1½ lb.-5½ lb.)-----	7 lb. :	48	48
Untreated-----	---	-11	-23

The data show that the cryolite spray was considerably more effective than the cryolite dust and that both were more effective than the paris green-lime dust mixture at the rates of application used. Each treatment was replicated on 4 plots of tobacco containing 100 plants each, the 16 plots being arranged in a Latin square. Application of the spray was by a knapsack sprayer, while that of the dusts was by a rotary hand-operated duster. The effectiveness of the treatments was determined by counting all larvae found on 20 plants per plot before application and at 48 and 72 hours after. The cryolite used in these tests contained 85 percent sodium aluminum fluoride.

Effectiveness of mole cricket bait.--Intensive experiments conducted by C. B. Wisecup and A. H. Madden during the fall of 1940 near Plant City, Fla., showed that a calcium arsenate-bran bait was effective against mole crickets under field conditions when applied at the rate of 30 pounds dry weight per acre, that the addition of molasses to this bait did not increase its effectiveness, and that the bait can be stored for 1 month without a loss of effectiveness. The species involved was chiefly Scapteriscus vicinus Scudd., although S. acletus R. & H. and Gryllotalpa hexadactyla Perty were also

present. There was no appreciable difference in the amount of surface burrowing by the mole crickets in plots treated with 30, 50, and 70 pounds per acre of the bait, but there was more burrowing when only 10 pounds of bait was applied. For the 30-pound application an average of 90 percent reduction in the surface disturbed by mole cricket burrows was recorded 2 weeks after the bait was first applied; however, on 3 of the 5 plots treated at this rate, a second application was made 1 week after the first. The addition of molasses caused a significant reduction in the efficiency of the bait when the combined results from the 4 rates of application were compared. The reduction in surface area burrowed by mole crickets ranged from 75 to 83 percent 1 week following a single application at the 30-pound rate for bait mixtures that had been prepared and stored for periods of 1, 2, 3, and 4 weeks prior to application. There was no significant difference among these and one freshly mixed at the time of application, although during storage the temperature in some of the mixtures rose to 126° F. The standard bait mixture employed in these experiments consisted of 7½ pounds of calcium arsenate and 100 pounds of mill-run wheat bran, slightly moistened with water prior to application. When molasses was included the bait was moistened with a mixture consisting of 1 part of molasses to 6 parts of water. The treatments were replicated from 4 to 20 times in randomized block arrangement of plots on representative farms. Each plot was 10 by 30 feet in size, surrounded by a vertical metal barrier extending 6 inches into the soil and projecting 2 inches above. The effectiveness of treatments was determined by counting the numbers of square inches of soil disturbed by mole crickets in each of 20 random areas of 100 square inches per plot before and at intervals after application. In order to stimulate surface activity and thereby to obtain a better index of the mole cricket populations, the plots were sprinkled with water a day or more prior to each examination, because these experiments were conducted during an unusually dry period. These studies were conducted in cooperation with the Division of Domestic Plant Quarantines, in connection with the widespread bait operations being carried out against mole crickets by that Division.

Seasonal variation in percentage of infective aster leafhoppers.--From a series of tests conducted by F. F. Smith, of the Beltsville, Md., laboratory, during the period May to September 1940, inclusive, it was found that of the aster leafhoppers (Macrostelus divisus Uhler), which transmits the "yellows" infection to aster plants, very few were infective in the field, and there was a considerable seasonal variation in the percentage of infective leafhoppers. From a total of 761 adult leafhoppers tested during the entire period, only 20 were found to be infective. The percentages of infective leafhoppers from collections made during May, June, July, August, and September were found to be 0.4, 1.0, 5.2, and 5.4, respectively. In conducting these tests, individual leafhoppers were isolated on aster seedlings to determine their ability to cause yellows infection at the time of collection. The samples of leafhoppers from which the individuals used in these tests were drawn were taken from collections made on lettuce and China asters.

Toxicity of insecticides against Say's stinkbug.--An intensive series of small-scale toxicity tests against Chlorochroa sayi Stal, an important pest of sugar beets grown for seed in the Mesilla Vally of New Mexico and in southern Arizona, has recently been conducted by O. A. Hills, V. E. Romney, and K. B. McKinney, of the Phoenix, Ariz., laboratory. In these tests a large

number of insecticides were used as sprays and dusts. The results showed that dust mixtures containing from 1 to 4 percent of dinitro-o-cyclohexylphenol effected high mortalities of the test insects but caused severe foliage burn when applied to sugar beets. There is some possibility, however, that a dust mixture can be prepared which will contain a sufficient quantity of this ingredient to be effective and will not cause foliage injury to the beets. Impregnated pyrethrum dust diluted so as to contain from about 0.2 to 0.3 percent total pyrethrins was the most effective insecticide tested. Corroborating field observations made during the summer of 1940, which showed that impregnated pyrethrum dust mixtures varied considerably in effectiveness against this stinkbug, the laboratory tests showed that careful grinding and mixing of the stock impregnated dust with some of the diluent was necessary to prepare a homogeneous dust mixture. Unless the mixing was thorough, small pellets of the impregnated dust occurred in the finished dust mixture, resulting in too great dilution. Dusts impregnated with derris extract, even at excessive strengths, gave unsatisfactory mortality of the test insects. A dust mixture consisting of impregnated pyrethrum dust and a diluent proved to be more effective than the same mixture which had also been impregnated with derris extract. In general, less effective results were obtained from the application of spray mixtures than dust mixtures of the insecticides compared. In conducting these tests quantities of the insecticides as nearly equal as possible were applied by means of hand sprayers or dusters to the test insects through the walls of small cylindrical screen-wire cages, which also contained branches of green plants for food, extending beneath into a separate container filled with water. After application the cages were retained in the laboratory and periodic examinations were made to determine the rate and amount of mortality resulting among the treated insects. In most instances each treatment was applied to 6 cages containing 10 insects each.

Fumigation detrimental to parasites and predators of stored-tobacco insects--C. O. Bare, of the Richmond, Va., laboratory, reports the results of tests to determine the fate of parasites and predators of the cigarette beetle (Lasioderma serricornis (F.)) and the tobacco moth (Ephestia elutella (Hbn.)), subjected to fumigation in open storage warehouses that had been sealed prior to treatment. The results of these tests indicated that the hymenopterous parasite Aplastomorpha calandrae (Howard) and the mites Seiulus spp. and Monieziella (?) augusta Banks were easily killed by atmospheric fumigation with hydrocyanic-acid gas applied at the rate of 12 ounces per 1,000 cubic feet in an open storage warehouse sealed with balloon cloth, when the test specimens were suspended in open-air spaces. However, the Monieziella mites at a depth of 5 $\frac{1}{4}$ inches in bales of tobacco withstood the fumigation. Previous experiments had indicated that the hymenopterous parasites Mesostenus gracilis (Cress.), Microbracon hebitor (Say), and A. calandrae are easily killed under similar conditions from the application of hydrocyanic-acid gas at the rate of 6 ounces per 1,000 cubic feet. In these tests the test specimens were suspended in open containers at each of three levels in the fumigated warehouse--near the ceiling, near the floor, and midway between. By use of testspikes the two species of mites were also placed at various depths in bales of tobacco undergoing fumigation. After 50 hours of fumigation the mortality among test specimens was determined and compared with similar data from other lots exposed in warehouses that had not been fumigated.

INSECTS AFFECTING MAN AND ANIMALS

Design of micro-apparatus and technique.--William Robinson, Beltsville, Md., reports that in his search for the enzyme urease in various organs of individual screwworm larvae, his associate, C. S. Wilson, has designed micro-apparatus and technique so that determinations have been made from tissues ranging from 15.0 to 0.3 cubic millimeters in size. It is believed that this is the first time such minute amounts of material have been isolated and analyzed.

Breeding place of stablefly larvae.--In his report for the last quarter of 1940, W. E. Dove, Panama City, Fla., tells of the discovery of infestations of "dog fly" (Stomoxys calcitrans L.) larvae and pupae in peanut litter in the fields throughout the principal peanut-growing section of northwestern Florida, southeastern Alabama, and southwestern Georgia. The breeding occurred in fermenting waste, leaves, and stems left in the field where peanut vines were baled for hay. After fall rains the infestations were found in every pile of litter examined. The piles, about 25 x 30 feet, and ranging from 3 inches deep on the edge to 3 feet deep in the center, were found at the rate of about 1 to each 10 acres of harvested peanuts. In 10 counties of western Florida, 9 counties of southern Alabama, and 33 counties of southeastern Georgia it is estimated that 1,000,000 acres of peanuts were harvested in 1940, and that these resulted in about 100,000 piles of litter which are breeding, or are capable of breeding, outbreak numbers of dog flies in that area. Mr. Dove states that in favorite locations there may be more than 100 larvae and pupae per square foot of litter. Another and a different dog fly breeding problem exists in drifts of marine grasses washed ashore on beaches of bays and sounds. The latter breeding occurs in different areas and at times when one would expect the breeding in peanut litter to be at a low point. In general, the months of July, August, and September are the dangerous months for breeding of dog flies in marine grasses, whereas breeding occurs in the wet peanut litter a month or two later.

New compound toxic to mosquito larvae.--W. V. King and R. C. Bushland, of the Orlando, Fla., laboratory, have found a new compound which has shown outstanding toxicity to larvae of the southern house mosquito (Culex quinquefasciatus Say). In preliminary laboratory tests 1.0 p. p. m. of the compound killed about the same percentage of test larvae as did phenothiazine (in 48 hours) and seemed more toxic than 4-(p-bromophenylazo)-m-cresol. Mixtures of the new compound with phenothiazine and with 4-(p-bromophenylazo)-m-cresol were not as effective as equal dosages of the components. The tests indicated a minimum lethal concentration of about 1.5 p. p. m. of the new material for satisfactory kills.

Age of mosquito larvae and resistance to insecticides.--Mr. King also reports that tests on Culex larvae at ages of 2, 3, 4, and 6 days indicated that as the larvae mature they become more resistant to insecticides.

Ditching reduces breeding of salt-marsh mosquitoes.--G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, state that during 1940 ditching reduced mosquito-larval density 100 percent on Batis marshes, 99 percent on bunchgrass marshes, 99 percent on Juncus marshes, 75 percent

on Distichlis marshes, and 67 percent on Salicornia marshes. Where Salicornia and Batis combined were dominant, a decreased larval population of only 63 percent occurred, whereas on areas where Salicornia and Distichlis combined made up the dominant flora, a decrease of only 23 percent was observed. Messrs. Bradley and Travis conclude that it is important to devise special control measures for various marshes or sections of marshes based on their special requirements, to which the vegetative cover is an index.

Ditch spacing a factor in reduction of mosquito larvae.--From data obtained on field studies conducted south of New Smyrna, Fla., by Messrs. Bradley and Travis, it was shown that ditches spaced at 75-foot intervals reduced breeding 91 percent; 150-foot spacings gave reductions of 87 percent and 18 percent, respectively, for two sections; and no reduction was noted where ditches were spaced at 300-foot intervals. This experiment further demonstrates the necessity of devising control procedure based on the special requirements of an area.

Examination of turkeys for Leucocytozoon smithi.--During the last quarter of 1940, Mr. Travis examined 81 turkeys from 15 flocks in Volusia County and 7 turkeys from 2 flocks in Gilchrist County, Fla., to determine the incidence and distribution of the turkey parasite L. smithi. Of the 88 turkeys examined, only 6 birds from 2 flocks showed no parasites in the blood. Mr. Travis' survey showed all birds examined from rural locations to be infected and birds from urban locations to be free of parasites. In all flocks where birds were heavily infected the growers indicated losses of young birds.

Soil sampling for marsh mosquito surveys demonstrated in Dade and Broward Counties, Fla.--At the request of Fred Stutz, mosquito control director of the Mosquito Abatement District of Dade and Broward Counties, Messrs. Travis and Bradley demonstrated the soil-sampling method for marsh-mosquito surveys in Mr. Stutz's district early in December. Hatching of both Aedes taeniorhynchus (Wied.) and Psorophora columbiae D. & K. was obtained from samples of soil taken on ditch and furrow sides, hummocks, and pond rims. No hatching was obtained from extensive unditched, flat marl marshes.

Relation of malaria control to wildlife conservation.--A joint meeting of the Technical and Policy Committees of the Tennessee Valley Authority, held in Knoxville, Tenn., on December 6, was attended by F. C. Bishopp and W. V. King. At this meeting consideration was given to the results obtained during the last 2 years and approval was given for the publication of some of the completed work. As the final action of the meeting a motion was passed to discontinue the present cooperative organization, but provision was made for continuation of the projects on a less formal basis.

Combination screwworm larvicides and wound protectors.--Roy Melvin, H. E. Parish, and C. L. Smith, of the Menard, Tex., laboratory, have summarized a study of approximately 100 mixtures of larvicides and organic chemical wound protectors. Of these, 12 smears have been developed and are now ready for large-scale field tests. These 12 compounds, in experiments on large, bloody cattle wounds, have, on the average, given not less than 3 days' initial protection and not less than a 10-day interval of protection between reinfestations, and have required not more than 4 treatments to heal the wound.

Seasonal appearance and abundance of cattle grubs.--A cross-section survey was made in the vicinity of Dallas, Tex., by E. W. Laake and W. G. Bruce, of the Dallas laboratory, to determine the seasonal appearance and abundance of cattle grubs in dairy cattle. The survey revealed that the first grubs appeared somewhat later than usual and that the heaviest infestations were in cattle on upland farms. On December 13, when 181 grubs were carefully staged, the development was as follows: 9.4 percent of the larvae were in the first stage, 71.8 percent in the second stage, and 18.8 percent in the third stage. The abundance of grubs in mid-December in an average herd on an upland dairy farm was as follows: 20.9 percent of the cows were uninfested; 53.5 percent had from 1 to 10 grubs per head; 18.6 percent had from 11 to 20 grubs per head; 4.7 percent had from 21 to 30 grubs per head; and 2.3 percent had more than 30 grubs per head. Cattle grub control experiments were started in the vicinity of Dallas the second week of December.

Experimental dipping for control of cattle grubs.--Three groups of cattle were dipped in the standard sulfur-cube dip and in modifications of it to test its efficacy against cattle grubs. These tests were made by R. W. Wells, of the Dallas laboratory. Clearly, about 40 percent of the grubs in cattle dipped once failed to survive the standard dip, while it was indicated less clearly that from two dippings a destruction of 75 percent of the grubs may be expected.

FOREIGN PLANT QUARANTINES

Another bruchid intercepted in vetch.--Live bruchids infesting vetch seed from Rumania, intercepted in foreign mails at New York, were identified by H. S. Barber, of the Division of Insect Identification, as Bruchus sp., near rufipes Hbst. Mr. Barber remarks that this appears to be a form not hitherto recognized in the National Museum's collection.

Imported live European corn borers, \$1 per pound.--On December 12 two sample packages of living larvae of the European corn borer (Pyrausta nubilalis Hbn.), one sent to a pet shop and the other to a gold fish company in San Francisco, were intercepted by a Customs mail examiner. A company in Tientsin, China, had sent the samples with a mimeographed letter stating that they were in position to furnish large quantities of these live "worms" for bird food from October to April at \$1 per pound f.o.b. San Francisco, including packing, in lots up to 3 pounds. Shipments of more than 4 pounds were offered to be sent c.o.d. A similar mail shipment was intercepted at Baltimore on December 17. Although these samples contained only about 20 larvae each, with corn-husk packing, it is not known whether or not all have been intercepted, and 20 mature larvae could easily start a serious infestation if given an opportunity. Again our thanks are given to the Customs personnel for stopping a dangerous plant pest.

Entomological interceptions of interest.--Adults of the lygaeid Peritrechus fraternus Uhl. were taken from lettuce found in passenger's baggage from Mexico at El Paso, Tex., on November 20 and 25. Lettuce was the host for an adult of the pentatomid Thyanta accerra McA., which was found in baggage arriving from Mexico at Laredo on November 19. At Nogales, Ariz., on July 20 there was a live adult of Euphrytus parvicollis Schaefer.

taken from mustard greens arriving in baggage from Mexico. H. S. Barber states that this chrysomelid is new to the Museum's collection. On November 16 at New York an inspection of ship's stores revealed apples from Portugal infested with live larvae of Ceratitis capitata (Wied.). A live adult of Chelymormpha pubescens Boh. was intercepted on bananas from Mexico which arrived at New Orleans on September 11. A live adult of the lygaeid Exptochiomera fuscicornis (Stal) was found at Brownsville on November 2 on cockscomb flowers from Mexico. Live larvae of the pink bollworm (Pectinophora gossypiella (Saund.)) were intercepted from okra carried in ship's stores which arrived at Boston, Mass., on November 30. Tangerine fruit infested with one live larva of the Mediterranean fruitfly (Ceratitis capitata (Wied.)) was intercepted at New York on December 4 in baggage from Portugal. Two living larvae of Heilipus lauri (Boh.) were found in avocado seed in baggage arriving at Laredo, Tex., on December 1 from Mexico. From grapefruit in stores living pupae and larvae of Anastrepha fraterculus (Wd.) were intercepted at Boston on December 16. The fruit originated in Argentina. Living and dead adults of Bruchidius incarnatus (Boh.) were found at New York in Vicia faba beans arriving from Egypt in stores on October 19. Mr. Bridwell states that this bruchid does serious injury to broadbeans in Egypt.

Pathological interceptions of interest.--A Cercospora intercepted on zinnias from Mexico on October 11 and again on December 7, 1940, at Brownsville has been determined as C. zinniae E. & M., although the spores are larger than had been reported for the species. Mycosphaerella citrullina (Smith) Gross. was found on November 22 at New York on squashes in stores from Japan. Nectria sp. was intercepted November 2 at Brownsville on a gardenia twig from Mexico, the tropical and subtropical species of the fungus being so inadequately worked up that determination to species would be a difficult task, requiring ample good material. Septoria musiva Pk. was intercepted on October 31 at El Paso on cottonwood leaves in baggage from Mexico. A group of protuberances making a gall-like growth several millimeters in diameter was intercepted on November 11 on stems mixed with grass packing from Mexico in a shipment entering at Nogales. Preliminary examination showed that the protuberances were filled with smut spores and the specialist reports that it appears to be Thecaphora pustulata Clinton, heretofore known only from two Puerto Rican collections on Bidens sp.

DOMESTIC PLANT QUARANTINES

Grasshopper bait used last year.--According to reports made by the State leaders in grasshopper control for the year 1940, more than 91,000 farmers used bait in 22 States, the largest number of farmers participating in the States of Minnesota, Nebraska, North Dakota, South Dakota, Montana, and Kansas. There were 63,673 dry tons of bait distributed by volunteer and paid labor in 1940, the bulk of which was distributed in Montana, Minnesota, North Dakota, South Dakota, Texas, Colorado, and California, in the order named.

Field headquarters for peach projects and citrus canker combined.--The consolidation of the peach mosaic, phony peach, and citrus canker projects has been effected with headquarters at 561 Federal Building, San Antonio, Tex. A. E. Cavanagh, formerly in charge of control activities relating to

peach diseases, with headquarters at Little Rock, Ark., is now in charge of the consolidated project. R. N. Dopson, who has been in charge of citrus canker eradication, will continue to direct the field work of that project under Mr. Cavanagh's supervision, and will also act in a similar capacity in peach mosaic and phony peach activities in Texas and nearby States. The office at Houston, Tex., formerly the headquarters for the citrus canker project, will be maintained as a suboffice for that work in Texas and Louisiana.

Tree-removal work for peach disease control.--During the month of December the destruction of abandoned, escaped, and diseased peach trees went forward in Arizona, California, Georgia, New Mexico, and Texas. In California all mosaic-infected trees have now been removed, with the exception of 359 trees on 4 properties. In Georgia more than 9,000 phony trees were removed by the property owners during the month.

Chinch bug outlook.--Preliminary estimates of the chinch bug situation as determined from the survey completed in December, indicate that infestations in Iowa and Nebraska next year will be lighter and more spotted than in 1940, and that the center of the infestation has moved to the north and west, where winter mortality will probably be heavier. In Kansas and Oklahoma, surveys indicate that the infestation will cover larger areas than last year and may be more intense. In Illinois and Indiana the situation has not changed appreciably from that indicated by last year's survey and it is not believed that there will be any serious outbreaks in Ohio. Chinch bug infestations of a moderate intensity were also found in a small area in the southeastern corner of South Dakota, involving approximately four counties. With weather conditions and population developments comparable to those of 1940, it is estimated that approximately 350,000,000 gallons of creosote oil will be needed next year. This figure may be more than doubled or drastically reduced by weather conditions during the spring months.

Survey for *Parlatoria chinensis* (Marl.).--Inspections in the city of St. Louis during December, by 8 Bureau inspectors in cooperation with inspectors of the Missouri State Department of Agriculture, disclosed a heavily infested area of approximately 94 city blocks in the immediate vicinity of the Missouri Botanical Garden and Tower Grove Park. Findings indicated that the infestation is centered in or near the botanical garden and diminishes or disappears within a distance of approximately 6 blocks. Inspections of isolated points throughout the city, particularly of those places to which plants from the infested areas have been moved, or are suspected of having been moved, such as cemeteries, other parks, and nurseries, have disclosed no additional infestations, with the exception of 1 infestation immediately north of Forest Park. The scale has been taken from a number of different plants, including althea, lilac, euonymus, privet, purple leaf plum, rose, sumac, peach, flowering currant, apple, and willow. Collections do not indicate any particular plant as a favored host.

Mole cricket control.--The distribution of bait for the control of mole crickets in 11 counties in Florida was discontinued on December 14, as it was felt by all concerned that the best interest of the growers had been

served. Mixers were dismantled and stored and surplus bait materials were also stored. During the 12 weeks of operation of the project, September 25 to December 14, over 2,500,000 pounds of mixed bait was distributed from four mixing stations located at Plant City, Lakeland, Wauchula, and Palatka, Fla. Growers and county and State authorities were unanimous in their expression of appreciation for the assistance rendered in controlling the serious outbreaks of mole crickets during the fall months. Without such assistance, it is indicated that many plantings of vegetables and strawberries would have been either completely destroyed or very severely damaged.

White-fringed beetle control.--A few adult beetles of Pantomorus leu-coloma Boh. and P. peregrinus Buch, were reported still active in the field at the close of December. Clearing work, with the assistance of W. P. A. crews, went forward in various infested areas in Alabama, Florida, and Mississippi. Over 800 acres was cleared for control operations in the month of December.

Sweetpotato weevil eradication.--Summing up the situation at the close of 1940, it is found that considerable progress had been made in the eradication of the sweetpotato weevil infestations since the project was begun in July 1937, jointly with the States, in designated commercial areas of Alabama, Georgia, Mississippi, and Texas, as shown by the following table.

State	: Infested properties, 1937-40	
	: Located	: Released from quarantine
	: Number	: Number
Alabama-----	: 426	: 399
Georgia-----	: 75	: 69
Mississippi--	: 530	: 491
Texas-----	: 187	: 182

Of the total of 1,218 infested properties located in the last $3\frac{1}{2}$ years, 1,141, or 93.6 percent, have been released from quarantine as apparently free from the weevils.

Transit inspection.--Seven additional inspectors were assigned to the Northeastern States region to assist in the inspection of Christmas greens moving from the gypsy moth and brown-tail moth infested area during December. As a result of the augmentation of the regular force by these inspectors, 315 apparent violations of quarantine 45 were reported by the inspectors in this region during December. The inspection covered not only the mail, express, and freight, but the movement of Christmas greenery into the New York City markets by trucks and boats. Several mislabeled and misrepresented parcels were noted as containing material in violation of quarantine 45. Some outstanding examples were a shipment marked "artificial flowers," which was found to contain hemlock and white pine branches with cones; another labeled "cut flowers" contained holly branches, wreaths, and evergreen corsages; from a florist came a boxwood wreath which bore the statement "no inspection necessary." One case of boughs was way-billed as "case of ferns." A consignment labeled "rush, perishable fruit" contained apples and oranges attached to a balsam wreath. One carton covered with stickers reading "glass" and "fragile" was found to contain

balsam wreaths. The inspectors from all regions reported a decided increase in the movement of mail and express during the last year, with the 1940 Christmas rush showing from 12- to 25-percent increase over previous years. Additional inspectors were assigned to several points in the Southern States, and a very thorough check was maintained on shipments of peach and plum nursery stock moving from the areas infected with phony peach and peach mosaic. This special inspection was discontinued on December 21.

Citrus canker recurs in Texas.--Citrus canker was found early in December in the outskirts of Alta Loma, Galveston County, on a small Citrus trifoliata seedling. It has been nearly 6 years since the premises were first found infected, and since that time the disease has not been found there, although the place has been intensively worked each year. The current infection was located some 300 yards from the spot where the diseased tree of 1935 stood. A photograph of the old tree shows that there was a bird's nest in it and most of the canker found in the tree that year was about the nest. It seems possible that the birds might have spread the infection. All the inspectors were promptly assigned to reinspect and recheck the entire town of Alta Loma, and the W. P. A. laborers to clean vacant lots, ditch banks, and fence lines in order to expose any other small seedlings present.

CONTROL INVESTIGATIONS

Sex of cockroach influences resistance to pyrethrins.--The toxicity to adult American cockroaches (Periplaneta americana L.) of pyrethrins dissolved in refined kerosene was investigated by E. R. McGovran and E. L. Mayer and they report that the female roaches were more resistant to the pyrethrins than were the males. The kerosene solution of pyrethrins, which was prepared by the Division of Insecticide Investigations, was applied with a micropipette to the dorsal integument of the thorax between the bases of the wings, which were spread apart during the application. To each female roach 0.006 milliliter of kerosene containing the pyrethrins was applied and 0.0045 milliliter to each male. The average body weight of the females was 1.208 grams and of the males 0.913 gram. It can readily be seen from these figures that the volume of kerosene and the amount of pyrethrins applied was proportional to the body weight of each sex and at approximately the rate of 0.005 milliliter of solution per gram of body weight of the insects. When a kerosene solution of pyrethrins containing approximately equal amounts of pyrethrins I and II, and 0.5 milligram of total pyrethrins per milliliter of refined kerosene was used, 81 percent of the male roaches treated were killed, as compared with 53 percent of the females. Refined kerosene that contained no pyrethrins when applied to the roaches at the same rate caused no mortality of the males and 7 percent mortality of the females. When a solution containing 1.0 milligram of total pyrethrins per milliliter was applied, it caused 83 percent mortality of females and 100 percent mortality of males. At this 81- to 83-percent level of mortality, which was caused by 0.5 milligram per milliliter of pyrethrins on male roaches, and 1.0 milligram per milliliter on female roaches, it is evident that the female roaches were twice as resistant as the male roaches to the pyrethrins in the refined kerosene. When 0.75 milligram per milliliter of total pyrethrins was used on the males and 1.5

milligrams per milliliter was used on the females, mortalities of 92 percent and 96 percent were caused. At this high level of mortality the females appeared approximately, or possibly slightly less than, twice as resistant as the males. At a lower level of mortality, where 53 percent of the females and 67 percent of the males were killed by 0.5 milligram per milliliter and 0.25 milligram per milliliter of total pyrethrins, respectively, the lower mortality of the females at double the concentration of pyrethrins, as compared with that of the male roaches, indicates that the females were more than twice as resistant to the pyrethrins as the males.

INSECTICIDE INVESTIGATIONS

McIndoo appointed bibliographer for Division.--Because of this wide scientific training, coupled with his successful research experience of many years, N. E. McIndoo has been transferred to this Division for the purpose of pursuing library research on insecticides and related subjects. Until this transfer on December 1, 1940, Mr. McIndoo had been connected with the Division of Control Investigations. In his new assignment he will be engaged in the writing of critical reviews and the compilation of bibliographies of insecticides and allied subject matter, such as attractants and repellents. In this capacity he will abstract and digest the information on these materials found in the entomological, chemical, medical, and agricultural journals. As is well known, the published reports of tests of insecticides and their physiological effects upon insects, as they appear in their original journal articles, are published in many languages and are inadequately treated in the abstract journals, and it will be necessary for Mr. McIndoo to make a wide search of the literature. On the basis of the classified abstracts so prepared, he will publish critical reviews on the insecticidal uses of inorganic and organic materials of both plant and synthetic origin, in an effort to guide the research endeavors of the Bureau's chemists and entomologists who are striving to develop new insecticides and to improve those in current use.

Work on testing of new insecticides on goldfish transferred to Division of Control Investigations.--The toxicity tests, employing the goldfish as the test animal, of various insecticidal compounds developed by the chemists of this Division are now being conducted in the Division of Control Investigations, where similar studies are being made except that in that Division insects have always been used for the tests. W. A. Gersdorff, who was in charge of these toxicity tests while they came within the jurisdiction of the Division of Insecticide Investigations, was transferred on December 1, 1940, to the Division of Control Investigations, where he will continue his studies along this line.

BEE CULTURE

Initiation of brood rearing probably not a temperature response.--Warren Whitcomb, Jr., of University, La., reports: "Brood rearing of bees in Louisiana follows rather closely the same trends as in more northern localities and is ordinarily characterized by a broodless period during December and January. Colonies which are abnormal in some respect may continue, or initiate, brood rearing during such normally broodless periods. Feeding

tests now in progress indicate that this broodless period can be changed by proper feeding and that brood rearing may be continuous. Evidently the initiation, or cessation, of brood rearing is a food, and not a temperature response."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Wild hosts of sweetpotato weevil.--A long series of the sweetpotato weevil (Cylas formicarius (F.)), from Sunset, La., was recently received from K. L. Cockerham, of the Division of Truck Crop and Garden Insect Investigations, for verification of name. The lot is of unusual interest in that it includes specimens reared from five wild host plants, namely, Ipomoea hederacea, I. trichocarpa, I. pandurata, I. barbiger, and I. quamoclit. Although the National Collection contains a good series of the sweetpotato weevil, nearly all the specimens are either unlabeled as to host or are stated to be from sweetpotato. The need of full and accurate data on the native or wild hosts of economic insects, and the practical utility of such information in relation to control measures, is apparent, but such records are also of much value in the taxonomic study of insect groups.

Apparent extension of range of an introduced European weevil.--The European barine curculionid, Cosmobaris scalopacea (Germ.), has been known from the Northeastern States for at least 40 years, and more recently has been reported from Illinois, Michigan, and Iowa. During May 1939, P. C. Ting collected two specimens of this species near Tracy, Calif., about 50 miles east of San Francisco, on cattails (Typha). The species has been reared from the stems of Chenopodium at Hyattsville, Md., by W. H. Anderson, and has been taken from stems of Chenopodium at Huntington, N. Y., by J. C. Bridwell. In Europe it has been reported from several other genera of Chenopodiaceae, including Salsola, Corispermum, Salicornia, Suaeda, and Atriplex.

Uncommon grasshoppers occasionally found in abundance.--During the summer of 1940, J. F. G. Clarke, of this Division, made a collection of Orthoptera, in the course of general collecting in the State of Washington, which is very helpful. Numerous species are included, but especially good series of the relatively uncommon Eremiacris pallida (Bruner), Bradynotes caurus Scudd., and Asemoplus rainierensis Caud. Among the more desirable Orthoptera occurring in partially wooded or alpine areas are wingless or short-winged grasshoppers, which are sometimes found literally swarming. As many of them are poorly represented in most collections and some are significant in the classification of more economically important species, it is advisable to take advantage of opportunities when these usually rare grasshoppers may be collected in abundance. Large series, consisting of 100 specimens or more per species, for instance, are desired in studying variation.

The quill-infesting chigger of chickens.--Sylvio Torres, eminent Brazilian parasitologist, now touring in the United States, visited the Division of Insect Identification and left several samples of the South American quill-infesting chigger (Apolonia tigipioidensis Tor. & Braga) for the National collection. This chigger enters the young quill before the

terminal opening closes and continues to feed long after the feather develops, causing the latter to break off near its base. After the feather is gone, a tumor develops about the quill base, becoming very conspicuous on the deplumed area about it.

Two hemipterous predators upon the corn ear worm.--Specimens of two species of the hemipterous family Anthocoridae were recently received for identification through the Division of Cotton Insect Investigations, with the report that they had been collected on cotton in the Canete Valley, Peru, in December by B. R. Coad. A note by Mr. Coad accompanying the material stated that these insects are remarkably effective as predators upon the eggs and newly hatched larvae of Heliothis. Observations indicated that fully 95 percent of the eggs had been destroyed and that, although there had been heavy egg deposition, it was almost impossible to locate Heliothis larvae. These predators have been identified by H. G. Barber as Cardiastethus assimilis (Reut.) and Paratriphleps laeviusculus Champ. The former was originally described from Texas, the latter from Panama.

Food-plant record for a coreid bug.--James Zetek, of the Division of Fruitfly Investigations, recently submitted for determination a number of specimens of the large coreid bug, Pachylis pharaonis Herbst, which he states is very abundant on Bougainvillea glabra Choisy in the Canal Zone. Apparently this is the first record of the food plant of Pachylis pharaonis.

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ADMINISTRATION

T. H. Jones Dies

Thomas Henry Jones, senior entomologist of the Division of Forest Insect Investigations, died suddenly in Morristown, N. J., on Saturday morning, February 22. Mr. Jones was the son of Robert P. Jones and Bertha A. (Tiepke) Jones. He was born at Pawtucket, R. I., on September 25, 1885, attended the Easton, Mass., public schools, and graduated from the Massachusetts State College in 1908 with the degree of Bachelor of Science. In 1929 he married Katherine H. Alyward.

He was appointed to the Bureau of Entomology on May 26, 1909, with the Division of Truck Crops and Stored Products Insect Investigations. In 1911 he resigned from the Bureau to accept a position with the Puerto Rico Sugar Planters' Association and during the next 4 years he published seven important papers, as follows: "Experiment with Fumigant at a High Temperature," "Some Notes on Laphygma frugiperda S. & A. in Porto Rico," "Some Notes on Life History and Habits of Lauron vicosa Drury," "Additional Notes on Porto Rican Sugarcane Insects," "Aphides or Plant Lice Attacking Sugarcane in Porto Rico," "The Sugarcane Moth Stalk Borer," "The Sugarcane Weevil Root Borer," "Report of Porto Rican Board of Commissioners of Agriculture for 1914," "Eggplant Tortoise Beetle," "Sweet-potato Leaf Folder," "Notes on Anasa andresii Guer., an Enemy of Cucurbits," and "A List of Coccidae of Porto Rico."

In 1914 he was reappointed to the Division of Truck Crop Insect Investigations and assigned to work in Louisiana. In 1920 he again resigned from the Bureau, this time to accept the position of entomologist for the Louisiana Agricultural Experiment Station at Baton Rouge. After 4 years in this capacity he returned to the Bureau in January 1924 to carry on investigational work on introduced parasites of the gypsy moth at Melrose Highlands, Mass. He continued in this capacity until 1935, when he was assigned to research work on the beetle vectors of Dutch elm disease. At the time of his death he was assistant to the entomologist in charge of the research laboratory carrying on these investigations.

Mr. Jones is survived by his wife, his mother, and a brother.

EDITORIAL OFFICE

Memorandum No. 3. Illustrations

Illustrations, as used in Department of Agriculture publications, are distinctly functional; they must justify their presence by serving a useful purpose, although some of them are also decorative. Therefore, in selecting illustrations for use in a new bulletin or other publication the first point to decide is whether the photograph, drawing, map, or chart will help to convey the message to the reader.

Most of our illustrations are printed from either line etchings or halftone plates. A few, such as the covers for Farmers' Bulletins and Leaflets, may involve a combination of both kinds.

Line etchings reproduce the illustrations very much as they are. They are used for printing drawings, maps, and charts, which consist of black lines on white backgrounds. The etching is usually made on zinc, but if a drawing contains very fine lines that must be brought out clearly the etching may be made on copper.

Halftone plates are used for printing reproductions of photographs, wash drawings, and other pictures that contain broad monotone areas and gradations (or halftones) between white and black. The process involves the use of a screen, which breaks up the continuous surfaces into small dots on the plate. The screen is a plate of fine glass which has very fine lines across it in two directions. The fineness of the screen may range from 60 lines per inch for rather coarse work to 200 or more lines per inch for superfine work. Halftone plates are generally made on copper.

As the halftone reproduction of a photograph is generally a little less clear than the original, care should be taken to select the best print available. A contrasty print is better than a hazy one and, as a rule, a print on glossy paper is preferable to one on matte paper. If the print is not particularly good, it is advisable to submit the negative also, or to make sure that it will be available if needed. Sometimes an expert can make an acceptable print from a weak negative by using special paper and technique.

Prints should not be mounted by pasting. They may be submitted loose, in which case each print should be identified by marking it on the back with a pencil, very lightly, so that the marks will not show through. The use of paper clips should be avoided, since they are likely to damage the prints. Perhaps the best way to submit a print is to attach it to a sheet of paper by inserting its corners into diagonal slits cut in the paper. If some part of a print is to be omitted, it need not be trimmed off; the part to be left out may be indicated by a notation on the paper. A copy of the legend should appear below the print.

When photographs for reproduction in a publication are being taken, especially in the case of indoor views of pieces of apparatus, the technique of a portrait photographer can well be followed. A number of poses

of the model or apparatus should be photographed with varied lighting and from different angles and with different exposure periods. Time of exposure is such a constant factor with the modern portrait photographer that he does not need to experiment, but with the entomologist working only occasionally with the camera and using different light sources and frequently taking pictures in which detail in dark cavities is of importance, a number of different timings are of great value in obtaining a good picture out of several trials. Proper lighting is of special importance with glassware. In any case, if after a number of pictures have been taken a really fine one has not been obtained, it is better to take some more rather than submit a poor photograph.

When a writer or artist is preparing a drawing of an insect or some other object for publication, he should take into consideration the size of the space that will be available for the illustration. The printing space in our bulletins is $4\frac{3}{8}$ inches wide and $7\frac{1}{2}$ inches high. As some of this space must be used for the legend below the figure, the maximum of space for the cut is likely to be about $4\frac{3}{8}$ by $6\frac{1}{2}$ inches, or about $7\frac{1}{2}$ by $3\frac{3}{4}$ inches, if the cut is placed lengthwise on the page. If the drawing is to be rather large, the lines in the drawing must be made heavy enough so that they will be clear when the reduction is made. Drawing ink must be used, since common inks do not reproduce well. Lettering should be indicated lightly with a pencil, to be inked in later by draftsmen who specialize in this line of work.

Although the printer insists on having the original drawing for making a cut, there is a distinct advantage in having it photographed. The prints not only serve as records of the drawings, but they can be sent with the manuscript to reviewers; thus excessive handling of the originals may be avoided.

The consideration of size and necessary reduction is especially important in connection with maps and charts, because there is often a tendency to make them rather large. In many cases charts measuring 24 inches or more across could be made just as well, or perhaps better, half as large. The main difficulty about a very large chart is the danger that after the chart has been reduced to fit the space available some of the lines may be too faint or too close together. Charts and maps need not be submitted as finished products. They may be submitted as pencil or ink sketches, from which the draftsmen in the Office of Information can make the finished drawings.

Sometimes a number of closely related drawings or photographs may be presented more effectively by combining them in one figure. When a figure in a Department publication consists of two or more separate prints or drawings, the parts are designated by italic capitals (sloping capital letters), whereas details in a print or drawing are designated by italic small letters (lower-case script). As a rule, the parts of a composite figure should be submitted unmounted and without the letters. They should, of course, be marked to identify them. They may be accompanied by a sketch showing the desired arrangement.

When an author has a considerable number of small prints or drawings that should be combined into composite figures or plates, he can often save himself and others much labor and trouble by consulting one of the editors about grouping, arrangement, and reduction, before he submits the material for publication.

If a drawing or print should be neither reduced nor enlarged, it should be marked to show that it is to be reproduced exactly the same size as the original.

The legend of a text figure should be included in the manuscript, as a separate item, following the paragraph which contains the first important reference to it. Occasionally we find the legend inserted in the paragraph according to the rule for footnotes. However, there is no need or excuse for applying the footnote rule to legends, since the position of the figure in the publication cannot be determined until the page proof is being made up, and in many cases it is not possible to place the figure on the same page with the reference. The legend should be double spaced, like other copy.

Sheets of paper on which the drawings or photographs for the illustrations of a manuscript are mounted, or to which they are attached, should not be numbered as folios of the manuscript and all should be placed together at the end of the manuscript.

In case a figure is to be printed from a cut used in printing some other publication of the Department, the picture may be cut out of the older publication and pasted on a sheet of paper. This should contain the legend, and also a notation showing the old figure number and the publication from which it is to be lifted. The sheet can then be inserted in its proper place in the manuscript. In the case of a figure in some old publication that should not be cut, the figure may be identified by means of a photographic print of the original, or even a print of the figure as published.

In our publications the term "plate" is applied to an illustration that is printed separately and inserted in the publication afterward. Usually the plate is a halftone, of rather fine screen, printed on calendered (or coated) book paper. The legend for a plate should accompany the photograph, but it should not be inserted in the manuscript, since the plate legend is not set in type until after the engraver's proof of the plate has been approved.

FRUIT INSECT INVESTIGATIONS

Local differences in fig spoilage.--Perez Simmons, of the Fresno, Calif., laboratory, reports that figs of the Adriatic variety, which do not require caprification, are subject to infestation by the dried fruit beetle (Carpophilus hemipterus (L.)); to souring, which appears to be predominantly the result of inoculation by insects, chiefly the dried fruit beetle; and to other defects, usually of lesser importance. During the harvest of 1940 two adjacent blocks in a large planting near Fresno showed

marked differences in spoilage and, as both blocks appeared to be equally exposed to invasion by the dried fruit beetle, a survey was made from August 30 to November 4 in an attempt to explain the conditions. The work was done by Dwight F. Barnes and George H. Kaloostian. Traps baited with fermenting dried peaches took 30 beetles per trap per day in block A and 167 per trap per day ($5\frac{1}{2}$ times as many) in block B. Samples of fallen figs from block B, examined during harvest, contained 7 times as many figs infested by larvae and adults of nitidulid beetles and 32 times as many sour figs as did samples from block A. General observations have indicated that fig trees which are supplied with abundant soil moisture produce long annual growth of branches, heavy dark-green foliage, and succulent fruit which is likely to become infested and sour in years when dried fruit beetles are plentiful. In contrast with the fruit on less favored trees, the figs on such trees appear to mature more slowly and therefore remain for a longer period in a condition favorable for infestation and souring. Examples of these contrasting conditions were found in block A, where the trees were in average condition, and in block B, where most of the trees were more thrifty and where the spoilage was greater.

MEXICAN FRUITFLY CONTROL

No larval infestations found in January.--Adult Mexican fruitflies (*Anastrepha ludens* Loew) were trapped on 102 premises in the regulated area in January. At this season of the year it is not unusual for fruitflies to be taken throughout the area, even though no larval infestations are known to exist. Many hours of intensive grove inspection in each of the several districts of this area failed to uncover any infested fruit in the groves. For the second consecutive month excessive rainfall occurred over most of the area. On January 27 rainfall ranging from 4 to 9 inches was recorded in the lower valley. Frosts occurred on two mornings and severely damaged tender vegetables but did no material harm to citrus. More fruit was certified for shipment from the regulated area in January than in any other month this season. Shipments for the month amounted to 5,268.4 equivalent carlots and for the season have reached the all-time high for this date of 17,330.0 equivalent carlots.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Baits for Mormon cricket.--J. R. Parker, Bozeman, Mont., reports that during the season of 1940 this Division cooperated with the Division of Domestic Plant Quarantines in conducting tests of the following Mormon cricket baits in Idaho, Nevada, and Oregon: (1) Straight bran bait, as compared with a mixture of 1 volume of millrun bran and 3 volumes of sawdust; (2) baits containing water versus baits in which oil was substituted for water; (3) strip baiting, against complete bait coverage. According to Frank T. Cowan, Bozeman, straight bran bait gave better results than did a mixture of millrun and sawdust, particularly during early season baiting when conditions were not at the optimum for cricket feeding. An oil bait consisting of 100 pounds of standard bran, 4 pounds of sodium fluosilicate, and 2 gallons of low-grade motor oil having a viscosity of S.A.E. 20 proved equally effective in preliminary plot and field tests as a similar bait in which 15 gallons of water was included instead of the oil. The motor oil cost 60 cents per gallon, making it too expensive for practical use.

In later tests 1 gallon of industrial lubricating oil costing 15 cents per gallon was used with equally good results. A total of approximately 800 acres was treated with the industrial oil bait, with resulting kills of 85 to 95 percent. Oil baits were spread satisfactorily by using power mechanical bait spreaders and airplanes. Oil baits have several important advantages over wet baits. They can be mixed in advance at central mixing stations and can be held in storage without deterioration until needed. Mixing can also be done at points where water is not available, an important consideration in many western localities. Mixed oil bait can be transported at about half the cost of water bait and spreading machines and airplanes can operate for a longer period without refilling. Strip baiting of light and medium infestations was found as effective and more economical than complete bait coverage. In light infestations of 3 or less crickets per square yard a 30-foot strip was baited and a 90-foot strip between strips was left unbaited. In medium infestations, of 4 to 10 crickets per square yard, a 30-foot strip was baited and 30 feet between strips was left unbaited. Complete coverage was found desirable for infestations of 10 or more crickets per square yard.

Grasshopper outbreaks and development of control methods in last 100 years.--Mr. Parker also states that during the conference on grasshopper and Mormon cricket control held at Denver, Colo., on November 7 and 8, he reviewed the history of grasshopper outbreaks and the development of control methods during the 100-year period 1841 to 1940. In the Great Plains, the Rocky Mountain, and Plateau regions peaks of abundance have occurred at approximately 10-year intervals for the area as a whole, and with less regularity in individual States. The most severe outbreak periods were from 1862-77, 1910-25, and 1930-40. Each of these periods include 2 fairly well defined peaks, with only a slight decline between them. In other words, 2 of the more usual 10-year cycles merged to form 1 long, extended outbreak. States in which the greatest numbers of outbreaks occurred were: Montana 50, 25 severe, 25 less severe; Minnesota 50, 18 severe, 32 less severe; Nebraska 48, 21 severe, 27 less severe; Colorado 47, 21 severe, 26 less severe; North Dakota 42, 18 severe, 24 less severe; South Dakota 41, 24 severe, 17 less severe; Utah 41, 13 severe, 28 less severe; Kansas 40, 26 severe, 14 less severe. The frequency, duration, and distribution of outbreaks is related to annual rainfall. Outbreaks occurred more frequently and lasted longer during years when precipitation was below normal and outbreaks were most common in zones where the normal annual rainfall was 10-30 inches. Adjacent regions having a normal precipitation greater than 30 inches experienced outbreaks during drought periods when precipitation dropped below 30 inches for several years in succession. Important developments in grasshopper control took place during each of the 3 major outbreak periods. Its first recognition as a National problem was in 1877, when Congress created the United States Entomological Commission to study the Rocky Mountain locust. Control measures developed at that time consisted mainly of plowing to destroy eggs and the use of hopper-dozers and catching machines against nymphs and adults. During the outbreaks from 1910 to 1925, recognition by State governments of the need for county governmental action in grasshopper control was made in a number of States which passed laws authorizing county authorities to create pest districts and to appropriate money for the control of grasshoppers and other insects. Although poisoned-bran bait was used in California in 1885, it was not used

successfully on a large scale until 1913, when Kansas entomologists organized farmers in many counties and prevented serious crop losses through extensive baiting. Later in the same period, volunteer county and community organizations were developed in Montana for the application of bait purchased with county funds and operated very successfully for several years. During this period, amyl acetate was substituted for the more expensive citrus fruits used in the Kansas bait formula without loss of effectiveness, and the importance of scattering bait when air temperatures were favorable for grasshopper feeding was discovered. Important advances made during the outbreak period which began in 1930, and is still in progress include: Recognition by Congress of the need of Federal appropriations in controlling regional grasshopper outbreaks; cooperation of State and Federal agencies in conducting control campaigns; more intensive educational and organization drives prior to actual control operations; development of survey methods to predict where outbreaks will occur and to estimate the cost of control; further reduction in the cost of bait without loss of efficiency; and the greatly increased use of mechanized devices for more rapid and effective mixing and spreading of bait. Even though great advances have been made in grasshopper control during the last 100 years, there has been no marked decrease in the frequency and duration of outbreaks. The millions of dollars spent for control have yielded extremely high returns in crops saved, but in most instances have not terminated any outbreak. The opinion is expressed that present conditions are more favorable for grasshopper increase than in the early development of western agriculture, and that outbreaks may be expected whenever climatic conditions are favorable. The high return on the money and effort invested in this work indicate the unquestionable desirability of continuing grasshopper control from a crop-protection standpoint. Although the complete prevention of outbreaks seems hopeless, it is believed that serious effort should be continued to prevent mass movements of migratory species. The great advancements made in control during the present outbreak encourage the belief that both of these objectives can be more completely obtained in the future.

Most white grubs in Wisconsin are below plowing level for long periods.--T. R. Chamberlin and Lee Seaton, Madison, Wis., submit a table in which the percentages were obtained by summarizing data as to the depths at which white grubs were found during the period 1935 to 1940, inclusive. Grubs considered here were all those taken in diggings 20 inches deep, or more. The percentages of grubs in sod and above the 10-inch level from 1935-40 in southern Wisconsin were as follows:

Month	Grubs in sod	Grubs above 10-inch level
	Percent	Percent
March-----	0	0
April-----	4.4	19.0
May-----	43.3	61.6
June-----	59.9	83.6
July-----	92.9	97.6
August-----	92.2	97.6
September-----	76.6	89.4
October-----	13.0	27.7
November-----	.4	11.7
December-----	1.7	5.1

These facts are of value in estimating the possible effects of plowing at various times of the year. It may be noted that the maximum proportion of grubs, about 92.5 percent, were located in the sod in July and August and that the maximum proportions were above the 10-inch level in June, July, August, and September. The actual proportion within reach of the plow is intermediate between the two percentages given for each month, as plowing is usually about 6 inches deep. As the data indicate, all the grubs that ascended to the sod did not reach it until July and there was some descent from the sod in September, although the descending grubs did not get below the 10-inch level in considerable numbers until October. It is known, however, that there is a difference in the time and rate at which grubs begin descent in different years and in different fields the same year, so that sometimes many grubs are out of reach of the plow by mid-September. Assuming that all grubs above plow level were killed by plowing, about 90 percent would be killed in July and August, with somewhat less in June and September. Control of grubs, however, does not depend solely on the grubs being within reach of the plow. It has been observed that when the soil is moist and cool, as is frequently the case in the spring and fall, grubs not crushed by the plow easily burrow into the moist soil and escape, but when the soil is hot and dry many uncrushed grubs die before or shortly after digging in.

Introduced parasite of bruchids recovered in year of release.--L. P. Rockwood, Forest Grove, Oreg., reports that Triaspis thoracicus Curtis, a European hymenopterous parasite of various species of bruchids, which was imported from France and multiplied by breeding in the Division of Foreign Parasite Introduction, was released in considerable numbers in Oregon in the period May 29 to June 5. Approximately 3,600 females were released on plots of peas at Forest Grove. Samples of peas from these plots, taken in July and August, showed parasitization of the pea weevil by this species to be as high as 4 percent in some cases. Adults of T. thoracicus emerged from this material from July 16 to October 16, but most of these emerged in July and August. Weevil larvae usually were killed early in stage 4, hence the cavity caused by the feeding of the bruchid was much smaller in peas from which Triaspis emerged than was the case when the parasitization had been by Bruchobius mayri (Masi), which kills the bruchid in a later stage. Whether or not T. thoracicus can survive the winter remains to be determined.

Tests of nozzle position in row-crop equipment.--C. H. Batchelder, New Haven, Conn., says that in reviewing the data and analysis from experiments conducted during the season of 1940 to determine the most effective nozzle arrangements for duster and sprayer booms, several items of interest were found. These experiments were designed to determine (1) whether general residue coverage on the plant was necessary, and (2) what restricted parts of the plant may be treated with an expectancy of maximum borer reduction. Row-crop dusting and spray equipment is fitted with a boom which serves to hold nozzles in position for treating row-planted crops continuously and on the assumption that the nozzle discharge will deposit residues at the desired points on a majority of the plants. When general coverage is desired, this is accomplished by simply directing the nozzle discharge downward in the direction of the row-planted crop, resulting in general enveloping of the plants in a spray or dust fog. For the purpose of restricting insecticide deposit to the locality of the ear-shoot of corn, it is

necessary to lower the nozzle to a point lateral to and just above the ear shoot. In this position the nozzle discharge is directed slightly downward at the ear shoot and in the same plane that the shoot is projected from its stalk. This is necessary in order to avoid the "umbrella effect" of overhanging leaf blades, and the resulting deposit is laid in a "band" along each side of the row. These two methods of nozzle adjustment were compared during the season of 1940 with both duster and sprayer equipment, the experiments being in repetition of similar tests conducted during 1939. The experiments of 1939 and 1940 differed essentially in that climatic effects on plant growth in 1940 resulted in so retarding development that only one, lateral, or ear-shoot application was made, as compared with two in 1939. Whorl applications were directed straight downward in both methods of treatment. Two standards of comparison were employed in these tests, i.e., (1) no treatment and (2) hand-directed, single nozzles. The most effective adjustment of nozzles on the boom of mechanically operated row-crop sprayers and dusters has been a subject of special inquiry during the last 3 years. Information of this kind is necessary to complete recommendations for large-scale insecticide applications, and no comparative tests had previously been made. Moreover, some confusion has prevailed as to which location on the corn plant leads to greatest effectiveness of insecticidal residues. On the theory that migrating first-instar larvae are impeded mechanically by surface residues, some investigators have attempted "general coverage" of the plants and for this reason have adjusted nozzles to discharge from above the plants. On the other hand, there appeared to be some logic in the assumption that only the points of borer entrance into the plant require protection. If such is the case, only "spot" applications are necessary. The results of these tests confirmed those obtained during the similar experiments of 1939 in that nozzle arrangements providing lateral discharge at the ear shoots gave significantly better protection of the ears than when nozzles were adjusted for overhead discharge and general coverage. In tests of spray-nozzle adjustment the use of two nozzles per row, placed laterally, were found to provide as much protection as when a third nozzle was added in an overhead position, and both of these nozzle arrangements were found to be superior to an arrangement of three nozzles all placed above the plant (overhead position). Nozzle arrangements supplying lateral discharge were found to be as effective as hand-directed applications. Tests of duster-nozzle arrangements were similar to those described above, except that two nozzles were used per row instead of three. The lateral position of the nozzles during ear-shoot applications was also found superior to an overhead arrangement. Further details in connection with these experiments have been assembled for a special report.

Relative resistance to establishment of European corn borer larvae in sweet corn.--Morris Schlosberg, Toledo, Ohio, says that in summarizing the results obtained in from 4 to 6 years of testing (1935-39), at Toledo, Ohio, using composite samples of seed, the Bantam inbred strains Michigan 1828, Minnesota 26-34, Iowa 45, and Iowa 9 showed respective larval populations which were 41.0, 36.2, 26.9, and 44.4 percent lower than the averages expected for their conditions of test; whereas the inbred strains Purdue 14, Purdue 39, and Purdue 51 showed respective larval populations which were 0.5, 3.6, and 13.8 percent above their expected levels of population. This established the former group as relatively resistant to the survival of the

larvae, and the latter group as of approximately average effect. Hybrid combinations of the strains mentioned above were tested in 1940. Comparing the performance of the relatively resistant inbred strains Michigan 1828, Minnesota 26-34, Iowa 45, and Iowa 9, when commonly crossed on the inbred strains Purdue 14, Purdue 39, and Purdue 51, the 4 respective groups of single-crosses showed average larval populations, which were 31.2, 35.0, 33.8, and 22.5 percent below the group average for the 3 possible hybrid combinations of the common inbred parents Purdue 14, 39, and 51, giving evidence that the relative resistance inherent in the inbred lines considered was transmitted to the hybrid strains containing them. Comparing the group performance when the relatively resistant inbred strains Minnesota 26-34, Iowa 45, and Iowa 9, respectively, were crossed on the average performing inbred strains Purdue 14, 39, and 51, and the relatively resistant inbred strain Michigan 1828, the group containing Michigan 1828 as a common parent showed 11.8, 28.6, and 15.1 percent fewer borers than the respective groups containing Purdue 14, 39, and 51 as common parents, showing that the inclusion of 2 relatively resistant inbred parents in the composition of the hybrid tended further to increase its resistance to the survival of the larvae. Summarizing these results, on an average basis, the hybrid combinations containing 2 relatively resistant inbred parents in their pedigree showed the lower levels of larval populations; those containing a relatively resistant inbred parent and an inbred parent of average performance in their composition showed intermediate levels of larval populations; whereas, those composed of 2 inbred parents of average performance showed the higher levels of larval population, clearly indicating the presence of the resistance trait in certain of the inbred lines, the capability of its transmission into hybrid combinations, and the accumulative character of its effect. As the results are only for a single reason, the relative degree of effect in hybrid combination are more qualitative than quantitative in their indication.

Field status of parasites of summer generation of European corn borer in southeastern Massachusetts and central Connecticut.--C. A. Clark and S. W. Carter, Moorestown, N. J., state that a corn-borer parasite survey was conducted at two biological-control-study localities (Taunton, Mass., and East Hartford, Conn.) during the summer of 1940. The exotic parasites recovered in the southeastern Massachusetts survey were Inareolata punctoria Roman, Lydella grisescens R. D., Chelonus annulipes Wesm., and Macrocentrus gifuensis Ashm. The first 3 species were also recovered from central Connecticut. A total of 843 borers from southeastern Massachusetts were observed for parasitization. Of this number, 222, or 26.3 percent, were parasitized by the polyembryonic Macrocentrus gifuensis, 66, or 7.8 percent, by Lydella grisescens, 44, or 5.2 percent, by Inareolata punctoria, and 5, or 0.6 percent, by Chelonus annulipes. Of the total number of borers in the collections, 337, or 40 percent, were parasitized by the introduced parasites named above. The total parasitization of the borers in the same locality on the summer generation of 1939 was 26.1 percent. In central Connecticut the survey covered 63.6 square miles, and 35.6 percent of the borers observed were parasitized. By far the most important parasite was Inareolata punctoria which accounted for 93.6 percent of the parasitization recorded for this locality. L. grisescens has spread westward and was found principally on the west side of the Connecticut River and in a narrow strip on the east side of the river opposite the City of Hartford. Parasitization of the borer by this tachinid remains low. One

specimen of C. annulipes was recovered from central Connecticut. This species was released here in the spring of 1939.

Domestic collection of corn borer parasite material.--C. A. Clark, Moorestown, N. J., reports that during November 1940, N. J. Nerney collected overwintering corn borer larvae in southeastern Massachusetts from which to rear parasites. Collections were made in the area in which the four exotic parasites, M. gifuensis, L. grisescens, I. punctoria, and C. annulipes are well established. It is expected that large numbers of the first parasite listed above and smaller numbers of the other 3 parasites will become available in 1941 as a result of these collections. Approximately 18,000 overwintering corn borer larvae were collected, shipped to the Moorestown, N. J., corn borer laboratory, and placed in cold storage at 35° F. Similar collections of parasite material are in progress in central Connecticut, where I. punctoria is particularly abundant. The tachinid L. grisescens will also be obtained from this source.

Dawson fly-resistance factors isolated.--According to W. B. Noble, Sacramento, Calif., tests made at the Sacramento laboratory during 1940 indicate the successful isolation and differentiation of the two factors for fly resistance that occur in Dawson wheat.

JAPANESE BEETLE CONTROL

Results of fumigation tests reported to grower.--Reports from the Division of Control Investigations indicate that approximately two-thirds of the varieties of perennial plants fumigated with methyl bromide at Mentor, Ohio, and transported to the Bureau's field laboratory at Sanford, Fla., for growing on have survived in such numbers as to indicate that their fumigation under commercial conditions is practicable. A conference was held by Randall Latta, of the Division of Control Investigations, and V. A. Johnson, of the Division's treating section, with the grower who furnished the material. The grower seemed very optimistic about the results, even though they were not as good as he had thought from his personal observations while on a visit to Florida. Six plants of each variety were tested and the observations based solely on the number of plants that grew. All 6 plants of 437 varieties survived, or 47.9 percent of the total varieties tested. Four or 5 plants of an additional 179 varieties, or 19.6 percent, grew. These 2 groups, comprising 67.5 percent of the varieties tested, may be considered tolerant to the methyl bromide fumigation. A third group, in which only 1 to 3 plants survived, involved 159 varieties, or 17.4 percent. There was complete mortality among 137 varieties, or 15.1 percent. Thus, results were unsatisfactory with 296 varieties, or 32.5 percent. After checking over the individual varieties in the last 2 groups, the grower expressed the opinion that the majority of these suffered injury from causes other than methyl bromide. Additional tests with the plants in the last 2 groups will be made on the grower's premises about the first of April and the plants set out there for observation. It is anticipated that many of these will be found tolerant to the fumigant when tested under more normal conditions.

Growers cooperate in use of fumigation chambers.--A fumigation chamber owned by a South Jersey nurseryman was moved during the month into a greenhouse of another establishment, where azaleas had been heeled in for

the winter. A suitable temperature was maintained in this location for the fumigation of azaleas owned by 1 firm and spirea roots for the other. Fifteen hundred Azalea indica were fumigated in this box during the month. The superintendent of an estate on Long Island also utilized this method for obtaining certification of cineraria plants in bloom to be shipped to the estate owners wintering in Florida. A large hydrangea grower in the Maryland area treated 9,078 hydrangeas with methyl bromide for shipment to points outside the regulated area and also fumigated 8,350 miscellaneous nursery and greenhouse plants for 2 other growers, both of whom report no bad effects from the treatment. These 2 growers expect to build their own fumigation chambers before spring. A farmer at Girdletree, Md., offered for inspection 7,200 listrus roots and 1,430 hard gip roots. After close examination it was found that both types of roots were filled with cavities, thus making inspection impossible from the standpoint of labor and time involved. These roots were fumigated with methyl bromide by a nearby strawberry plant shipper. The fumigation charge was much less than the cost of hand cleaning and inspection. These roots were shipped to Florida for planting on a farm operated by the owner of the roots.

Plant shipments during January.--A total of 503,991 plants was shipped from the Delaware area during the month, a slight increase over the preceding month. This was due to the movement of roses from 1 large establishment. Another establishment also shipped during the month, mostly boysenberry plants. This firm expects to start shipping canna roots in February. Of this total, 10,350 plants were fumigated with methyl bromide. On the Eastern Shore of Maryland and Virginia practically all nurserymen dug stock for storage when weather permitted. The stock was graded, cleaned, and inspected prior to placing in certified storage rooms. A grower in the Philadelphia area shipped pansy plants that were dug in the fall before the ground froze. After most of the soil was removed, the plants were placed in trenches similar to those used in storing celery. With heavy paper and soil they were protected from ice and snow. Now they can be readily lifted for immediate shipment. This appears to be a satisfactory method since the plants show little injury.

Substitutes for Dutch bulbs.--Nursery and greenhouse inspectors report that azaleas are moving exceptionally well. Growers of this plant report as high as 66 percent increase in sales, owing to the fact that no bulbs can be imported from European countries. A recently classified establishment in South Jersey, after treating the floor of their greenhouse with naphthalene and fumigating their potting soil, started 50,000 petunias from seed. Approximately 25,000 of these were potted in 2 1/4-inch pots for the Easter trade outside of the Japanese beetle regulated area. This firm expects to start shipping in February. A large-scale grower in the Philadelphia area is growing more lilies and hydrangeas, as well as azaleas, to make up for the shortage of foreign tulips and hyacinths.

Demonstration of fumigation chamber.--The Division's portable methyl bromide fumigation chamber was taken to a large establishment at New Brunswick, N. J., for testing roses and a few varieties of perennials. Roses fumigated were mostly of the New Dawn variety. These were fumigated and put back in storage to be planted out this spring for observation. If the test is successful a further check run will be made this spring. Heretofore

these roses have been made eligible for certification by washing the soil from the roots. This has caused some injury. If the fumigated roses show no ill effects, this firm will construct a gas chamber and fumigate all plants for which they desire certification.

Lumber sales corporation purchases hurricane lumber.--Word was recently received at the Waltham, Mass., gypsy moth headquarters that a lumber sales corporation, with headquarters in Boston, has purchased from the Government all of the softwood hurricane lumber in New England. The quantity involved is approximately 425,000,000 board feet. The company has set up seven assembling points for the milling and shipping of lumber, five of which are located in central and southern New Hampshire, one in southern Maine, and one in central Massachusetts. In addition to the above, there are two assembling points for the loading of rough lumber in central New Hampshire. Lumber is being hauled to these points from a radius of 60 to 100 miles. This corporation has not had an opportunity to arrange a storage point in the States of Connecticut and Rhode Island where there are 17,000,000 feet of hurricane lumber. No accurate figures are available as to the total amount of this lumber that will require actual piece-by-piece inspection, as this will depend on the type of milling, length of storage, and exposure to gypsy moth infestation. It is probable that at least 40 percent of the lumber will require such inspection. Shipment of the lumber from the storage points is to be spread over a period of 2 years.

Hurricane lumber inspected.--One temporary inspector was employed during January for the purpose of assisting with lumber inspection at Concord, N. H., where a lumber company has purchased approximately 4,000,000 board feet of hurricane lumber from the Government. This concern ships about four carloads, or 80,000 board feet, per day. As this lumber was cut more than 2 years ago and was exposed to gypsy moth infestation during the egg-laying season of 1940, each individual board must be examined prior to loading on the cars. The increased demand for lumber in the present emergency is shown by a comparison of shipments made in 1940 and 1941. In January 1940, 5,083,625 board feet were inspected and certified for shipment from the gypsy moth regulated areas. In January of this year, 9,559,875 board feet, or an increase of nearly 100 percent, were inspected and certified.

Bark-beetle distribution in eastern Pennsylvania.--Bark-beetle population appears to be heavy along the Delaware River lowlands in Pike County, but in other portions of the county thus far covered it is reported as light. In Monroe County Scolytus multistriatus Marsh. seems to be rare in the highland, with a light infestation of Hylurgopinus rufipes Eich. occurring at points approximately 5 miles west of the Delaware River in the mountainous section. The portion of Northampton County which lies in the outer disease zone has a heavy beetle population. Beetles are comparatively scarce in Lehigh County, as a large portion of the county is considered elm-free. Bucks County has a heavy beetle population in the areas along the Delaware River as far south as Morrisville, where it begins to lighten considerably. Beetles are plentiful in Montgomery County along the creeks in the northwestern part of the county, with medium infestation throughout the remainder of the county. A light infestation has been

reported from the Roxborough section along the Schuylkill River, in Philadelphia County. Medium infestations were found in the approximate center of the work area in Chester County, with light infestations in the remainder of the county. In Delaware County infestation is medium in two areas in the center of the county and one area in the southern part. In the portion of Berks County covered to date, a medium beetle population was found in four areas along the Schuylkill River below Reading. Two adjoining areas which lie along the Montgomery County line showed a very heavy infestation, owing to a number of fallen trees and hangers caused by a local storm which struck this area last summer. An elm eradicated in the southwestern part of Hanover Township, Luzerne County, was found to contain galleries from which H. rufipes had emerged. Signs of this beetle are very rare in this vicinity, and none has been found alive.

Elm girdling handicaps operations in Ohio.--Deliberate girdling of elms in the Athens, Ohio, detached Dutch elm disease area continues to hamper sanitation activities in that section. It is estimated that approximately 75 percent of the work performed in the Athens area is due to girdling by farmers, who know that project workers will be obliged to remove girdled trees. Ten of the 16 infected elms discovered in Athens County during 1940 were girdled. Each of 3 confirmed trees discovered in Lodi Township of this county last December had been girdled by the property owners after the beetle-material scouts had completed tagging trees in the area. In each instance the disease proved to be a 1940 infection. One tree was heavily infested with Scolytus multistriatus, with most of the beetles already emerged. No beetles of either species were found in the other two elms, as they were still too green for successful entrance.

Survey ice-storm damage in New Jersey and Pennsylvania.--A survey conducted throughout the New Jersey and Pennsylvania work areas, to determine the extent of damage caused by the ice storm of January 16 and 17, showed very little breakage in elms. The damage observed was confined largely to 1- to 3-inch branches. In New Jersey approximately 75 percent of the broken elm material was on the ground. This condition will reduce climbing considerably during sanitation operations. In Union County, N. J., storm damage is general, making it necessary to rescout the entire county for potential beetle material.

Beetle-material scouting completed along Susquehanna.--Scouting for beetle-infested or potential beetle material along both sides of the Susquehanna River from the Town of Falls to the City of Berwick was completed in the Wilkes-Barre, Pa., detached area. This scouting has afforded an accurate check on beetle conditions along the river for a distance of approximately 30 miles below the city of Wilkes-Barre, and about 20 miles above the city. The number of elms found to be infested along the river was small, but a large amount of potential beetle material was tagged.

Precautionary measures in Binghamton, N. Y., area.--An effort is being made to complete the removal of all elm material containing infestations of elm bark beetles, or likely to become so infested, along the banks of the major streams and rivers in the Binghamton area before these

streams reach the flood stage in the spring. The purpose of this is to eliminate the possibility of this material being carried down stream and bark beetles from the infected zone emerging in noninfected areas.

FOREST INSECT INVESTIGATIONS

Chemical-injection experiments with living elms.--R. R. Whitten, Morristown, N. J., has summarized experiments conducted during the last 5 years on the internal application of chemical solutions to living elm trees. The principal purpose of the tests was to develop an efficient and economical means of killing woodland elms without subsequent attack by bark beetles. An effective method of application has been developed and good results have been obtained with sodium arsenite, cupric chloride, cupric nitrate, ammonium bifluoride, and cupric sulfate. It was possible to get the allotted dosage into a tree during every month of the year, provided the solution did not freeze. However, only in those months in which elms are in foliage was it possible to obtain good distribution of the solution through the tree. During the dormant season some of the solutions moved into the stump and roots but did not rise more than 15 feet above the point of application. In the first 2 weeks of the foliar season the movement was very rapid but for the most part upward. Such rapid upward movement often led to poor treatment of the stump and roots, and when certain chemicals were used sprouting occurred below the point of treatment. During the latter part of the foliar season the solutions moved upward and downward satisfactorily. The distribution of the chemical within the tree was determined in the case of trees into which cupric sulfate and sodium arsenite solutions were injected. This was accomplished by analyses of increment core samples, leaves, and small twigs. The outstanding results of these analyses were as follows: (1) There was no correlation between concentration of chemical and bark-beetle attack; (2) from 80 to 90 percent of the chemical was found in the outer $\frac{1}{2}$ inch of a radial increment core; (3) during the first month after treatment an average of 38 percent of the chemical was in the bark and 1 year after treatment this average had increased to 57 percent; and (4) a considerable portion of the chemical was lost in the falling foliage. In the case of trees treated with the heavier dosages of sodium arsenite solution there was enough of the chemical in the falling leaves to kill the succulent undergrowth. Sodium arsenite was the most effective chemical used in the experiments. The minimum effective dosage of the commercial concentrate containing 6 pounds of arsenic trioxide and 2 pounds of sodium hydroxide was found to be 0.06 cc. per square foot of bark area. One half this dosage readily killed elm trees and reduced the subsequent bark-beetle development from 90 to 95 percent over corresponding checks. When applied in dosages of from 0.03 to 0.06 cc. per square foot of bark area the sodium arsenite concentrate did not appear to be repellent to bark-beetle adults, as did the other effective chemicals used; however, it was toxic to the bark-beetle brood. The most objectionable quality of sodium arsenite is its high toxicity to man and animals.

Penetrating sprays in whitebark pine.--The possibility of using penetrating sprays as a means of controlling the mountain pine beetle in whitebark pine is reported by A. L. Gibson, of the forest insect laboratory at Coeur d'Alene, Idaho. Although the effectiveness of these sprays against

the same insect in lodgepole pine has been demonstrated, it was not until last season that similar control was obtained from experiments conducted in whitebark pine. The results came as somewhat of a surprise, as the supposedly more resistant bark and the much cooler environment of whitebark pine were expected to present a more difficult control problem. However, experiments with two formulae, conducted on Mt. Washburn, in Yellowstone National Park, indicate satisfactory control even against brood in trees recently attacked, where bark that is still green or moist offers high resistance to penetration by the spray.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Satisfactory progress of gypsy moth work during January.--Gypsy moth work progressed without interruption because of weather conditions during the first half of January, with two exceptions. Most of the crews working in Vermont and Massachusetts preferred to work on January 7 because of the extremely low temperatures, and some crews in Connecticut and Pennsylvania also suspended work on that date. Again, about the middle of the month, subzero temperatures accompanied by high winds caused much discomfort to the workers and the discontinuance of work in some sections. This was followed quickly by moderating temperatures and a driving snow and sleet storm that coated trees and roads with ice. The storm was not sufficiently intense to interfere seriously with thinning and brush-disposal work in the Vermont and Massachusetts sections of the barrier zone, but scouting was immediately discontinued when the ice coating prevented the thorough examination of trees and shrubs for egg clusters, and in Connecticut was so severe that all field work was temporarily discontinued. Another severe storm near the end of the month resulted in a fall of dry snow ranging in depth from 6 or 8 inches in northern Vermont to 14 inches in western Massachusetts and Connecticut. This storm did not seriously hamper gypsy moth work, as it started on Friday after most of the crews had completed their work schedule for the week.

National Defense program draws many gypsy moth workers.--It is becoming increasingly difficult to obtain a sufficient number of W. P. A. workers to accomplish the gypsy moth work planned for the present fiscal year in many localities. The labor situation is especially serious in Connecticut, where increased activity in the manufacturing centers requires increasing numbers of men; and also in Pennsylvania, where W. P. A. employment officials are continually transferring men to training projects connected with the National Defense program.

Results of gypsy moth scouting work in Vermont.--Addison County: A special crew of agents working on summer-residence properties bordering Lake Dunmore, in Salisbury Township, destroyed several egg clusters while engaged in the disposal of brush accumulated at the center of a small gypsy moth infestation discovered earlier in the season. Much of the growth around the shores of the lake, particularly in the infested area, includes a substantial percentage of trees favorable for gypsy moth development. Oaks and poplars, especially favored by the insect, are abundant and comprise some of the best shade trees surrounding the cottages. Several scattered egg clusters were also found and creosoted in Bristol Township.

Bennington County: The crew scouting in Manchester Township continued to find and creosote egg clusters scattered through the woodland on the northerly slope of Equinox Mountain. A few egg clusters were also found in the northern section of Shaftsbury, bordering the Arlington Town line and only a few miles southwest of the infested area in Manchester. Several scattered egg clusters were also creosoted in Pownal Township, in the southwest corner of the county. Franklin County: Scouting was begun in Montgomery Township early in December, but no indications of gypsy moth infestation have been found. Lamoille County: No additional infestations have been found recently in Eden Township. Orleans County: No new infestations have recently been found in Lowell Township. Rutland County: Numerous widely scattered egg clusters were recently located in Brandon Township, one of the northernmost towns in Rutland County. Most of the egg clusters were found in the vicinity of small infestations discovered last year along the eastern border of the township. The control work at the Brandon infestation last year was confined to the creosoting of egg clusters and the crushing of larvae and pupae found under burlap bands, as the necessity of spraying more important infestations with the limited equipment available prohibited the spraying of the Brandon colonies. Most of the new infestations are located, as were the older colonies, on the precipitous and rocky slopes of a mountain ridge extending from the northern part of Rutland County north across the entire eastern side of Addison County and into Chittenden County.

Gypsy moth infestations reduced by unfavorable weather.--Scouting crews working in the Massachusetts section of the barrier zone continued to find numerous scattered gypsy moth egg clusters, although in some localities the number of new egg clusters appeared to be substantially decreased from numbers found last year. No evidence of new egg clusters could be found in several areas where old hatched egg clusters were in evidence, which indicates that the larval mortality was unusually high during the long period of unseasonably cold and wet weather late last spring and early in the summer. With few exceptions the new egg clusters found to date occur singly, and in many instances are widely separated. A large number of broken egg clusters was found as a result of an ice storm during the week ended December 21, and which was particularly severe throughout Berkshire County, Mass., and in the mountainous areas of northwestern Connecticut. Additional work will be necessary to eliminate the infestations where the broken egg clusters occur, as the severed portions and individual eggs fall to the ground and cannot be found in the forest debris.

Woodlots scouted in advance of logging operations.--White birch is being cut on a timber lot consisting of several hundred acres in Lanesboro Township, Berkshire County, Mass., and also from a lot of equal size in Florida Township, also in Berkshire County. The timber is transported to wood-working mills in Bennington, Vt., and Berlin, N. Y. Gypsy moth scouting is done in both lots well in advance of the cutting operations, which will be conducted throughout the winter, so that all egg clusters may be destroyed by creosote before the logs are hauled to the mills, thereby eliminating the possibility of spreading gypsy moth infestation to uninfested localities. Several egg clusters have already been found scattered through the woodlots.

Gypsy moth work in progress in Pennsylvania.---By the middle of January gypsy moth scouting work in the Pennsylvania area was being conducted in 14 townships, 7 of which are located in Lackawanna County, 4 in Luzerne County, 2 in Monroe County, and 1 in Carbon County. Gypsy moth infestations have been found in each of the towns, many of them consisting of only a few scattered egg clusters. Thinning work at infested locations was being done by 26 crews of laborers who succeeded in disposing of large quantities of brush and other useless wood that had been gathered and piled for burning despite considerable unfavorable weather. Gypsy moth scouting and thinning work was also done by 14 National Youth Administration crews and by 1 crew provided by the Department of Public Assistance.

Satisfactory work done by gypsy moth scouts.---Two experienced regular gypsy moth employees were recently detailed to reexamine some of the woodland previously scouted by W. P. A. workers in the Pennsylvania area, as a check on the efficiency of the crews. It was found that most of the intensive scouting work was satisfactory.

C. C. C. gypsy moth work during January.---A total of 6,320 6-hour man-days was used by the C. C. C. on gypsy moth work east of the barrier zone under the supervision of this Bureau in January. Only 542 man-days were used during the week ended January 4, while 1,631 man-days were used during the week ended January 25. A new enrollment period began on January 1, and the recent enrollees go through an orientation course to acquaint them with camp routine and also must be given special training in gypsy moth work before being released for actual service. The amount of work accomplished is necessarily reduced during these training periods and increases as the new men are turned over for field work. A holiday, snowstorms, icy road conditions, an epidemic of colds, and unfilled quotas at some of the camps also contributed to the small amount of work done during the first part of January. The work consisted of scouting, selective thinning of favored food plants, and brush disposal. The brush is usually burned along the roadsides, but is often scattered and left to deteriorate in other sections in order to reduce the cost of operations. No new heavy gypsy moth infestations were found during January.

Quarterly report and plans for future work distributed.---Copies of the report of C. C. C. gypsy moth work for the second quarter of the current fiscal year were distributed in January. The data were given in the News Letter (v.VIII, No. 2, p. 14, Feb. 1, 1941). The data are arranged by towns and camps, a report for each State is delivered to the State and Federal officials concerned, and sections pertaining to the various camps are sent to the camp superintendents and foremen. The latter sections are further broken down into colony records, which are of especial interest to the foremen. The maintenance of the detailed statistics necessary to provide these reports by colonies has proved useful in reducing the time consumed in thinning, assembling, and burning work from 20.8 man-days per acre for the last half of the fiscal year 1937 to 16.0 man-days per acre during the first half of the fiscal year 1941. Unusually high costs at any location is shown by the records, and corrective measures can be taken. Plans for C. C. C. gypsy moth work for the 17th and 18th periods, which begin on April 1, 1941, and end on March 31, 1942, were also distributed to the camp superintendents and State officials concerned. These plans are of assistance to the superintendents in planning the work for the entire camp, and the figures are often

used without alteration. The amount of time provided for in the present set of plans will undoubtedly have to be revised, as information was recently received that the camp quotas are to be reduced from 206 to 167 enrollees per camp, and all activities will be reduced proportionally.

Gypsy moth scouting to be done from camp in northern Vermont.--Arrangements have been made to obtain C. C. C. enrollee labor to do gypsy moth scouting work from a camp in northern Vermont. The men will be used to determine the extent and density of gypsy moth infestation in the vicinity of the camp, which is located north of the area where present gypsy moth work is conducted, and across the Connecticut River in New Hampshire. Supervision will be provided by the transferral of experienced men from another Vermont camp where gypsy moth work is done, and the scouting program will be so arranged that it will not interfere with construction work now in progress at the camp.

Gypsy moth control measures applied by private property owner.--Added evidence of the cordial relationships existing between property owners and C. C. C. gypsy moth workers was reported by a gypsy moth foreman in a Vermont camp. The foreman examined a recently purchased tract of 150 acres of timberland with the new owner and recommended the measures best suited to control the gypsy moth in the stand. Since that time the owner has employed several laborers to thin out the growth favorable for gypsy moth development, and he plans to follow this work with the planting of tree species resistant to gypsy moth. This will directly benefit both the property owner and the gypsy moth work as a whole, and demonstrates the practicability of cooperative work.

PLANT DISEASE CONTROL

Barberry bushes found on 30 properties in Nebraska in 1941.--When field work was suspended in Nebraska about December 15 because of severe temperatures and considerable snow, areas comprising 14,325 square miles had been covered with an intensive survey during 1940. Twenty-two new properties were found infested with barberry bushes and seedlings and escaped bushes were found on 8 of the 203 old properties reinspected. The following table shows the trend of survey and eradication in Nebraska during the 5-year period 1936-40.

Year	Labor used	Area surveyed	Time used per square mile	Properties found	Area surveyed per property	Average bushes per property
	Hours	Square miles	Hours	Number	Square miles	Number
1936----	147,971	7,930	18.659	29	61.47	5.11
1937----	62,980	7,639	8.240	72	106.00	6.87
1938----	50,343	6,379	7.890	29	220.00	2.65
1939----	47,921	13,705	3.496	39	351.40	2.82
1940----	56,191	14,325	3.900	30	477.50	2.10

Progress in barberry eradication in Illinois in 1940.--Field activities for 1940 were confined to three areas that will be discussed separately. The methods of survey consisted of the same practices that had been used for

several years on intensive survey. Local workers were organized into crews of six to eight men each, under the direction of a foreman. Two or more such crews were used in a county under the direction of one supervisor. One assistant State leader took charge of three or more county groups. All scouting was of the intensive type. One group of counties in eastern Illinois was given the initial intensive survey. These included Champaign, Macon, Douglas, Moultrie, Coles, Edgar, and Shelby, where a farmstead and city survey had been made in 1925. One group in western Illinois, including Pike, Brown, Hancock, and McDonough Counties, was given an intensive survey. These differ from the eastern counties in that they contain a large amount of timbered land. Several infested areas known to exist in these counties had been reinspected once since the first farmstead survey in 1924-26. Because of the topography and the size of the timbered areas, progress there was much slower than in counties comprising the first group. A third group in north-central Illinois, representing a region in which rather extensive areas of infestation have existed and in which no work had been done for 5 to 7 years, demanded further attention. An intensive survey was conducted in the portions of the counties in which barberries had been numerous in the past. These counties are La Salle, Marshall, Putnam, and Rock Island. They had had an original farmstead survey in 1923-24 and a reinspection of escaped areas in 1927-28. The results of the intensive survey are indicated in the following tables.

Table 1.--Summary of survey activities for calendar year 1940, by properties

Counties in Illinois	Percentage of county covered	Initial survey	Subsequent survey	Number found	New properties				Old properties										
					Planted	Escapes or bushes	seedlings	Fruiting	Percentage Fruiting	Barberries	Seedlings	Fruiting bushes							
GROUP I:																			
Eastern:																			
Champaign	36	380	0	3	33.3	66.7	66.7	35	17.1	2.8	11.4								
Coles	40	209	0	6	100.0	0	33.3	40	2.5	0	0								
Douglas	100	417	0	4	10.0	---	100.0	41	0	0	0								
Edgar	72	419	0	4	75.0	25.0	25.0	90	2.2	0	1.1								
Macon	33	196	0	1	0	100.0	0	13	7.7	0	7.7								
Moultrie	100	338	0	1	0	100.0	0	24	4.2	0	0								
Shelby	1	4	0	---	---	---	---	0	---	---	---								
Subtotal	--	1,993	0	19	73.6	31.5	47.3	243	4.5	0.41	2.4								
GROUP II:																			
Western:																			
Brown	48	143	0	1	100	0	0	0	0	0	0								
Hancock	70	548	0	20	10	90.0	50	50	18.0	0	2.0								
McDonough	4	24	0	0	0	0	0	0	0	0	0								
Pike	7	58	0	5	60	40.0	60	12	73.3	0	25.0								
Subtotal	--	773	0	26	23	76.9	50	62	20.9	0	6.4								
GROUP III:																			
North-central:																			
LaSalle	5	0	56	15	20.0	80	40.0	69	53.6	10.1	24.6								
Marshall	39	0	156	11	0	100	36.4	107	15.9	0.9	5.6								
Putnam	62	0	107	8	12.5	87.5	37.5	47	25.5	4.3	14.9								
Rock Island	6	0	26	2	0	100	0	47	27.7	0	6.4								
Subtotal	--	0	345	36	11.1	88.8	36.1	270	29.2	3.7	12.2								
Total	--	2,766	345	81	29.6	71.6	43.2	575	17.9	1.9	7.5								

Table 2.--Summary of survey activities for calendar year 1940, by bushes found

Counties in Illinois	Bushes found on new properties				Bushes found on old properties				Total	
	Number	Percentages of--	Fruit-	Bar-	Percentages of--	barberry:	bushes	Salt		
		Planted:Escapes	ing	berries, Bar-	Planted:Escaped:Seed--	Fruiting: de-	used			
		bushes and	seedlings:bushes:	all kinds:bushes:	bushes:	ings:	bushes: destroyed	Number	Pounds	
GROUP I:				Number						
Eastern:										
Champaign	8	12.5	87.5	20	85.0	10.0	5.0	75.0	28	45
Coles	10	100.0	0	1	0	100.0	0	0	11	0
Douglas	11	45.4	54.6	0	0	0	0	0	11	40
Edgar	5	60.0	40.0	2	50.0	50.0	0	50.0	7	45
Macon	1	0	100.0	2	100.0	0	0	50.0	3	20
Moultrie	1	0	100.0	1	100.0	0	0	0	2	--
Shelby	0	--	--	0	--	--	--	0	--	--
Subtotal	36	52.7	47.2	26	80.7	15.3	3.8	65.3	62	150
GROUP II:										
Western:										
Brown	1	100.0	0	0	0	0	0	0	1	0
Hancock	33	12.1	87.8	95	14.7	85.3	0	1.0	128	1,170
McDonough	0	--	--	0	--	--	--	--	0	--
Pike	14	21.4	78.6	49	0	100.0	0	10.2	63	435
Subtotal	48	16.6	83.3	144	9.7	90.2	0	4.1	192	1,605
GROUP III:										
North-central:										
LaSalle	21	14.3	85.7	977	0.2	85.8	14.0	7.3	998	1,950
Marshall	25	0	100.0	181	2.8	91.7	5.5	15.5	206	1,415
Putnam	12	8.3	91.7	99	1.0	91.9	7.1	20.2	111	1,120
Rock Island	2	0	100.0	53	0	100.0	0	11.3	55	370
Subtotal	60	6.6	93.3	1,310	0.61	87.6	11.7	9.5	1,370	4,855
Total	144	21.5	78.5	1,480	2.9	86.6	10.5	10.0	1,624	6,610

Accomplishments in blister rust control work in 1940.--The following table shows by regions the approximate results of blister rust control work during the calendar year 1940. The data for "acreage worked" include the areas initially cleared of Ribes, as well as those that were reworked.

Region	: Area : worked : Acres	: Ribes : pulled : Number	: Labor : Man-days	: Ribes : per acre : Number
Northeastern-----	: 1/706,021	: 10,930,821	: 139,840	: 2/15.5
Southern Appalachian--	: 653,421	: 3,072,604	: 28,152	: 32.0
North Central-----	: 324,419	: 15,947,553	: 67,860	: 49.0
Western white pine---	: 115,608	: 20,210,854	: 144,090	: 176.0
Sugar pine-----	: 171,952	: 18,455,641	: 158,984	: 107.0
Total-----	: 1,971,421	: 68,617,473	: 538,926	: 34.8

1/ Includes large areas found to be Ribes-free.

2/ Bushes found per acre on Ribes-bearing areas only.

During the active season, from May to November, satisfactory progress was made on this project. In the western white pine region, Mr. Swanson reports that for the Inland Empire, exclusive of work on National Parks, 34,743 acres were worked initially and 80,865 acres were reworked, making a total of 115,608 acres worked during 1940. This represents an increase of 12,226 acres over the 1939 accomplishments.

Indiana foresters cooperate with A. A. A. in blister rust control.--Oscar J. Dowd, in charge of blister rust control work in Ohio and Indiana, attended a conference on white pine blister rust control in connection with the Indiana A. A. A. forestry program on February 7 at Indianapolis. Indiana foresters and representatives of the A. A. A. program in Indiana attended the conference. White pine is highly regarded as a reforestation tree in Indiana and discussion and questions from committeemen living in various parts of the State brought out the fact that 70 percent of all trees used for reforestation in Indiana are conifers. Conifers are preferred because experience has shown that they will grow on eroded planting sites where hardwood plantings fail. It was stated by Paul Yost, associate forester of the Division of Conservation, that 60 percent of the conifers planted in the State are white pine. T. E. Shaw, extension forester of Purdue University, stressed the rapid growth rate of white pine, the fact that it is native in parts of the State, and that farmers want to plant it for windbreaks and forest plantings. Wild Ribes are rare but not entirely absent south of Indianapolis and are fairly abundant in northern Indiana, except in dry upland oak woods.

Open weather in January aids Ribes eradication.--Because of the open weather in January, it was possible to continue Ribes eradication in Georgia, North Carolina, Tennessee, Virginia, and West Virginia. A total of 75,147 acres was worked during the month. This includes 5,000 acres of crew or scout work and 70,147 acres of "blockout," or areas found to be free of Ribes. A total of 118,949 Ribes, both wild and cultivated, were eradicated with an

expenditure of 12,405 man-hours of labor. In January 1940 only 11,041 acres was worked and 58,375 Ribes eradicated.

COTTON INSECT INVESTIGATIONS

The pink bollworm situation in the Big Bend.--The seasonal infestation and population of pink bollworms entering hibernation in the Big Bend of Texas during the 1940-41 season has continued very low. At the last green-boll examinations made in the vicinity of Presidio during the latter part of October in 18 identical fields for which comparable records are available for 1939, an average of 44 percent of the bolls were found to be infested, as compared with 67 percent in 1939. However, more bolls per plant were present at that time than last season and the worm population per acre was estimated to be 30,657 in 1940, or practically the same as the 29,133 found in 1939. In the upper end of the valley above the mouth of the Conchos River there was a still greater reduction in population of green bolls, with an average of 15,086 worms per acre this season, as compared with 29,363 in 1939 in 7 identical fields. The importance of these reductions is shown by comparison with populations of 150,000 to 200,000 larvae per acre during the heavy infestations of 1935-37. The freeze that occurred during the middle of November 1940 killed approximately 95 percent of the worms in the succulent bolls and still further reduced the number of worms entering hibernation. The fields were cleaned by the Division of Pink Bollworm and Thurberia Weevil Control this fall, as part of the 2-year plan, by cutting and burning the stalks in all fields and hand-collecting the shattered bolls and squares in some of the more heavily infested fields. Examinations were made after the clean-up in representative fields by members of the Presidio, Tex., laboratory, to determine the overwintering pink bollworm population remaining in the soil and in the surface debris. A comparison of the overwintering worm population remaining after the clean-up in different environments in 27 representative fields of the Presidio Valley in 1940 with that of 1939 is shown in the following table.

Year	Average larvae per square yard in--:			Larvae : per acre
	: Surface trash:	Soil :	Total	
	: Number	: Number:	Number	: Number
1939-----:	0.46	: 2.69 :	3.15	: 15,246
1940-----:	.33	: 1.83 :	2.16	: 10,454

In examining the surface trash this year a record was kept of the number of larvae found in bolls and locks of cotton and in the squares, blooms, and leaf trash. Approximately 16 percent of the larvae above ground were found in the bolls and locks of cotton and 84 percent in the squares, blooms, and leaf trash. Examinations made in 17 identical fields to determine the number of worms remaining in the bolls and locks of cotton before and after the field were cleaned showed that approximately 75 percent of the overwintering surface population had been destroyed in the clean-up. The clean-up did not reduce the number of larvae hibernating in the soil, but growers were encouraged to plow, irrigate, and plant winter crops on the most heavily infested fields. Investigations have shown that these cultural practices

greatly increase the winter mortality, and a very light carry-over into next season is expected. Several factors are believed to be responsible for the extremely favorable situation in the Big Bend. A very heavy infestation had built up in 1937 and, as the fields were not cleaned that fall, over 300,000 larvae per acre were estimated as going into hibernation. The expected heavy carry-over did not develop in 1938, as a considerable acreage of cotton was flooded by overflows of the Rio Grande during July and September, killing a large number of worms and permitting the crop to be picked early and the fields cleaned early that fall. As a result, the larval population remaining in the fields was estimated at 10,112 per acre. In 1939 delayed planting as a part of the 2-year plan was carried out for the first time. However, withholding of late irrigations, a dry fall, and defoliation by cotton leaf worms caused an early maturity of the crop, and the number of hibernating larvae remaining in the fields after the clean-up was estimated at 15,246 per acre. The infestation developed slowly in 1940, owing to the light carry-over and to a heavy rain and hail at the critical time of spring moth emergence in May. The planting of quick-maturing varieties, a dry season, and defoliation by leaf worms again caused an early maturity of the crop, and after the clean-up the larval population remaining in the fields was about the same as the low point reached in 1938.

A new host plant of the pink bollworm.--Two pink bollworm moths emerged in November and December 1940 from flower buds and green seed capsules of the wild mallow (Pseudabutilon lozani R. E. Fries) which were collected and caged in November 1940 by C. A. Richmond and Ivan Shiller. The first moth emerged on November 19 from 50 flower buds and 75 seed capsules collected in the vicinity of infested cottonfields at Rangerville, Tex., on November 1, and the second emerged from 1,500 flower buds and seed capsules collected at Monte Christo, Hidalgo County, and La Paloma and Rangerville, Cameron County, Tex., between November 1 and 6. The moths found in the cages were identified by Ignacio Moreno, of the Brownsville, Tex., laboratory, and verified by J. F. Gates Clarke, of the Division of Insect Identification. It is thought that these are the first records of pink bollworm breeding in P. lozani under natural conditions. Under artificial conditions at the Presidio, Tex., laboratory the pink bollworm has been found to feed on the seed capsules of P. lozani. In 1 test L. W. Noble placed pink bollworm eggs on 25 seed pods and later recovered 1 mature fourth-instar larva and 4 immature larvae. In another test he released 45 pairs of moths in a field cage that had been placed over a P. lozani plant. On November 4, 1940, 489 seed capsules were collected in this cage and in each of 3 pods there was found 1 third-instar larva of the pink bollworm. The plants on which these tests were conducted were grown from seed from the lower Rio Grande Valley, as this plant is not known to occur naturally in the Presidio Valley. In Hanson's "The Malvaceous Plants of Texas" (Tex. Agr. Expt. Sta. Cir. 22) this plant is recorded as Wissadula lozani (Rose) Fries and the distribution given as: "Mesquite woods, southwestern Texas, Corpus Christi, Brownsville, Mission, Laredo, San Antonio, Uvalde." Personnel of the Brownsville laboratory have found it in Cameron, Willacy, Kenedy, Hidalgo, Nueces, Starr, Zapata, Uvalde, Duval, Webb, and Maverick Counties, Tex., and in the State of Tamaulipas, Mexico, from near the mouth of the Rio Grande to a distance of 125 miles west. P. lozani is a perennial that grows rather abundantly in the lower Rio Grande Valley of Texas and Mexico on brushland, along fence rows and railroad tracks, and on other waste

land. Under favorable conditions it fruits throughout the year but more abundantly in the spring and fall. Its importance as a host of the pink bollworm has not been determined and it is not known whether the pink bollworm would maintain itself on this plant in the absence of cotton.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Destruction of sprout and volunteer cotton.--Under the control program for the eradication of the pink bollworm in the lower Rio Grande Valley, cotton plants are destroyed immediately after the cotton crop is harvested, in an effort to create a starvation period for the pink bollworm. However, climatic conditions in that region are so favorable to the growth of cotton that any lateral roots left in the ground after plowing will sprout and produce fruit throughout the year. This makes it imperative to carry on an intensive campaign for the destruction of sprout cotton from fall until early spring, in order to prevent the fruiting of sprouts and the consequent build-up of the pink bollworm prior to the fruiting of the spring crop. This activity was continued through January with good results. Heavy frost and freezing temperatures on January 18, 19, and 20 killed approximately 90 percent of the cotton sprouts over the lower Rio Grande Valley. So far as is known, all fruiting sprouts had been removed prior to this subnormal temperature, but the freeze undoubtedly killed back any plants that might have been overlooked and will prevent the fruiting of any plants within the near future. During the last few days in January heavy rains were received over most of the lower valley, amounting almost to flood conditions in some sections; however, only a light precipitation was received in the vicinity of Brownsville and in the Matamoros area of Mexico, which was the most heavily infested area in the valley in 1939.

Control program in the Big Bend.--Field clean-up is conducted each year in the Presidio-Ojinaga area of the Big Bend of Texas and Mexico, immediately after cotton is picked, as one of the principal measures for pink bollworm suppression. Cotton picking in the Presidio Valley was completed in December, and field clean-up activities were completed on January 11. Prior to its completion a campaign was started to interest farmers in winter plowing and irrigation of fields that showed a high number of pink bollworms, such fields being determined by the Division of Cotton Insect Investigations through surface trash and soil examinations. The host-free period thus created will be carried through until late spring by preventing the fruiting of any sprout cotton that may develop in the interim and by delaying the planting of the 1941 crop about a month later than usual. This delayed planting will bring cotton into fruit after the peak of moth emergence in the spring, resulting in a high mortality of the pink bollworm. Farmers on both sides of the Rio Grande appear desirous of putting forth every reasonable effort to aid in this work. This can be easily understood when the material benefits that have accrued to them as a result of this program are realized. At the time this plan was put into effect in the Presidio-Ojinaga area of the Big Bend, in the fall of 1938, farmers were losing on an average, 50 percent or more of their cotton crop through pink bollworm ravages. In 1939 infestation had been so reduced that no damage was present in the crop, and records for the present season show a still greater reduction.

Control measures in lower end of the Juarez Valley of Mexico.--Inspection of the 1940 cotton crop in the Vado de Cedillos and Banderas sections of the lower end of the Juarez Valley of Mexico, showed a considerable increase in pink bollworm infestation. This region is really a continuation of the Big Bend, with very similar climatic and cultural conditions. Consequently, regulations were promulgated by the Mexican Department of Agriculture, for reducing the pink bollworm infestation in that area, identical with those which have proved successful in suppressing the heavy infestation in the Presidio-Ojinaga area of the Big Bend. Clean-up of fields was delayed during January on account of weather conditions, and was then further delayed because the farmers were required to cooperate in maintenance of irrigation canals. The irrigation system is a cooperative project, and during each winter the farmers are required to donate time and equipment in cleaning out the canals that serve their farms, and it is necessary to place the canals in good condition before water is available. However, practically all of the area had been cleaned by the middle of January, and by the end of the month most of the acreage had been plowed and irrigation was progressing rapidly, with the promise of early completion. As an indication of the cooperation and interest of the farmers in the lower Juarez Valley, some 1,300 acres of land in excess of the acreage placed under regulation, was voluntarily cleaned, plowed, and irrigated by the farmers immediately adjacent to the area required to be cleaned.

Wild-cotton eradication in Florida.--In 1932 it was found that wild cotton, which grows abundantly in southern Florida, was heavily infested with the pink bollworm, and efforts were begun to eradicate this dangerous cotton insect through the elimination of its host plant. Good success has attended the efforts of the Bureau in this undertaking, and both plants and infestation have been greatly reduced. With the exception of two Bureau crews operating from houseboats, all of the wild-cotton eradication work this season is being carried on by W. P. A. personnel and C. C. C. enrollees. Wild-cotton work was going forward during the period in the Cape Sable region, where the C. C. C. Camp is located, on the west coast of Florida in practically all counties from and including Hillsborough to Florida Bay, and on the Mainland Keys between Miami and Key West. With the exception of the Cape Sable area, most of the wild-cotton area had been covered once this season at the end of January, and the second cleaning was in progress in some sections. In some parts of the Cape Sable area conditions for the work were not entirely favorable, owing to excessive rains, following which mosquitoes became so troublesome as to handicap the work. For the period approximately 5,300 acres were covered, from which were removed 13,869 plants with mature bolls, 160,836 seedlings, and 314 sprout plants.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Effectiveness of metaldehyde bait against slugs.--A. E. Bonn, of the Forest Grove, Oreg., laboratory, reports the results of observations indicating the effectiveness of metaldehyde bait against the gray garden slug (Agriolimax agrestis L.), made late in November and early in December 1940 in fields of vetch and Austrian winter field peas in the Willamette Valley. The fields were being severely damaged by the slugs. These observations, made in cooperation with L. P. Rockwood and M. M. Reeher, of the Division of Cereal and Forage Insect Investigations, showed that the mortality of slugs from the use of metaldehyde bait was slightly less than 50 percent for

Washington County as a whole. Counts were made in 1 field where the bait had been distributed by placing large handfuls 8 to 10 feet apart one way and about 12 feet apart the other. As many as 200 dead or paralyzed slugs were counted on or about some of the piles of bait, but counts for the entire field indicated a total mortality of only about 43 percent. The bait used consisted of bran or bran and apple pomace, with 3 percent of metaldehyde. The low mortality of slugs obtained from applying this bait during the outbreak was probably due to the high relative humidity following the application, thus sufficiently retarding the rate of body desiccation to permit full recovery of a large percentage of the paralyzed slugs.

Toxicity of triethanalamine dinitroorthocyclohexylphonate to wireworms.--C. E. Woodworth, of the Walla Walla, Wash., laboratory, reports that the triethanalamine dinitroorthocyclohexylphonate salt proved very toxic to wireworm larvae (principally Limonius canus Lec. and L. californicus (Mann.)) when they were submerged in water to which had been added small quantities of this chemical. However, it was found that the mortality of the wireworms was very low when they were placed in soil that had been treated with a water mixture containing this chemical. When the wireworms were submerged in a solution consisting of 350 parts of the chemical per million parts of water, they were killed in 4 hours or less. When the soil was treated at rates of 10 cc. and 100 cc. of the chemical per cubic foot the larval mortality at the end of 4 days was negligible, whether the wireworms remained in the treated soil or in the soil above or below it. To determine the role of the soil in decreasing the toxicity of this chemical, larval mortality was determined by submerging wireworms in solutions of the chemical originally mixed so as to contain 350 parts per million but which had passed through the soil. The results of this series of tests showed a larval mortality of 60 percent, after the larvae were submerged for 8 hours in a liquid obtained by filtering the drainage from soil saturated with 2 parts of the solution to 1 part of soil. Larval mortality was 75 percent after the test insects had been submerged for 8 hours in the liquid obtained by filtering the drainage resulting from the use of a vacuum pump in passing the foliage through a column of soil 3 inches deep. Mortality was 100 percent when the larvae had been submerged for only 4 hours in a liquid obtained by passing the liquid through filter paper only. Other tests showed that the larvae took up the solution by osmosis, that the submerged specimens showed the presence of the chemical in the blood, and that the contraction of the muscles was stopped in a few hours. Apparently this chemical acted as a contact poison but readily lost its toxic qualities upon coming in contact with the soil.

Deterioration of cube mixed with carriers.--N. F. Howard and R. A. Fulton, in reporting the results of an experiment conducted at Columbus, Ohio, conclude that there was no deterioration of the rotenone-deguelin content of ground cube root mixed with a finely ground diatomaceous earth, Georgia talc, and hydrated lime, with sulfur, after these dust mixtures had been prepared and stored at room temperatures in stoppered, amber-colored bottles for 2 years. They also found only slight deterioration in the rotenone-deguelin content when the ground root had been mixed with monohydrated copper sulfate-hydrated lime and stored under similar conditions for a period of 1 year. However, after being stored for 2 years in glass Petri dishes in a greenhouse the cube mixed with monohydrated copper sulfate-hydrated lime, hydrated lime, and Georgia talc, had deteriorated 20 to

35 percent, but the mixtures with diatomaceous earth and with sulfur had deteriorated only 15 percent. The rate of deterioration of rotenone-deguelin in a cube-bordeaux mixture was found to be 50 percent after 3 months, 50 percent after 18 months, and only 55 percent after 24 months. All of the dust mixtures used were originally compounded to contain 1 percent of rotenone, being prepared from a cube root powder analyzed as containing 5.7 percent of rotenone and 24.5 percent of total extractives. The cube-bordeaux mixture originally contained 0.015 percent of rotenone; and was stored in a clear bottle at room temperatures. The amount of deterioration of the rotenone-deguelin content was determined at intervals during storage of the mixtures by the use of a colorimetric method of analysis.

Fumigation of infested narcissus bulbs with methyl bromide.--In preliminary tests conducted by F. S. Blanton, of the Babylon, N. Y., laboratory, effective control of the bulb fly *Merodon* sp. was obtained by fumigating infested narcissus bulbs with methyl bromide. A larval mortality of 100 percent was obtained by fumigating with a dosage of $2\frac{1}{2}$ pounds of methyl bromide per 1,000 cubic feet of space with a 4-hour exposure. In 3 tests receiving this treatment a total of 268 infested bulbs were treated and all of the larvae were killed. To determine any possible effects of this treatment upon the bulbs, a number of healthy bulbs were subjected to this treatment and then planted in the field, while some receiving the treatment were saved for forcing in the greenhouse.

INSECTS AFFECTING MAN AND ANIMALS

Ranch-management, screwworm-prevention program.--Trapping surveys and the contacting of ranchmen in regard to winter screwworm cases were continued during January by D. C. Parman, H. M. Brundrett, and W. L. Barrett, of the Uvalde, Tex., laboratory. Mr. Barrett also assisted county agents in Uvalde and Kinney Counties in presenting the program to meetings of ranchmen.

Winter horse tick.--Tests were made on a number of horses in the vicinity of Menard, Tex., by H. E. Parish, Roy Melvin, C. L. Smith, and E. C. Cushing to determine the tickicidal value of some of the best new insecticides for goat lice. Although some of the new insecticides gave a good kill of the nymphs, none of them killed 100 percent of all stages of the ticks.

Cattle grub control being started in Wyoming.--The active interest of Wyoming livestock owners in cattle grub control has manifested itself in the provision of funds for the initiation of a control project in the northern part of Sheridan County, and an appeal through the State entomologist for assistance from this Division in getting the work started. In response to this request, F. C. Bishopp attended the Biennial Pest Control Conference of Wyoming at Laramie on January 24 and 25 and discussed the cattle grub and cattle louse problems. Following this conference, a survey trip was made in the northern edge of Colorado and northward through Wyoming to Sheridan. It is in Sheridan and Johnson Counties that most of the active interest in grub control is manifest. At the call of the county agent, about 60 cattlemen met in Sheridan on January 27 and Margaret Greenwald, assistant State entomologist, and F. C. Bishopp discussed cattle grubs and cattle lice, horse bots,

and other livestock-insect problems. The following day a demonstration of the treatment with cube wash of cattle for grubs was staged before 15 local cattlemen at a ranch near Parkman, Wyo. This is the locality where the control work is being initiated. The original plans contemplated the treatment of about 15 thousand head of range cattle, but it is doubtful if systematic work will be carried out on such a large scale this year. The survey revealed the presence of considerable numbers of the common cattle grub (H. lineatum (De Vill.)) in the backs of cattle in northern Colorado and across Wyoming. A few specimens of the northern cattle grub (H. bovis (Deg.)) were taken at Casper, Buffalo, and Parkman. These were all young, indicating that this species reached the subcutaneous tissues of the backs several weeks later than did H. lineatum larvae, as is usual. The infestation of animals raised on the Laramie Plains was relatively light. Some of the grubs in each of the localities visited were nearing maturity, indicating that treatment should be begun within a week or 10 days.

FOREIGN PLANT QUARANTINES

Citrus black spot from Africa.--Phoma citricarpa McAlpine, known for years as the cause of a serious spotting of citrus fruits in China and Australia, has been reported to occur in South Africa more recently. On December 15 the fungus was found at New York on a grapefruit in stores from Durban, South Africa. As the spots are said to develop readily under storage conditions, it is hoped that it will be possible to detect the disease in any infected fruit reaching United States ports and to prevent its entry and establishment, at least so long as it occurs in distant places only.

Accents on vigilance and cooperation.--Martin Johnson, acting as verifier opener and packer at the Appraiser's store at Chicago, is evidently very thorough in his work and cooperates to the fullest extent with inspectors of this Division, as evidenced by his recent finding of rice straw in the padded lining of basket receptacles for china tea sets from the Orient. Heretofore the padding has always been of unrestricted material but Mr. Johnson took nothing for granted. Although the Bureau's representative, F. O. Dodd, to whose attention the straw was brought, failed to find any insects or diseases present, the instance serves to show the importance of eternal vigilance in such work, as well as the splendid cooperation we receive from the Customs personnel.

Entomological interceptions of interest.--Two living larvae of the trypetid Anastrepha fraterculus (Wied.) were found at Boston on December 22, 1940, in grapefruit in stores from Trinidad. Specimens of the mite Eriophyes tulipae Keifer were found at Laredo, Tex., on garlic in cargo from Mexico. Living adults of the bostrichid Dinoderus bifoveolatus Woll. were intercepted at New York on January 4 in the stems of rattan in cargo from the Dutch East Indies. A living larva of the trypetid Anastrepha mombinpraeoptans Sein was intercepted at Norfolk, Va., on January 4 in mango in quarters from Jamaica. A living specimen of the phycitid Anypsiopyla univitella Dyar was taken with Pithecellobium samen pods at the Inspection House, Washington, D. C., on December 18, 1940, in mail from Ecuador. Six living larvae of the Mexican fruitfly (Anastrepha ludens (Loew)) were taken at Galveston, Tex., on December 15, 1940, in an orange, in quarters from Mexico. Living larvae, pupae, and adults of the otitid Euxesta sororcula

(Wied.) were found at Brownsville, Tex., on December 17, 1940, in green corn in baggage from Mexico. The scarabaeid Onthophagus marginatus Cast. was intercepted at New York on September 16, 1940, with cotton waste in cargo from Cuba. A living adult of the bruchid Rhipibruchus picturatus (Fahr.) was taken at Hoboken on November 20, 1940, in the seed of Prosopis nigra in mail from Uruguay. A living adult of the chrysomelid Phaedon incertum Baly was taken on a persimmon at Boston on November 17, 1940, in stores from Japan. Living adults of the cucujid Laemotmetus rhizophagoides (Walk.) were found at New York on September 23, 1940, in bamboo lumber used as dunnage from Java. Pierce's "Manual of Dangerous Insects" lists this insect as being injurious to dry rice and grain in Ceylon and Germany.

Pathological interceptions of interest.--Several species of nematodes, including Aphelenchus avenae Bast, were found on January 14 at New York in soil around a plant of Musa sp. in baggage from Costa Rica. Bacterium citri Doidge was found on December 12 at Boston on sour limes in stores from India. Ceratostomella ulmi (Schwarz) Buism. was found in three lots of suspicious looking elm crating from England, collected at New York on October 28, on another on November 29, and on a fifth lot on December 17. Colletotrichum orchidearum Allesch, with shorter and especially narrower spores than usual, was intercepted on October 18 at Hoboken on Phalaenopsis sp. from England. The same species was found on Ansellia africana, a new host for our interception files, also from England, on October 19 at Hoboken. C. orchidearum var. odontoglossi Verpl. & Cl., agreeing unusually well with the authors' description, was intercepted on October 18 at Hoboken on Odontoglossum sp. from England. Diplodia henriquessiana Trav. & Spessa was intercepted on October 28 at Hoboken on Cattleya sp. from Peru. The fungus found in a diseased area of an avocado from Mexico, intercepted on November 12 at Hidalgo, has been tentatively determined as Dothiorella sp. Erinella longispora (Karst.) Sacc. was found on November 30 at Hoboken on decaying wood in baggage from Brazil. Gloeosporium cattleyae Sacc. & D. Sacc. was found on December 4 at San Juan on Cattleya mendelli from Colombia. Pestalozzia rhododendri (D. Sacc.) Guba was intercepted on November 28 and 29 at San Francisco on varieties of Azalea indica from Japan. Phomopsis magnoliicola Died. was intercepted on December 30 at Seattle on a magnolia from Japan. Phoma camelliae Pass. was intercepted on January 17 at Seattle on Camellia japonica from Japan. Trochila ilicis (Chev.) Rehm. was found on November 22 at New York on holly in mail from England. Uredo oncidii P. Henn. was found on October 30 at Hoboken on an orchid leaf in baggage from Brazil, and on November 27 at San Francisco on Oncidium lanceanum in mail from England.

DOMESTIC PLANT QUARANTINES

Many Federal agencies helped control' hoppers and crickets.--In the 1940 campaigns against the grasshoppers and Mormon crickets substantial assistance was given to the Bureau by the Indian Service, the Civilian Conservation Corps, the Division of Grazing of the Department of the Interior, the Soil Conservation Service, the Forest Service, the Bureau of Reclamation, and the Fish and Wild Life Service. Labor, equipment, materials, and transportation were contributed by these organizations of the Department of Agriculture and Interior, to the total value of over \$30,000.

Mormon cricket control in 1940.--During last season, Mormon cricket control operations were conducted in cooperation with various State and

Federal agencies, for crop protection only, in 9 infested States, namely, Idaho, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming. Approximately two-thirds of the cost of control was borne by the Bureau and one-third by the States, counties, and individuals. The control operations included power and hand dusting of more than 158,000 acres of infested lands, baiting of nearly 161,000 infested acres, and the operation of 1,602 mile-days of metal barrier, 961 mile-days of oil-on-water barrier, and 113 mile-days of trench barrier. It was estimated that these operations resulted in protecting 1,629,000 acres of crop lands. Areas infested with populations of Mormon crickets sufficient to cause crop damage were conspicuously fewer in Montana and Wyoming in 1940 than in 1938 and 1939. Populations of Mormon crickets remain high in Nevada, and in rather limited areas in Idaho, Oregon, and Washington, in spite of extensive control operations where crop protection has been adequate. However, infested areas, remote from crops, maintain a source of supply for continual reinfestation of crops.

Methods and equipment in Mormon cricket control.--The outstanding development in Mormon cricket control last year was the increase in the use of power dusters and proportionate decrease in the use of hand dusters, as well as the increase in the use of sodium fluosilicate bait and the proportionate decrease in the use of sodium arsenite dust. Where Mormon crickets and grasshoppers occur in the same area, both are satisfactorily controlled by the use of sodium fluosilicate bait. Important improvements in equipment effected in the season's control of 'hoppers and crickets were the development and use of a power bait mixer, a power bait spreader, and portable units for servicing and equipping bait spreaders, also the designing and installation of effective bait hoppers in Bureau-owned airplanes.

Diseased peach trees being taken coming out.--All phony trees found in Georgia during the 1940 field season, a total of nearly 61,000, have now been removed, with the exception of 1 tree in Stewart County. Growers, on the whole, have cooperated well with the program, having themselves removed nearly one-third of all the peach trees found to be infected in Georgia during the inspection work of last season. In California good progress is being made in taking out mosaic peach trees, all known infected trees having been removed from San Bernardino County. There remain only 348 known mosaic trees now standing in California. These are on two properties in the Hemet district of Riverside County. Abandoned trees in the Beaumont-Banning district are being removed by tractor. Peach growers in the Imperial district have organized to encourage the removal of neglected apricot, plum, and almond orchards.

Peach plantings in California.--According to a recent newspaper article, peach growers in the Yucaipa district, where 18,000 trees were removed last year because of mosaic infection, are replanting their orchards, 10,000 trees having been planted up to February 1. The new trees are being purchased in an area well removed from mosaic infection.

White-fringed beetle control program discussed.--A conference attended by representatives from the office of the Chief of the Bureau and from two research divisions, as well as the control project workers, was held at Gulfport, Miss., on January 25 and 26. Careful consideration was given to the results of the control and research work from 1937 to the

present time, and from these results a general work program for 1941 is being prepared, to be presented to the State cooperators for consideration.

Certification requirements of white-fringed beetle quarantine modified.--In a revision of circular B. E. P. Q. 485, the Chief of the Bureau, on January 24, 1941, modified the restrictions of the white-fringed beetle quarantine by waiving the certification requirements for a limited period on certain articles and materials. This modification applies to soil-free potatoes and sweetpotatoes until May 1, 1941. It applies to 5-pound packages of bird sand and bird gravel, and 5-pound quantities of ground peat, to orchids growing in Osmunda fiber, and to the fiber itself, until June 1, 1941. The methods under which the above articles and materials are produced and handled, or the application of control measures and the maintenance of sanitation practices are such, it is believed, as to eliminate risk of spread of the beetle.

Sweetpotato weevil infestation in another Alabama county.--An infestation of sweetpotato weevils was recently uncovered near Greenville, Butler County, Ala. The farm and all other properties in the vicinity were carefully inspected, and arrangements made to dispose of all infested stock and materials that might be exposed to infestation. The county is also being designated as an eradication area. The infestation was traced to tenant movement 3 years ago of sweetpotatoes from an infested area in Louisiana. No weevils had heretofore been known to exist in Butler County.

CONTROL INVESTIGATIONS

Full-bloom stage best time to harvest devil's-shoestrings.--The changes in the insecticidal value of the roots of cultivated devil's-shoestrings (Tephrosia virginiana) at 4 seasonal growth periods has been studied by A. F. Sievers, M. S. Lowman, and G. A. Russell, of the Bureau of Plant Industry, in cooperation with W. N. Sullivan, of this Division. In this work the clonal progenies of 10 parent plants of Tephrosia virginiana were grown under cultivation in northeastern Texas, to study the changes in the amount of rotenone and chloroform extractive present in the roots of such progenies and their toxicity to houseflies at 4 seasonal stages of growth. Two or more of the clonal progenies of each parent were completely removed from the ground at the dormant stage (January 26), the emergence stage (March 25), the full-bloom stage (April 26), and the mature-seed stage (August 6). The roots were dried and ground, the amount of chloroform extractive and rotenone determined and the toxicity of acetone extracts tested on houseflies. The results indicate that at the full-bloom stage the roots are significantly more toxic to houseflies than at the dormant and emergence stages but their superiority over those at the mature-seed stage is less pronounced. The chloroform extractive and rotenone content is also highest at the full-bloom stage. The toxicity of the roots of the several clonal progenies of the same parent does not vary significantly, but significant differences were found in this respect between the progenies of different parents. The results of this work were published in the American Journal of Botany (27 (5): 284-289).

INSECTICIDE INVESTIGATIONS

Organic sulfur insecticides.--In May 1935 the mimeographed publication E-344, entitled, "A List of Organic Sulfur Compounds (Exclusive of Mothproofing Materials) Used as Insecticides," was issued. In this publication an attempt was made to catalog all the organic compounds containing sulfur used or proposed for use as insecticides, fungicides, or bactericides, as well as those wetting and emulsifying agents containing sulfur that have been used in conjunction with insecticides. A supplementary list covering the years 1935-37, inclusive, and some early references that were overlooked when E-344 was compiled, has now been completed by D. L. Vivian and F. Acree, Jr. After the list has been mimeographed it will be available for distribution.

Acetanilide derivatives patented.--A dedicated patent which covers the use of the chloro-, bromo-, and iodo-acetanilides as insecticides was issued to Lloyd E. Smith as U. S. Patent 2,226,672 on December 31, 1940.

BEE CULTURE

Sugar concentration controls bee activity.--G. H. Vansell, Davis, Calif., has been studying the effect on bee activity of sugar concentration in nectars. He draws the following general conclusions as the result of work thus far: "Plants provide bees with nectars of different sugar concentration. Only part of this variation is because of difference in shape of blossoms, which is or is not conducive to evaporation. Some plant nectars are consistently rich in sugar, whether occurring in situations of low or high humidity. Notable cases are mustard and filaree, which appear always to yield relatively concentrated nectars. The approximate average values obtained in the field for a few plants are shown in a table below. The exact values change with additional data, but the relative position of a plant remains fairly constant. The sugar concentrations in nectars studied are shown in the following tabulation.

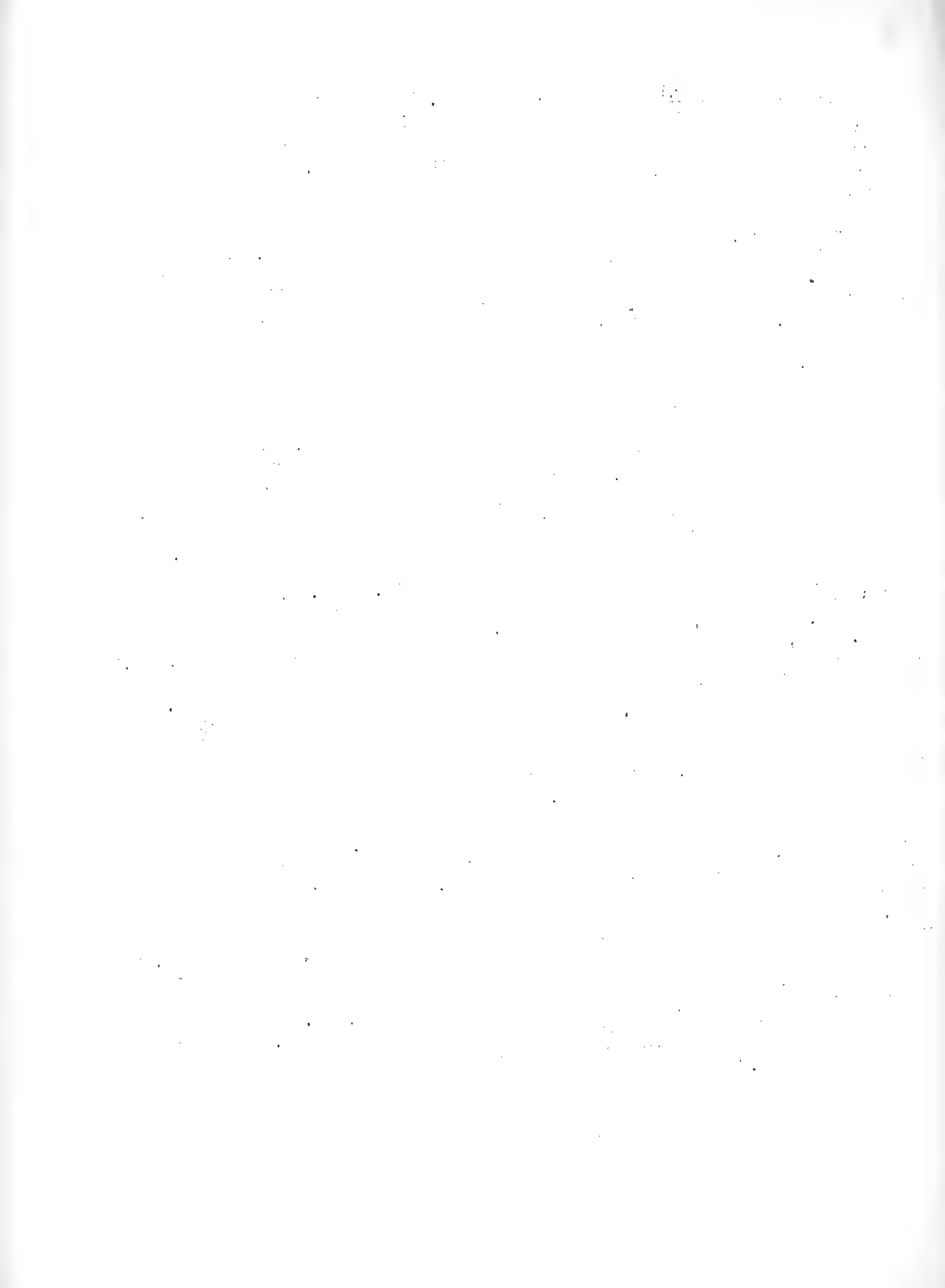
<u>Source</u>	<u>Percentage of sugar</u>
Bartlett pear-----	10
Cleome-----	16
Orange-----	20 (1939) light crop
Orange-----	30 (1940) good crop
Blue curls-----	27
Star-thistle-----	38
Alfalfa-----	41
Mustard-----	50
Filaree-----	60

A plant which is not abundant and does not carry a large number of blossoms can scarcely qualify as a major source of honey. In addition, it is concluded that, to be a major source of honey, the nectar in the plant must frequently show a concentration of at least 30 percent sugar. Bee activity is greatly influenced by sugar concentration; for example, in the orange orchards they prefer mustard, except when evaporation of water from the orange nectar increases its richness."

Crop dusting and beekeeping.--Frank E. Todd, Davis, has summarized the effect of crop dusting on beekeeping in California and Arizona as follows: "The airplane dusting of cotton in Arizona for the control of hemipterous insects results in considerable losses of bees. The beekeeper is hard-pressed by low prices, as well as by poison losses in the irrigated areas. The losses are not confined to the field bees, as colonies in poisoned areas die out over an extended period and those that live do not recover strength. This indicates poison in their food stores. In other areas this condition has been traced to poison in the pollen rather than the honey. In cotton observed in the San Joaquin Valley pollen is not collected to any great extent. As cotton blossoms are closed during the usual dusting time, it is probable that the poison pollen is collected from ground flowers about the cottonfields. Puncture vine is a probable source in Arizona. The airplane dusting of peas and melons in Imperial Valley has also been the cause of great bee losses. The State regulation requiring notice to the beekeeper has tended to relieve the situation somewhat, but has forced the beekeepers of that area to become migratory, thus greatly increasing production costs at a time when honey prices are very low. Bees work on both peas and melons. Another aspect of the airplane-dusting problem is not concerned with commercial beekeeping. The small beekeeper, unable to move his colonies out of the area, is being eliminated. Losses of this type may result in pollination difficulties as yet unsuspected."

Pollen sources during winter season at Davis.--Geo. H. Vansell reports: "Honeybees are collecting nectar (Jan. 31) from the female blossoms on cypress, arborvita, and juniper trees. A large number of medium-sized yellow, pink, or brown pollen loads are also provided from the same sources. In some cases the male and female blossoms occur on separated parts of the same plant. These plants are usually considered as wind-pollinated but, as bees visit them consistently, they must be at least in part insect-pollinated. The coast redwood (Sequoia sempervirens) constitutes a fairly important source of bee pollen each spring, but apparently no nectar is obtained from this source. From the early blossoms of the California bay tree both nectar and pollen are obtained."

Step towards "self-fertilization" of queen bees.--Otto Mackensen, University, La., has reported success in inseminating artificially unmated drone-laying queens with sperm from their sons. He states: "The virgin queens were confined to their hives until they started laying unfertilized eggs. Sperm from the drones resulting from the development of these eggs was then used to inseminate artificially the virgin mothers. Genetically, this is equivalent to self-fertilization, since a queen's sons represent her germ cells. Some sperm was found in the spermathecae of all the 10 queens mated in this way. The maximum number was 1,550,000. All the queens stopped laying immediately after mating and soon all were dead. These results demonstrate that sperm can be made to reach the spermathecae of virgin laying queens."



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UNITED STATES
DEPARTMENT OF AGRICULTURE



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ADMINISTRATION

Bureau Appropriations

The bill to provide appropriations for the Department for the fiscal year 1942 passed the House and is now being given consideration by the Senate. As it passed the House, the bill provides \$5,198,493 for the Bureau, exclusive of white-pine blister rust funds. The \$5,198,493 is \$103,439 below the budget estimates. The budget estimates for the fiscal year 1942 provided the following increases and decreases in amounts of the appropriations for the current fiscal year:

Increases

Mexican fruitfly control -----	\$ 7,500
Barberry eradication -----	20,000
Insecticide investigations -----	5,000
Foreign plant quarantines-----	20,000

Decreases

Citrus canker eradication -----	\$ 13,485
Dutch elm disease eradication -----	100,000

The bill, as it passed the House, provides for reductions below the budget estimates for the following:

Mexican fruitfly control -----	\$ 7,500
European corn-borer control -----	17,939
Barberry eradication -----	20,000
Bee culture -----	33,000
Insecticide and fungicide investigations ---	5,000
Foreign plant quarantines -----	20,000

The white-pine blister rust estimates have been handled differently this year, because of a change in the authorizing legislation intended to enable the appropriating powers to have all estimates for blister rust work before them at one time. The blister rust estimates, therefore, as submitted by the Bureau of the Budget amounted to \$1,409,000, which included an increase of \$100,000 for the Bureau, an increase of \$50,000 for the Forest Service, and an item of \$215,000 for the Interior Department. As the bill passed the House, these items were reduced to \$1,159,000, the Bureau increase and the Forest Service increase being eliminated and the amount of the estimate for the Interior Department being decreased to \$115,000.

FRUIT INSECT INVESTIGATIONS

Raisin moth larvae survive long cold storage.--Charles K. Fisher, of the Fresno, Calif., Laboratory, reports that a few full-grown larvae of Ephestia figulilella Greg., collected December 12, 1938, were still in the larval stage 2 years later, after storage for most of that period at about 40° F. Four hundred larvae had been stored in paper cans which were partly filled with raisins and provided with rolls of corrugated paper for pupation quarters. They were exposed to outdoor temperatures from December 12, 1938, to April 10, 1939, when they were placed in a mechanical refrigerator. Seven were alive on December 4, 1940. After incubation at about 80°, 3 adults emerged in January 1941.

Temperatures above 60° F. bring plum curculio out of hibernation.--Investigations under field conditions have shown that a mean temperature above 60° F. for several successive days is required to cause the plum curculio to appear on peach trees in numbers from hibernation. Now Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that investigations under greenhouse conditions confirm those under field conditions. On February 13, 1941, a cage containing 400 plum curculio adults hibernating in Bermuda grass and oak leaves was removed from an orchard and placed in a greenhouse, with the thermostat set at 60°. Observations showed that after this cage was placed in the greenhouse the temperature was never below 60° in the night and ranged from 60° to 80° in the daytime. No curculios appeared from hibernation on the first, second, third, and fourth days after the cage was placed in the greenhouse, but on the fifth day they began to appear on the screen above the hibernating material. Therefore, 5 successive days with a mean temperature above 60° was required to bring adult plum curculios out of hibernation under controlled-temperature conditions.

MEXICAN FRUITFLY CONTROL

Fruitfly status in the lower Rio Grande Valley.--The first larvae of the usual spring infestation of the Mexican fruitfly were found at Weslaco, Tex., on February 12. By the close of the month larvae had been found in grapefruit on 16 other properties. With one exception, none of these infestations were widespread throughout the groves. No forecast can be made as to the probable amount of infestation which might take place this season. Trap recoveries, however, indicate that no more than

the normal amount of infestation is to be expected, as less than the usual number of flies is being taken. Sterilization rooms are in readiness to take care of any amount of fruit which might need to be treated before being shipped, and it is not believed that any out-of-the-ordinary difficulties will arise which will prevent the successful shipping of fruit and termination of the harvesting season as set forth in the regulations. Growing conditions were excellent for citrus during February. Heavy rains over the entire regulated area in January caused citrus trees to bloom profusely and all indications point to a heavy set of fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Chinch bugs extract more substances from susceptible than from resistant sorghums.--R. G. Dahms and Larry Bewick, Lawton, Okla., report that preliminary tests conducted during August 1940, in which over 2,000 chinch bugs were used, showed that chinch bugs feeding for 8 hours on Dwarf Yellow milo (susceptible) gained on an average of 0.00012861 gram, whereas those feeding on Atlas Sorgho (resistant) lost 0.00001715 gram per bug.

Chinch bug oviposition increased when feeding on sorghum plants growing in solutions containing high nitrogen or low phosphorus.--According to R. G. Dahms, Lawton, second-generation chinch bugs laid 50 eggs per female more on Finney milo plants growing in nutrient gravel cultures containing a high amount of nitrogen than when the solution contained a low amount; however, the plant growth was apparently normal in both cases. On the other hand, plants growing in solutions containing a low amount of phosphorus laid a few more eggs than those feeding on plants growing in high phosphorus solutions. In these experiments the longevity of females was lower when the number of eggs per female-day was high than when it was low.

Concentrated sprays effective against *Pantomorus peregrinus* Boh.--H. C. Young, Florala, Ala., reports that S. F. Potts found calcium arsenate and cryolite more effective against *P. peregrinus* at Gulfport, Miss., during 1940 when applied in the form of a concentrated spray than when applied as a dust or dilute spray. From 3 to 10 gallons of the concentrated spray containing 3 to 15 pounds of insecticide was applied per acre. The concentrate contained water as a carrier and 0.1 pound of dissolved casein or 0.2 pound of raw linseed oil, or 0.1 pound of dissolved casein and 0.1 pound of raw linseed oil per pound of insecticide as an adhesive. Cotton and peanut foliage treated with this concentrated spray produced good mortality of the beetle after exposure for 2 weeks to natural weather conditions, in which 3 to 5 inches of rain fell. For the caged females, tests giving satisfactory control caused a reduction of 90 to 98 percent in feeding and a 93- to 98-percent reduction in viable eggs. This degree of control reduced the number of eggs per mass to about one-third of the normal.

European corn borer migrants from corn debris.--W. A. Baker, Toledo, Ohio, reports that E. W. Beck and K. D. Arbuthnot encountered an unusual survival in and around a piggery in eastern Massachusetts. Green corn-stalks had been fed to hogs in the piggery, examination of which disclosed

no measurable corn debris. Crevices between fence boards and posts were filled with a weblike material such as lepidopterous larvae produce. Many corn borer larvae, and even a greater number of pupal cases, were present. Although the stalks of this year's crop had been destroyed by feeding or trampling of the hogs, some of the larvae had escaped and found suitable hibernation quarters. The presence of pupal cases indicated that many larvae had passed the winter of 1939-40 successfully in this situation or were individuals of the first generation. The latter seems unlikely because very little early corn was grown by the owner this year. It was ascertained that corn from a 1939 field, which averaged about 17 borers per stalk, was fed to the hogs in this same piggery. Almost every crevice, crack, and nail hole along the fence and buildings forming a part of the enclosure showed evidence of borers. One pupal case was found under a shingle near the lower edge of the roof.

Influence of nutrition on successive generations of corn borer.-- G. T. Bottger, Toledo, reports on the differential effect of nutrition on the rearing and development of successive generations of the corn borer in the laboratory, as indicated by infesting a few different kinds of green plant tissue with newly hatched larvae, rearing the surviving ones to maturity, and confining the progeny of each successive generation to the same type of food. When larvae of each generation were 15 days old they were weighed to determine any differences in size between generations which may have resulted from any of the various nutritive substances under test and also to determine the relative effect, if any, of the different nutriment on successive generations of the insect. Relatively low average weight and percentage pupation of the F_1 -generation reared on sweet corn kernels preserved by the quick-freezing method were attributed to the too advanced stage of maturity of the corn when frozen. In other tests, corn kernels preserved by freezing have compared favorably with green beans and peas as a source of nutrition for the borer. The subnormal physiological condition of the F_1 -generation borers nourished on corn kernels preserved by freezing may have been the cause of the very low average weight and percentage survival of the F_2 generation reared on this food. This generation failed to reproduce, which is considered as further evidence of a possible cumulative adverse nutritive influence in this instance. Failure of any test larvae to survive up to 35 days when reared on green cornstalks which had been quick-frozen was attributed to the physical condition of the corn tissue. Although the freezing process does not change the chemical composition of green plant tissue, it ruptures the cellular structure, causing a rather quick collapse of the tissue after thawing, which apparently is conducive to excessive mold growth and general decomposition. In various other tests corn borer larvae were reared on frozen corn tissue but the stalks, being more mature than those employed in these tests, were less succulent and consequently less affected by freezing. Furthermore, in previous tests with quick-frozen tissue, new material was supplied the larvae every 24 to 48 hours, whereas in the tests under discussion, the 5-day feeding interval, successful for most fresh green-plant tissues, was relied upon for all materials, whether frozen or fresh. Weights of larvae reared on green beans or peas through the F_4 generation indicated no appreciable influence of laboratory rearing on larvae up to at least the fifth generation.

Resistance of field corn to European corn borer.--L. H. Patch and R. T. Everly, Toledo, report: "Six commercial double-cross hybrids were

used as 1 set of standards against which the borer populations in the other hybrids were compared. Each plant was infested by hand with 4 egg masses in addition to a light natural infestation of less than 1 egg mass. As a result the commercial hybrids averaged 6.41 borers per plant. The 6 most resistant experimental hybrids were R4 X Wis. CC5, R4 X Kan. G-30, R4 x Mich. 285, R4 X L317, (R4 X Hy) X L317, and (L317 X Hy) X R4. With the exception of inbred Hy, the inbreds involved in these crosses had shown marked borer resistance in past tests. The 6 hybrids averaged 2.94 borers per plant, or 54.1 percent less than the number of borers in the 6 commercial hybrids. The relative maturity of the strains was considered in making this comparison. A group of 6 New Jersey hybrids, tested for the first time and including 2 commercial double crosses, averaged 8.09 borers per plant, or 26.2 percent more than the standard hybrids. The New Jersey hybrids were the most susceptible to the borer of any tested. One group of single-cross hybrids involved 14 inbreds crossed on borer-resistant inbred Ill. R4. These inbreds were used because of their promise of containing some resistance to the borer in previous tests. Another group of 14 single crosses involved the same inbreds crossed on partially borer-resistant inbred Ill. Hy and a third group involved the same inbreds crossed on borer-susceptible inbred Ill. A. The three groups averaged 3.86, 5.56, and 6.85 borers per plant, respectively, indicating that the borer resistance of inbred R4, the partial borer resistance of inbred Hy, and the borer susceptibility of inbred A were transmitted to the single crosses. The 14 inbreds were also tested as inbreds. The combined correlation coefficient between the borer populations in the inbreds and their crosses on inbreds R4, Hy, and A is +0.7206. The very high significance of this value indicates again that the factors for borer resistance in the single crosses were inherited from the inbreds in this experiment and that inbreds may be used to test the borer resistance of unknown material, at least in a preliminary test."

Inheritance of field-corn resistance to European corn borer.--Messrs. Patch and Everly are studying the inheritance of field-corn resistance to the European corn borer by observations on the borer resistance and susceptibility of segregates out of a single cross of 2 resistant inbreds, R4 and L317. In 1939 the kernels from 1 ear of (R4 X L317) F₂ were planted and each plant was selfed, obtaining 142 ears. In 1940, half the seed from each ear was planted and the F₃ plants were given the usual test for their resistance to borer survival by infesting the plants by hand with a given number of egg masses and counting the borers maturing. In other words, the segregation of the F₂ plants of R4 X L317 was studied on the basis of the performance of their progenies. Each line was planted on May 22 in 1 2-hill plot in each of 4 blocks or replications. The plants were infested from July 13 to July 24 and 6 egg masses per plant, averaging 124.8 eggs per plant. The lines silked from August 5 to August 13. When the plants were infested on the mid-date July 18, the segregates averaged 51.4 inches in height to the tips of the leaves extended upward, the infestations being made before the tassels became a factor in borer survival. An average of 6.54 borers per plant survived in all the plants dissected the last week of August. Statistical analysis showed highly significant variation among the borer populations in the individual lines. Since the lines differed significantly among themselves in number of borers surviving, the especially borer-resistant and borer-susceptible lines were determined. On the basis

of odds of 39 to 1 against a mean varying negatively from the mean of all lines silking on the same date to the extent of 1.966 or more times the standard error of estimate due to chance alone, only 3.6 lines on the average would be expected to vary to that extent. Actually 17 lines were found to contain that low level of borers. Seven of these lines averaged 4.3 borers per plant, as compared with 8.7 borers in 9 lines that were found to contain significantly more than the expected number of borers.

Relation of field corn planting dates to yields under corn borer conditions at Toledo.--Messrs. Patch and Everly have also been investigating the combined effects of field corn infestations by first- and second-generation European corn borer larvae in relation to planting dates, as reflected in final yields of bushels per acre of 15.5 percent moisture content. In the 1940 program, plantings of the single cross hybrid A X TR were made on May 3, 13, 23, and on June 1 and 11. As the ears of all except the June 11 plantings were beyond the milk stage on September 10, when the second-generation borers were one-quarter grown, it is believed that the second-generation borers reduced the yield of the earlier plantings very little if at all. Experiments conducted during 4 years showed that the amount of reduction in yield caused by first-generation borers to corn normally yielding 85 bushels per acre is considerably more per borer in the early June plantings than in the early May plantings. For corn normally yielding more than 85 bushels per acre the reduction in yield was found to be somewhat greater. These greater reductions in yields per borer due to later planting and higher levels of yield, together with the differential effects of weather and the differences in the number of mature borers between the plantings due to differences in the number of egg masses laid and the rate of borer survival, had their combined effect on the yields made by the plantings. In 1940 the May 3, May 13, May 23, June 1, and June 11 plantings gave yields of 99.3, 103.6, 104.4, and 87.6 bushels per acre, respectively, of 15.5 percent moisture content. The standard error of the yield of the first and last plantings with six replications is ± 1.37 bushels, and of the intermediate plantings with 10 replications is ± 1.07 bushels. Since May 13 to 23 may be considered a normal time for planting corn in the locality under study, there was nothing gained this year by delaying corn plantings to escape damage by the corn borer. In 1939, when a late summer drought occurred, the May 13 planting gave the maximum yield, even though it was infested with 2.0 and 3.5 more first-generation borers per plant than the May 23 and June 2 plantings. In 1939 and 1940, therefore, plantings made at the normal time resulted in maximum yields under the conditions of weather and corn borer infestations for the locality studied.

Relation of survival of European corn borer larvae to level of egg populations.--Messrs. Patch and Everly have also established a relationship of lower survivals of European corn borer larvae with increasing numbers of corn borer egg masses per plant. As an average of plantings made on May 8, May 17, May 25, and June 3, the number of borers resulting from the different levels of egg infestation ranged from 4.50 per plant in the 1.5 egg-mass or 31 eggs-per-plant level to 6.63 per plant in the 12 egg-mass or 250 eggs-per-plant level. Placing twice as many eggs on the plants (3 versus 1.5 masses) resulted in no increase in the borer population, 4 times as many eggs (6 versus 1.5 masses) resulted in a 21.8 percent increase

in the borer population, and 8 times as many eggs (12 versus 1.5 masses) resulted in a 47.4 percent increase. A surprisingly small increase in the number of borers resulted, considering the number of eggs placed on the plants. The increase was no greater on the May 8 and May 17 plantings, although these plantings were more mature and in a better condition to maintain a higher level of borers. There were no differences in the date of silking between the plots infested with different levels of egg infestation.

Damage to sweet corn by second-generation corn borer larvae and by corn earworm in relation to time of planting.--In a series of plantings of sweet corn made by Morris Schlosberg near Toledo, progressively higher rates of damaged ears were found in the later plantings. For plantings made on May 23, June 8, June 15, June 25, and July 5, the percentages of injured ears were found to be 22, 38, 43, 60, and 74, respectively. Under the single- and two-generation strain conditions of the European corn borer in the vicinity, infestation of the plantings by the corn borer was mainly from oviposition by the second-generation moths, progressively higher levels of larval populations appearing in the later plantings. The increased rates of damaged ears in the later plantings were associated with this factor, plus an increasing rate of infestation by the corn earworm as the season advanced. In relation to the plantings given above, of the total numbers of corn borer larvae in the plants, 31.7, 35.7, 47.0, 57.8, and 64.3 percent, respectively, were in the ears (including nubbins). The increased numbers of corn borer larvae in the ears in the later plantings were associated, in part, with their higher levels of larval populations in the plants and, in part, with the presence of the ears at the time of infestation, a condition conducive to their invasion. When infestation of the plants occurred prior to the appearance of the silks, a larger proportion of the larvae tended to invade and remain in the stems, and was reflected in the production of fewer and smaller ears, owing to direct injury of the plant.

JAPANESE BEETLE CONTROL

Municipally sponsored Japanese beetle control.--George H. Hollister, superintendent of parks of Hartford, Conn., has submitted the following report concerning damage by Japanese beetles in the city parks: "Japanese beetle grubs did considerable damage to the lawn areas in four of our parks during the season 1940, namely, Keney Park and Keney Park golf course in the south end, Colt Park in the east side, and Pope Park in the southwestern part of the city. We found as many as 50 grubs per square foot in a number of different areas and the damage was quite severe, as we were able to pick the turf up as you would a rug. We treated approximately 135 acres with lead arsenate late in August and early in September, spraying it on and washing it in with a sprayer. The cost of applying the lead and washing it in averaged about \$42 an acre. This year we are planning to treat more of our lawn areas. We hope to be able to do this work before rolling in the spring, when the surface of the ground is porous, and rely on early spring rains to take the poison down where the grubs are when they are feeding."

Adult beetles collected.--On February 24 and 25, inspectors from the Philadelphia district office collected 537 adult Japanese beetles in greenhouses. These were delivered to the Japanese beetle research laboratory at Moorestown, N. J., for use in experimental work. Although 400 specimens were collected at one establishment under favorable weather conditions, the adults were comparatively scarce. At another rose grower's establishment at Kennett Square, only 7 beetles were found in a large range of greenhouses. Many of the growers contacted reported fewer beetles than in the past. A number of these unclassified establishments sterilize their soil before planting, thereby destroying the larvae. The greatest number of adults was taken from the foliage of Better Times, a red rose. Foliage feeding on this variety was noticeable and light infestation on the blooms was also noted.

Plant-shipping establishments canvassed in newly regulated areas.--Surveys of nurseries, greenhouses, and plant-growing establishments in the sections of Maryland, New York, Pennsylvania, Virginia, and West Virginia added to the Japanese beetle regulated area under the revision of the regulations effective February 12, 1941, were in progress at the end of the month.

Inspection activities in Pennsylvania.--Classified growers of nursery and ornamental stock in the Pittsburgh area are anticipating for 1941 the biggest sales season since 1929. Notwithstanding the severe weather during February, there was a marked increase in the movement of quarantined products to points outside the regulated area. The material consisted mostly of greenhouse stock, although a few shipments of nursery stock were certified. Growers in the central Pennsylvania district report a scarcity of Easter-bulb stock, with no hyacinths and only a few tulips. Some growers are trying to push cinerarias and calceolarias to replace them. One large grower has one-third more Easter lilies and 25 percent more azaleas than usual.

Certification of sports exhibit materials.--Twenty-five inspections were made of materials moving from the Boston Sportsman's Show, held from February 1 to 9, to the New York Sportsman's Show, starting on February 15. Those in charge of the various State exhibits were well informed of the plant quarantine regulations and came to the show this year with the materials properly certified or with proof that the products originated outside the regulated areas. The inspections ranged from a single piece to a carload lot. Both Japanese beetle and gypsy moth certifications were involved. Most of the materials collected in New Hampshire and Maine were inspected and certified under the gypsy moth regulations by the local district inspectors at the collection points and were recertified to New York on the basis of the initial examination. All materials inspected were found free from the gypsy moth.

Reduced supply of stored lumber.--District inspectors in New England report that, with the exception of hurricane lumber, there is very little local, yard-dried lumber left from the cutting and sawing of last spring and summer. The hurricane lumber is being inspected and shipped at the rate of approximately 10 million board feet per month. The district inspector at Greenfield, Mass., reports that the mills now operating are shipping

their green lumber about as fast as they manufacture it. Most of the green lumber is being used locally, although some is being shipped to points outside the gypsy moth regulated area. Piece-by-piece inspection is required of the lumber to be certified, as the saw logs in this area average very small, with the result that the so-called square-edge lumber, as well as the round-edge, is likely to contain more or less bark which may harbor egg clusters.

Nursery stock moving from New England.--Although 1 foot of frost was encountered in digging the trees, a nursery near Boston presented for inspection and certification on February 12, a carload of nursery stock for shipment to Michigan. The shipment consisted of 183 specimen hemlock trees from 5 to 10 feet in height. Two gypsy moth egg clusters were removed from this shipment. This consignment was well in advance of the regular spring shipping season. A nurseryman in the Portland, Maine, district on February 10, with the temperature 10° below zero, requested inspection and certification of 1,100 young evergreens and evergreen seedlings, for shipment to the States of Washington and Colorado. Shipments of nursery stock inspected last fall and stored over winter were quite heavy during February. Nurseries that handle this type of stock are located in central Connecticut and western Massachusetts. These firms report an increase in shipments, as compared with 1940. During February district inspectors in the New England area scouted all greenhouses certified under the Japanese beetle quarantine regulations. These were found free from infestation.

State gypsy moth nursery scouting.--Under the direction of Connecticut State inspectors, employees at one of the large nurseries in the Middletown, Conn., district treated 20 gypsy moth egg clusters in a block of hemlock trees on the premises. The State scout crew did not finish the inspection of the nursery during February, as some of the evergreens are brittle and may be broken off while frozen. A heavy gypsy moth infestation was found by another State scouting crew in Rocky Hill, bordering the Connecticut River.

Demands for New England minerals increase.--Calls for certain minerals used in the National Defense program have resulted in renewed interest in feldspar, mica, beryl, and other minerals found in sections of New England. Many old abandoned mines are being investigated and their products sampled. Inasmuch as these mineral products come under the gypsy moth quarantine regulations, the district inspectors have been called upon to inspect and certify the sample shipments.

European corn borer certification work.--Interception by State inspectors in Oregon of several shipments of chrysanthemum and aster that had not been inspected and certified with Federal European corn borer certificates led the shippers in Holland, Mich., to request such inspection and certification of their chrysanthemums, asters, and dahlias. This establishment was visited several years ago and at that time our inspectors were told that they did not ship to any of the nine States that require Federal corn borer certification. The corn borer inspector stationed at Detroit, Mich., reports that one of his larger shippers will start moving

stock about March 1. This inspector also reports that dahlia growers are still busy shipping clumps and roots under Federal certification. Forty shipments were inspected and certified from that area during February.

Cooperation in Dutch elm disease control received from Connecticut State Park officials.--A. V. Parker, Superintendent of Connecticut State Parks, recently issued the following notice to park superintendents and caretakers working under his supervision: "To park superintendents and caretakers at units of the State Park system listed on reverse: You are hereby authorized to allow men working for the United States Department of Agriculture, or for the Connecticut Agricultural Experiment Station, to remove dead trees that are causing the spread of disease, beetles, etc.; also to allow them to cut away parts of living trees, if their operations in so doing will not seriously injure the trees for park purposes. Keep in mind that the men on this work have but one object in mind, which is to check, or eradicate, the trouble they are fighting and we do not want to stand in their way. We, on the other hand, have State parks to consider and care for and the trees are a very important feature in our work. We should, therefore, be very sure that it is vitally necessary to cut, trim, or prune, before doing so ourselves, or allowing others to do so." This is another advance in the Division's efforts to obtain full cooperation from the various agencies throughout the State, particularly those with widespread holdings and operations, such as the State Parks, State forests, State highways, utility companies, and contractors.

Experimental burning of elm woodpiles in Ohio.--With the consent of the local fire warden, experiments were conducted in February to find a satisfactory method of covering incompletely consumed burning piles at the end of the day's work. The procedure tried involved chunking all unburned logs into as compact a pile as possible. The entire pile is then covered with a layer of soil at least a foot thick. The soil forms a protective covering to prevent the fire from escaping during the night, and at the same time allows the remainder of the unburned material to be consumed by the following day. In nearly every instance, the piles were completely burned by the next morning, except perhaps for a few ends. The soil in most locations contains sufficient clay so that it is baked by the heat and forms a dome over the logs. The following morning the soil is leveled out and any remaining log ends are burned. The trials have indicated that this method of safeguarding fires at night is superior to completely extinguishing them at the end of the day, a procedure that requires considerable labor to rekindle them.

Difficult removal of elm in Ohio.--Difficulties were encountered by elm-sanitation workers in the removal of a 45-inch elm which had to be taken out of Buck's Lake at Garden, Athens County, Ohio. This is an artificial lake constructed for recreational and fish-propagation purposes. Raising of the water level caused the tree to decline, rendering it potential beetle material. The men were obliged to use boats to reach the tree and fell it, as the water at the trunk reached a depth of 10 feet. It was possible to fell the tree so that all of the crown and half of the trunk fell on the bank. The lower half of the trunk had to be sawed into sections in the water and pulled onto the bank by block and tackle. A 60°

incline added to the task of pulling out the logs. Two crews supplied the pulling power.

Beetle wood collected for rearing and culturing.--Several units were assigned early in February to collect beetle-infested elm wood from districts around the margin of the major disease area. This wood was brought into the headquarters at Bloomfield, caged in a constant-temperature, lighted insectary, and the emerging bark beetles were cultured by a special technique to determine whether they bore Ceratostomella ulmi. Collections will continue in a general area within 25 miles of the known limits of the disease area and along selected highways, railroads, and streams where concentrations of elms may be found. Collections will be made at 2-mile intervals when this is possible.

Storm-damage survey in Bethlehem, Pa., district.--A survey of the damage caused by the ice storm of January 16 and 17 last in the Bethlehem district has disclosed that only a small number of elms was damaged in the northern and central portion of the district, with the damage confined mostly to small branches and twigs. Damage is slightly higher in the southern areas of Montgomery and Bucks Counties, although broken material in these counties is mostly small branches under 2 inches in diameter. Trees other than elms were hardest hit. Approximately 15 elms have been tagged for removal because of storm-broken branches.

Beetle-infested area in Connecticut sanitized.--Elm-sanitation operations were completed early in February in the heavily infested beetle area at a beaver swamp in New Milford Township, Litchfield County, Conn. A total of 722 beetle-infested elms and 22 elms that contained wood liable to be attacked by bark beetles were removed. The trees subject to attack were within the flooded area, but had not been weakened enough to harbor beetles.

Clear-cutting operations in New Jersey.--Clear-cutting work to rid a small beaver swamp of elms near Lake Hartung, Jefferson Township, Morris County, was completed in February. Most of the elms in the flooded area were dead, with most of them heavily infested with Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich. Clear cutting was also completed in the Basking Ridge section of Somerset County, N. J.

Hog-girdled elms to be removed.--Approximately 250 elms that had been girdled by hogs were located in Wayne Township, Marion County, Ind., a section of the Indianapolis work area. Most of these were red elms and were still too green for bark-beetle attack. Permission has been obtained for removal of the trees, although the wood is to be left for the owner to use before this year's beetle emergence.

Lumbering operations increase bark-beetle population.--Bark-beetle-infested material in the Albany County, N. Y., area will run high, owing to lumbering operations carried on in that section. A considerable amount of elm slash was left on the ground. This has become heavily beetle infested.

FOREST INSECT INVESTIGATIONS

Larch sawfly and hemlock looper in northern Rocky Mountains.--J. C. Evenden, of the forest-insect laboratory at Coeur d'Alene, Idaho, reports that the larch sawfly, which was reported from the Flathead National Forest in 1934, is now known to occur to the south and west for more than 100 miles. Although there are spot infestations of this insect throughout the Kootenai, Cabinet, and Coeur d'Alene National Forests, no serious damage has occurred. Mr. Evenden also reports that the severe epidemic of the hemlock looper which occurred throughout the alpine fir stands of Idaho and Montana in 1937 has been reduced through natural agencies to a point where it is no longer in evidence. During the short period of its existence a large percentage of the defoliated trees were killed; however, as this tree species is of little economic importance, the fire hazard which this destruction created is of the greatest consideration.

California pine scale causes damage to ponderosa pine.--During the spring of 1940 a severe infestation of the California pine scale (Nuculaspis californica (Coleman)) was found by H. L. McKenzie on mature ponderosa pines on Timber Mountain, Modoc County, Calif. This needle-infesting scale was apparently causing serious defoliation resulting in stunted needle tufts and a rather thinned appearance of the crowns of the trees. Whether the injury noted was entirely due to the needle scale or to infestations of Matsucoccus spp., also observed on stems of the pines, has not as yet been determined. For the last two seasons infestations of this same insect have been causing serious injury to pines on summer home tracts on the San Bernardino Mountains of southern California. One area is localized near Crestline, covering roughly about 700 acres between Lake Gregory and Camp Seeley. In some parts of the Crestline area the scale has become so bad on trees, which form the only cover for certain summer homes, that these pines are suffering very severely. Some trees have become badly stunted as a result of repeated defoliations and such trees appear to be more susceptible to attacks of flathead borers and secondary cambium-mining insects.

Matsucoccus^{1/} scale found on mature ponderosa pines in California.--Studies to determine the nature of the distribution of Matsucoccus spp. populations on low- and high-risk ponderosa pine trees in northeastern California, and also to ascertain the distribution and numbers of scales in relation to areas of tree crowns showing conspicuous deterioration and flagging, were initiated by H. L. McKenzie in 1940. A sketch of each tree, made in the field while the tree was standing, was included on a form sheet, and any unusual crown features, such as dead areas, flagging, or an old top-kill were indicated. After felling, the points from which the sample branches were taken were indicated on the tree sketch. From the limited data accumulated (8 trees to date) the following generalized statements may be made: (1) All trees examined, whether low- or high-risk types, carried infestations of Matsucoccus spp. scale in varying intensities; (2) heavier populations of scale are most likely to be found on trees exhibiting twig-flagging; and (3) high-risk trees show greater populations of scale than do the low-risk types.

^{1/} Matsucoccus bisetosus Morrison; M. californicus Morrison, and M. sp. (probably secretus Morrison).

Relation of Scolytus multistriatus to latent infections of Dutch elm disease.--During the period 1938-40, W. D. Buchanan, of this Bureau, and S. J. Smucker, of the Bureau of Plant Industry, Morristown, N. J., conducted an experiment with S. multistriatus Marsh. and its relation to revival of latent infections of Ceratostomella ulmi in elm. In the spring of the year nursery trees were inoculated with C. ulmi. Some of these were subjected to feeding attack by disease-free S. multistriatus in the following spring; others in the next spring. It was found that the feeding of the insect in diseased tissue of the crotches and trunks of the trees did not result in revival of external symptoms of the disease. The beetles very rarely picked up C. ulmi in feeding on the diseased tissues of trees containing latent infection. Further evidence of this fact appeared when logs of recently felled disease-free trees were exposed to attack by these beetles. Numerous galleries were formed but in no case was C. ulmi recovered from them.

Toxic and repellent sprays for elm bark beetles.--R. R. Whitten, Morristown, has prepared a manuscript on toxic and repellent sprays for the control of elm bark beetles. It is based on experiments that he has conducted. A total of 19 different spray mixtures were tested for their repellency or toxicity to the two principal elm bark beetles, S. multistriatus and Hylurgopinus rufipes Eich. The cost per gallon of these sprays ranged from 12 to 55 cents. Bark-moisture percentages (expressed in terms of dry weight) from 30 to 139 were found not to affect the results of these sprays. Air temperatures above 50° F. were found best for optimum results. The age of the bark-beetle brood had no significant effect on the toxic effect of the sprays. Based on emergence per 100 millimeters of egg galleries, reductions over checks for these mixtures ranged from 68.4 to 100 percent. Based on the number of egg galleries per log, 9 of the 19 mixtures gave reductions over checks ranging from 75 to 100 percent. Certain of these repellent treatments were exposed to weather from 7 to 52 weeks and to bark-beetle attack from 4 to 20 weeks. Repellent sprays applied early in May were found effective for the entire active season. Certain of these mixtures applied to tightly ranked, 1-cord, elm-wood piles under field conditions gave good repellency and kill. From 2.45 to 3 gallons of spray, costing from 49 to 78 cents, was found necessary to treat wood piles having between 60⁴ and 775 square feet of bark surface.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Weather aids gypsy moth control work.--Climatic conditions, while distinctly unfavorable at times, were generally better than usual during February, and satisfactory progress was made in gypsy moth work during the month. The snow in western Massachusetts and Vermont has not been deeper than 30 inches at any time this winter, and has averaged 18 to 24 inches during most of the period. This condition is rather unusual, as the depth of snow in mid-February is more likely to range from 4 to 5 feet in the wooded and mountainous areas. All types of gypsy moth work have been aided materially by the relatively small depth of snow.

Thinning and cutting crews make good progress.--Crews engaged in thinning work at gypsy moth infested locations confined their cutting to

the removal of the larger worthless trees during the periods when the snow was deep, as they could be felled and cut into sizes suitable for burning much more easily than the snow-covered small growth.

Scattered infestations found in Vermont.--Gypsy moth scouting work was completed during the first part of February in Castleton Township, Rutland County, Vt., and the crews began work in Benson and Fair Haven Townships, also in Rutland County. Occasional scattered egg clusters were found and creosoted, but no serious infestation has yet been discovered. Two small colonies were found in an extensive tract of woodland at a relatively high elevation in Benson. While a moderate amount of oak, which is particularly favored as food by the gypsy moth, is scattered through the wood lot, the small number of egg clusters found to date indicates that the infestation can be readily eradicated. Additional gypsy moth infestation was also recently located in Bristol Township, Addison County, where a limited amount of scouting last year resulted in the discovery of several small infested areas that were thoroughly sprayed later in the season.

Birch lots scouted in Bennington County, Vt.--Gypsy moth scouting work was temporarily discontinued in Manchester Township, Bennington County, late in January, and the crew was transferred to an area in the adjoining town of Dorset, where the cutting of paper birch trees had been started. The trees were cut into 4-foot lengths and the logs were trucked to a wood-working mill in Berlin, Rensselaer County, N. Y., and converted into bobbins, dowel stock, and wood novelties. Several gypsy moth egg clusters were discovered scattered through the wood lot and were creosoted in order to prevent the spread of infestation to uninfested areas. Birch logs cut in Woodford Township, in the southern part of Bennington County, were also shipped to the same mill, and a small number of egg clusters were found and destroyed in the timber lot where the logs originated. The scouting of both these wood lots was completed early in February.

Hurricane damaged timber lots difficult to scout.--Gypsy moth scouting crews working in Eden Township, Lamont County, and in Lowell, Orleans County, Vt., continued to encounter hurricane-damaged timber lots. In such areas the large growth had been uprooted, and the falling trees had smashed down all small growth in their path. Dense thickets of underbrush have grown up through the tops of the windfalls during the 2½ years that have elapsed since the hurricane, making an almost impenetrable thicket which is extremely difficult to examine for gypsy moth egg clusters.

Control work eliminates gypsy moth infestations on edge of barrier zone.--Scouting work was completed during the first part of February in an extensive area in Cummington Township in Hampshire County, Mass., which was heavily infested by the gypsy moth last year. The infested woodland in this town, which borders the eastern edge of the barrier zone, was thoroughly sprayed last June as a protection to the barrier zone. The effectiveness of the spraying is evident, as the scouting work revealed no new gypsy moth infestation in the treated area.

Scattered small logging operations increase gypsy moth scouting work.--More small logging jobs are being conducted this winter than for

several years throughout Berkshire County, Mass. The lots from which logs are to be hauled to other localities for sawing and manufacture are carefully scouted for the gypsy moth, and all egg clusters are creosoted. Several scouting crews are now engaged in the examination of these scattered woodlots in order to prevent the spread of gypsy moth infestation through this channel.

Scouting work completed at two gypsy moth infestations in Connecticut.--Gypsy moth scouting work at an infestation in Roxbury, Litchfield County, Conn., and at an adjoining infestation in Southbury, New Haven County, was completed early in February. Work at these colonies had progressed slowly because an insufficient number of workers were available to conduct the work in the most efficient manner in southwestern Connecticut.

Destruction of dead chestnut trees improves scouting conditions.--Large quantities of dead chestnut trees were cut and burned by gypsy moth thinning crews at some of the infested sites in Cornwall Township, in the north-central section of Litchfield County, Conn. It was difficult to locate all of the egg clusters on these dead trees, which had become so weathered that the coloration was similar to that of the gypsy moth egg clusters. As there was no safe way of reaching and creosoting the egg clusters deposited high up on the dead trees, it was necessary to chop the trees down and destroy them. The removal of these trees will permanently improve future scouting conditions in this section.

Unusual gypsy moth infestation found in Pennsylvania.--A large number of new gypsy moth egg clusters was discovered on a single white oak tree in a woodland area in Jenkins Township, Luzerne County, Pa., which was carefully scouted last year. Conditions were somewhat unusual in that the infestation was confined almost entirely to one tree, and a close examination failed to disclose any old egg clusters. The origin of the infestation was puzzling until it was learned that surface stone, gathered from stone walls in that vicinity, had been assembled under this tree preparatory to use on a road-building project. It is believed that one or more infested stones were responsible for the establishment of the infestation on the oak tree.

Gypsy moth egg clusters found on surface stone and mine timbers.--The movement of surface stone for use in road building in Pennsylvania increased somewhat as the snow disappeared and permitted the resumption of road work. All stone originating within the quarantined area is carefully examined for gypsy moth infestation before permission is given for its removal, in order to prevent the spread of infestation. During one week in February, five gypsy moth egg clusters were found and destroyed on four different shipments of surface stone originating in Pittston Township, Luzerne County. During the same week, four new egg clusters were found on mine timbers cut in Bear Creek Township, also in Luzerne County.

W. P. A. gypsy moth employees transferred to National Defense work in Pennsylvania.--All W. P. A. gypsy moth field workers in the Pennsylvania area were interviewed by W. P. A. employment officials during February. Group interviews were held at designated points, either at the beginning or at the end of the day, so that a minimum amount of time would be lost to

gypsy moth work. Employees whose work histories indicated some experience or profession that might be of value to National Defense work are being rapidly transferred to activities connected with that program.

Motor vehicles transferred to gypsy moth work.--A fleet of motor-trucks, consisting of 20 pick-up type machines and 5 $1\frac{1}{2}$ -ton trucks, was recently received at Wilkes-Barre, Pa. The machines were transferred to the gypsy moth project from the Grasshopper and Mormon Cricket Control at Denver, Colo. The trucks were urgently needed on the gypsy moth work to replace some of the worn-out equipment.

C. C. C. gypsy moth work during February.--The enrollment of the C. C. C. in February in this area has been below normal and, although the quota has been reduced from 206 to 167 enrollees per camp, very few camps have been filled to the reduced quota. The situation has been helped somewhat by permitting enrollment 8 times a year instead of 4, but there is still a deficiency in the numbers of enrollees. Some camps have as few as 65 or 70 enrollees available for work. The allotment for gypsy moth work has run fairly even and has ranged from 1,459 6-hour man-days during the first week of the month to 1,557 for the week ended March 1. The plan of work for February called for considerable scouting, and this was done on suitable days. On extremely cold and windy days, on stormy days, and on days of poor visibility, the men were used on thinning and burning work, so that no time is lost to gypsy moth work unless the conditions are very severe. During the thinning work the slash is piled and burned in a strip at least 100 feet wide along the roadsides, but the debris is scattered on the ground to deteriorate inside of this roadside strip, when possible, in order to reduce the cost of operation. Numerous large spreading oaks were removed during the month, some by chopping and others by girdling. Such work reduces the percentage of favored gypsy moth food plants at a low cost, especially when the trees are girdled. Many old apple trees were also removed from abandoned pastures, although an occasional tree was left for the encouragement of wildlife. A few hollow logs were also left in areas of general gypsy moth infestation to aid in wildlife management.

Close cooperation by C. C. C. with State and town gypsy moth officials and State foresters.--The C. C. C. cooperates in many ways with other agencies concerned with gypsy moth work in order to promote the efficiency of the work as a whole and to prevent duplication of work by different organizations. C. C. C. gypsy moth foremen in Massachusetts discuss and plan their work with the local moth superintendents. In Vermont, cooperation with the State entomologist has resulted in efficient work done around lunching and camping spots and at the storage place of a large fleet of trucks used in the express business, where severe gypsy moth infestations are present. The two organizations have worked together at some of these locations in creosoting egg clusters and in thinning work. Close cooperation is maintained with foresters in the areas where the C. C. C. is engaged in gypsy moth work. In some States the actual marking of trees to be removed is done by foresters or by gypsy moth foremen who have been trained by the foresters. In one case in February the assistant State forester of Vermont was requested to attend a conference with a property owner and gypsy moth foremen, in order that the best program could be determined for the treatment of woodland property containing

a considerable gypsy moth infestation. The woodland was examined and suggestions made for treatment which combined good forestry practices as suggested by the forester and for gypsy moth cutting. In some cases pure cutting was recommended by both agencies and the forester was able to suggest the most desirable species to be planted, based on soil and other conditions. Occasional conferences of this kind have resulted in improving gypsy moth forestry practices, especially in relation to developing stands of timber more resistant to the insect.

Favorable food plants removed at dangerous location.--An area of some 35 or 40 acres located on a high elevation in Vermont received gypsy moth chopping work in February. The growth in much of this area consisted of a very heavy stand of alder which contained scattered gypsy moth infestations. The conditions were serious because of the danger of the build-up and spread of the insect from this location. The danger was removed by cutting out the favored food plants and leaving those less favored by the gypsy moth. A similar area treated in this way 3 years ago now shows the development of a stand which is much more resistant to the gypsy moth.

C. C. C. gypsy moth training leads to permanent employment.--It was learned during the month that one of the New England States which has a position open for a gypsy moth foreman has confined the applicants to C. C. C. enrollees who have been trained on gypsy moth work. This speaks well for the training given to the enrollees on this work, and should encourage them to produce good work while in the C. C. C. Many enrollees who have been trained to climb trees with spurs and ropes on gypsy moth work have obtained well-paid employment with tree and telephone concerns, and many others have been given employment because of the training and experience they have had in other types of C. C. C. gypsy moth work.

PLANT DISEASE CONTROL

Nearly 2,000 square miles surveyed in Missouri in 1940.--According to George M. Frandsen, in charge of barberry eradication in Missouri, 338 barberry bushes were destroyed on 32 properties as a result of an intensive survey of 1,980 square miles. In commenting on accomplishments of the last year, Mr. Frandsen points out that approximately 90 percent of the area covered is now believed to be entirely free of barberries and will require no further attention. The remaining 10 percent, or approximately 190 square miles, will need at least one more intensive survey. The counties in which bushes were destroyed during the year were Callaway, Carroll, Chariton, Franklin, Jackson, Linn, Macon, Ray, St. Louis, St. Louis City, and Sullivan.

Accomplishments in Iowa.--D. R. Shepherd summarizes progress made in barberry eradication in Iowa during 1940, as follows: "The survey in Iowa in 1940 was completed in areas comprising 3,627 square miles in 36 counties. Of the territory covered 2,817 square miles was initial survey, 432 square miles initial semi-intensive survey, and 377 square miles subsequent intensive survey. In addition to this, some limited areas, principally the site of all former bushes, were reinspected in Dickinson, Plymouth, Sioux, and Woodbury Counties. In the area covered in 1940, 4,967 barberries were destroyed on 189 new and 179 resurvey properties. Although

barberries were found on a large number of new properties, it was noticeable that the area where we made the initial survey was definitely marginal and practically devoid of areas of escapes. The territory covered consisted of those counties or parts of counties where the barberry was never widely used for hedge or ornamental plantings and where it was expected that only scattered small plantings and single bushes would be found. Considering the resurvey work as a whole for 1940, barberries were found on 179 of the 990 old properties, or 18 percent of the old properties inspected. This figure is consistent with the results of reinspection work done during the last 5 years. The 377 square miles of subsequent survey completed in 1940 were in areas where a heavy infestation was found 5, 6, or 7 years before. The results in Winneshiek County probably indicate fairly well the conditions that we might expect to find in comparable areas of heavy infestations where the initial intensive survey has been completed since 1933. Listed below is a comparison of the results of the initial survey made in 1933-35 with the subsequent survey in the same area in 1940.

Survey	Year	Properties having bushes	Barberries destroyed	Salt used
		Number	Number	Pounds
Initial-----	1933-34-35	126	10,328	58,260
Subsequent--	1940	^{1/} 91	848	2,502

^{1/} 26 were new properties in 1940.

The number of properties with bushes, especially the new properties, seems large, unless one is familiar with the survey. Of the new properties found in the area covered, 3 were obviously missed on the initial survey. The bushes on the other 23 properties were bushes either too small to be found through the initial survey or which were not there at the time of the initial survey. It was noticeable that the new properties were practically all found within a short distance of old properties where bushes were previously destroyed. That the bushes were small is obvious from the fact that only an average of 27 pounds of salt was used on each property this year, as compared with 462 pounds per property on the initial survey.

Summary of 1940 work in the sugar pine region.--The Ribes-eradication program in the sugar pine region during 1940 was largely devoted to reeradication work on areas from which the initial Ribes removal had been done from 3 to 6 years before. Of 156,728 acres covered during 1940, the work on 106,232 acres was reeradication, and that on 50,496 acres was initial. Wild Ribes totaling 18,702,711 bushes were destroyed with the expenditure of 142,279 man-days of labor. On the basis of present acreage

outlined for control treatment, complete control has now been established on approximately 18 percent of the control area in the region, and the job of initial eradication is 30 percent completed. During the season 40 camps were in operation, of which 16 were E. R. A., 16 C. C. C., 1 N. Y. A., and 7 Forest Service regular-fund camps. The distribution of personnel in these camps at the peak of the field season was as follows: E. R. A. 1,290 men, C. C. C. 1,320, N. Y. A. 10, and Forest Service regular camps 230. An interesting observation on the W. P. A. men employed is that of 1,711 men assigned to the project during the season, 857, or 50 percent, stayed less than 1 month. This rapid turnover in W. P. A. labor makes adequate supervision a real necessity to assure effective work. Although most of the work was done by standard hand-eradication practice, some problem areas were treated by special methods. Decapitation of Ribes and oil treatment of exposed crowns was used on 160 acres supporting rock-bound bushes in Lassen Volcanic National Park. In Yosemite National Park large Ribes nevadense bushes were destroyed by blasting with dynamite of 20-percent strength. Mechanical eradication was confined to the Sierra National Forest where a tractor, equipped with a bulldozer Ribes rake, was used to strip lanes through dense brush fields to facilitate the eradication of the Ribes by C. C. C. crews. Some especially heavy Ribes concentrations were eradicated by the use of a grapple plow powered from a drum winch on the tractor. In addition to eradication work, pine surveys were conducted on 100,258 acres of forest land to determine the sugar pine and Ribes populations in areas about which little information had hitherto been available. The acquisition of this information will enable control unit boundaries to be fixed more definitely.

Saratoga County, N. Y., aids blister rust control program.--Saratoga County, N. Y., which contains a large amount of white pine, has appropriated \$5,000 for blister rust control work during 1941 and also provided District Leader Barber with excellent office space and a part-time clerk in the new County Building at Saratoga Springs. This county expended over \$7,400 on control work in 1940.

Possibility of rust resistance in white pine to be studied.--Ray R. Hirt, of the State College of Forestry, Syracuse, N. Y., has begun a study of white pines to see if there are strains resistant to blister rust. He will test white pines propagated from cuttings taken from individual trees located in heavily diseased areas that show no visible evidence of blister rust infection. Cooperation has been sought from agencies concerned with propagation of white pines from cuttings and Professor Hirt is assured of numerous sources of possibly infected material in the Northeastern States.

COTTON INSECT INVESTIGATIONS

Micronized insecticides for cotton insects.--Experiments to determine the relation of particle size to toxicity of several insecticides were conducted last season. The materials were micronized or finely ground through the cooperation of the Micronizer Processing Company, Moorestown, N. J. The mean surface diameter of particles was measured with an air permeation apparatus by the Division of Insecticide Investigations.

The fine materials, such as calcium arsenate and barium fluosilicate, were but little affected by micronizing. The calcium arsenate averaged about 1.5 microns before and after micronizing and the barium fluosilicate was reduced from 3.0 to 1.5 microns surface mean diameter by the grinding. Paris green was reduced from 11.5 microns to 0.5 micron and derris was also much reduced. Micronized sulfur was a commercial product and not especially prepared for us. It had a surface mean diameter of particles of about 5 microns. Two percent of tri-calcium phosphate was added to the calcium arsenate as a conditioner and to prevent packing, and a small quantity of sand was used with the derris as an abrasive to assist in grinding. The original and micronized calcium arsenates containing low, intermediate, and high water-soluble arsenic by the Geneva method were used in cage tests at Tallulah against the boll weevil. The three original calcium arsenates (not micronized) seemed to have somewhat better dusting qualities and gave significantly higher weevil mortalities than the micronized materials. Also the calcium arsenates with the higher water-soluble arsenic caused higher weevil mortalities. In plot tests at Tallulah with a calcium arsenate intermediate in water-soluble arsenic, there were no significant differences in infestations and yields between the original and micronized samples. Mixtures of micronized calcium arsenate and regular derris, micronized calcium arsenate and micronized derris, and regular calcium arsenate and regular derris were tested for boll weevil and aphid control at State College, Miss., on 1/20-acre plots. There were no significant differences in boll weevil or aphid infestations between the treatments, but all the mixtures containing derris held the aphid infestation lower than in the checks and prevented the heavy build-up that occurred in the plots treated with calcium arsenate. However, in cage tests against the boll weevil at Tallulah the mixtures containing micronized materials did not give as high weevil mortalities as did the unmicronized mixture. In plot tests at Waco and Port Lavaca, Tex., a 1:2 mixture of calcium arsenate and micronized sulfur gave better flea hopper control than did a similar mixture of calcium arsenate and ground sulfur. Micronized sulfur used alone has given about as good flea hopper control as twice the poundage per acre of 325-mesh dusting sulfur, but it costs about twice as much as the regular ground dusting sulfur. It has the advantage of sticking to the plants better and can be dusted under more adverse conditions or used as a spray when the plants are dry and may have a place in flea hopper control. Micronized barium and sodium fluosilicates were much inferior to the original materials against the boll weevil in cage tests at Tallulah. Both of the micronized materials had very poor dusting qualities, which probably accounts for the reduced weevil mortalities. Micronized barium fluosilicate used as a dust and spray also gave less control of the bollworm than did the unmicronized dust in plot tests at Waco, Tex. However, in tests at Presidio, micronized cryolite caused greater reduction in the number of pink bollworm larvae per boll than did cryolites with regular and coarse particle sizes. A paris green with three sizes of particles was tested for control of the boll weevil and tarnished plant bug in cages at Tallulah. The particle sizes were (1) the original material (coarse), (2) ground in a hammer mill with a surface mean diameter of 11.5 microns, and (3) micronized with a surface mean diameter of 0.5 micron. Micronizing also apparently increased the water-soluble As_2O_5 from 0.8 percent in the sample ground in the hammer mill to 4.5 percent in the micronized sample. When mixed with lime and tested against the boll weevil none of the samples

were very effective and there was little difference between them. When mixed with sulfur and tested against adults of the tarnished plant bug, the net mortalities averaged 64 percent for the regular particle sizes, 76 percent for the sample ground in a hammer mill, and 82 percent for the micronized sample. The net mortalities of the tarnished plant bug nymphs were 44, 51, and 50 percent, respectively. In plot tests at Mesa, Ariz., for control of *Lygus* spp., *Chlorochroa*, and other insects a 1:12 mixture of micronized paris green and clay gave an increase in cotton yield of 16 percent, as compared to an increase of 9 percent for a mixture of the regular paris green and clay. Thus the effectiveness of paris green and sulfur was considerably increased by micronizing, but there was little or no increase in the effectiveness of the other insecticides tested.

Survey of hemipterous insect damage to cotton in Arizona.--The annual survey was begun at the end of September and concluded in November by T. P. Cassidy and associates, Tucson, Ariz. A minimum of 500 bolls per field were examined for punctures from each of 97 representative fields selected from the main cotton areas of the State. Included in the examinations were 35,000 bolls from 70 fields of short-staple cotton and 27,000 bolls from 27 fields of long-staple cotton, or a total of 62,000 bolls for both types. The results in comparison with previous years are shown in the table.

County	Percentage of bolls punctured					
	Short-staple			Long-staple		
	1938	1939	1940	1938	1939	1940
Yuma-----	61.0	62.0	56.1	--	--	--
Maricopa----	44.7	40.6	37.7	30.9	23.8	26.9
Graham-----	19.0	18.9	21.1	4.9	4.2	5.0
Pinal-----	17.8	18.8	20.3	5.6	5.1	18.1
Santa Cruz---	12.7	4.7	11.1	2.5	1.9	--
Pima-----	7.7	4.3	8.1	1.0	1.3	2.9
State						
average----	31.5	28.2	33.4	14.6	8.7	14.7

Surveys have been made during the last 7 years, and Yuma County has always shown the most extensive damage with the other counties consistently maintaining their relative positions in regard to hemipterous-insect damage. Long-staple cotton has also always been much less damaged than short-staple. The average damage for the State in both kinds of cotton was heavier in 1940 than in any other year since the surveys have been made. While making these examinations, records were also kept of the bolls damaged by bollworms. The average for the State was 0.73 percent of the short-staple bolls and 0.34 percent of the long-staple bolls damaged. These percentages do not include the total damage caused by hemipterous insects and bollworms, as many squares are also destroyed.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Planting of the 1941 cotton crop in the lower Rio Grande Valley.--While climatic conditions are such that cotton can be planted from late in January until late in spring, for the present season State regulations were promulgated establishing the planting period for the lower part of the Rio Grande Valley between February 1 and March 15, in an effort to retard spring fruiting. However, on account of hard rains throughout that entire region during the latter part of January, and general rains over the area during the greater part of February, only a comparatively small percentage of the cotton acreage had been planted at the end of February. With the excessive amount of moisture in the ground and the cool prevailing temperatures, it is believed that a considerable amount of the cottonseed planted will probably decay. The date for the beginning of cotton planting in the lower valley of Mexico was also fixed at February 1 by officials of the Mexican Department of Agriculture, and it was estimated at the close of the month that, despite very unfavorable conditions, approximately 50 percent of the crop had been planted. It is estimated that, because of the unusual amount of rainfall, there will be a considerable increase in the acreage planted to cotton in the Mexican areas adjacent to the lower Rio Grande Valley of Texas this season.

Destruction of sprout and volunteer cotton.--In the lower Rio Grande Valley cotton stalks are destroyed each season immediately after the harvesting of the crop, as a pink bollworm control measure. However, on account of the subtropical climate, sprout cotton continues to develop throughout the year from roots left in the ground after plowing, making it necessary to carry on an intensive campaign for the destruction of such plants during the off-cotton growing season in order to deprive the pink bollworm of propagating material. Owing to adverse cotton-growing conditions for the last 6 weeks or more, cotton sprouts made very little growth. During February inspectors continued to scout the areas where roads were passable to locate fields where grubbing would have to be done, as soon as the ground dries up sufficiently, to prevent the fruiting of volunteer cotton prior to the fruiting of the planted crop. Farming operations incident to the planting of the new crop, will destroy most of the cotton stubble left in the fields.

Wild-cotton eradication.--In 1932 a program was begun to eradicate the pink bollworm from southern Florida through the destruction of the wild-cotton plant, which serves as a host to that dangerous cotton insect. For the present season wild-cotton eradication work is being carried on with approximately 200 C. C. C. enrollees and 102 W. P. A. workers, and a few laborers employed by the Bureau. The Bureau laborers have headquarters on houseboats, from which they work areas inaccessible by land. Conditions were not favorable in February, owing to rains, bad roads, and mosquitoes, but there was a slight improvement over the previous month, and good progress was made in all areas. In the Cape Sable area more acres were covered in February than in January. The first cleaning of the season was completed, with the exception of 2 small areas which could not be reached because of wet roads. A second cleaning of this area for the present season was begun about the middle of the month, and it was found that the area being worked for the second time could be

covered rapidly, as fewer plants were encountered and work trails had been cleaned out during the first clean-up of the season. Good progress was made in the second recleaning over the entire Bradenton-Fort Myers subdistrict, which includes the counties of Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, and Collier. In the Main Keys subdistrict, the Matecumbes and Long Key were completed, and second cleanings for the season were in progress in all other parts of that subdistrict. The number of seedlings found was considerably less than during the first cleaning, and few mature plants were encountered. This area was also covered rapidly, as work trails are excellent. In the Marathon-Key West section a second cleaning for the season was continued. The houseboat crew attached to the Cape Sable subdistrict scouted considerable area in the Whitewater Bay section and also in the Seven Palm Lake area. In addition, wild-cotton colonies on the islands in Florida Bay and on the Dade County mainland were cleaned. The houseboat crew attached to the Keys subdistrict spent the entire month scouting Biscayne Bay Keys. Several wild-cotton colonies, aggregating 7 acres, were found. During February a total of approximately 5,608 acres was covered, resulting in the finding of 6,316 plants with mature bolls, 89,812 seedling plants, and 195 sprout plants.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Rates of application of rotenone-bearing dusts against pea weevil.--
During the summer of 1940, F. G. Hinman and W. E. Peay, of the Moscow, Idaho, laboratory, conducted toxicity tests on replicated small plots of peas in each of several fields to determine the effectiveness of several rotenone-bearing dusts when applied at several rates against Bruchus pisorum (L.). In 5 fields, embodying a total of 35 replicates for each insecticidal dust mixture, 1 dust containing 2 percent of rotenone applied at the rate of 11 pounds per acre resulted in 98.0-percent reduction in the numbers of living weevils in 24 hours, whereas a dust mixture containing 1 percent of rotenone resulted in 96.9 percent and 96.2 percent reduction for the same interval following application when applied at 20 and 10 pounds per acre, respectively. The first 2 of these treatments were also tested in 3 additional fields making a total of 8 fields altogether and comprising a total of 65 replicates for each treatment. An analysis of the data from the application of the 2 percent dust at 11 pounds per acre showed that this treatment resulted in an average of 97.1-percent reduction, as compared to an average of 96 percent for the 1-percent dust at the 20-pound rate. The latter percentages are significantly different. Should similar differences obtain another season, the growers may realize a considerable saving in treating their peas by reducing the rate of application and increasing the rotenone content of the dust mixture used. In 6 of the fields inferior results were obtained with a dust containing 0.5 percent rotenone and 1 percent of dinitro-o-cyclohexylphenol, which had given very promising results against this insect in small-scale tests conducted in the laboratory. The plots of peas used in these tests were located on the borders of peafields and had been planted earlier than the remainder of the fields, in order to trap the weevils as they emerged from hibernation and moved into the fields. Each plot was 20 feet wide and about 218 feet long, comprising approximately 1/10 acre. All applications were made with a power duster mounted on a

2-wheeled trailer pulled through the plots by a truck and equipped with a trailing apron. The weevil population was determined before application and at 24 hours after, by counting the number of adult weevils collected in 50 sweeps of a standard insect net in each plot, 25 sweeps being made at random in 2 parts of each plot. The diluent used in all dust mixtures was diatomaceous earth. The source of the rotenone for the mixtures used in some fields was derris root powder, in others it was cube root powder.

Arsenical residues on cauliflower.--Field studies by C. E. Smith and P. K. Harrison, of the Baton Rouge, La., laboratory, indicate that arsenicals should not be applied to cauliflower after leaves have developed that will be present on the marketed product. None of the leaves that had been dusted was present on the marketed portion of plants to which the last application of arsenical had been made 29 days prior to harvest, on November 12. The number of such leaves and the residue analyses of cauliflower treated at different times with a dust mixture of calcium arsenate and paris green (10 pounds to 1 pound) were as follows:

Number of applications	: Days between application and harvest	: Rainfall during this interval	: As ₂ O ₃ per pound of cauliflower at harvest	: Average dust leaves appearing on marketed product
	: Number	: Inches	: Grains	: Number
9-----	: 8	: 5.89	: 0.1335	: 25
8-----	: 19	: 7.12	: .0536	: 18
7-----	: 29	: 7.12	: .0037	: 0
None-----	: --	: --	: .0009	: --

Single plots of cauliflower 105 feet long and 5 rows wide were employed in this study. The applications of insecticide were made with rotary hand-operated dusters, beginning on August 12 at 5 pounds per acre and repeated at intervals of approximately 10 days. Most of the applications were made at the rate of about 10 pounds per acre, but the final application on 2 of the plots was at 30 pounds and 20 pounds per acre, respectively. Harvest extended over the period November 12 to December 11, but the above analyses were based on 10 plants taken from each plot at the beginning of harvest on November 12. W. P. Denson, of the Louisiana Agricultural Experiment Station, made all of the analyses, using the opposite quarters of each sample plant as prepared for market, including both curd and leaves. The number of dusted leaves was determined by counting those present after the plant had been prepared for market. This count was made possible by notching the smallest leaf present on each plant at the final application.

Diluents for natural cryolite in controlling tomato fruitworm.--J. Wilcox and R. E. Campbell, of the Alhambra, Calif., laboratory, report that a smaller percentage of tomato fruits were damaged by Heliothis armigera (Hbn.) on plants treated with a dust mixture of natural cryolite containing 70 percent Na₃AlF₆ diluted with talc and with soapstone than on

plants treated with natural cryolite of the same strength diluted with sterilized tobacco dust or with walnut-shell flour. Following are the results obtained from using various diluents in one series of experiments:

<u>Diluent used</u>	<u>Average percentage of fruits damaged</u>
Soapstone-----	1.6
Talc and mineral oil (19-1)-----	1.8
Talc-----	2.2
Talc and soybean flour (9-1)-----	2.2
Talc and basic copper ammonium silicate (4-1)--	2.4
Diatomaceous earth-----	3.0
Corn flour-----	3.4
Talc and basic copper chloride (6-1)-----	3.5
Walnut-shell flour-----	4.5
Sterilized tobacco dust-----	5.4

In replicated undusted plots in another experiment in the same field 17.5 percent of the fruits were damaged. An analysis of these data showed that the differences between the averages for the first four treatments and those for the last three were significant. The treatments were replicated in three randomized blocks, each plot being 30 by 60 feet. Three applications of the dust mixture were made at intervals of 2 weeks, using rotary hand-operated dusters, beginning when the first fruits set. The rate of application was 20, 30, and 40 pounds per acre for the three applications, respectively. The percentage of injured fruits was determined at picking by examining all of the tomatoes on five plants taken at random in each plot.

Tobacco field as breeding ground of tobacco flea beetle.--Clemence Levin and associates, of the Oxford, N. C., laboratory, determined the seasonal emergence of adults of Epitrix parvula (F.) from larvae developing in the soil around tobacco plants in a field of tobacco grown for flue-curing during the summer of 1940. The results of the study showed the importance of the tobacco field as a breeding ground of the beetle and indicated the possible value of cultural measures for the control of this pest. Tobacco transplanted to the field on May 17 soon became infested with overwintering beetles, there being from 2 to 4 per plant during the period May 22 to June 18. On June 11, before appreciable numbers of beetles of the newly emerged generation could have reached the field from the tobacco-plant beds, a series of field plants which had been infested by overwintering beetles was caged and treated with an insecticide. Beetles began to emerge from the soil in these cages on June 19 and by July 1 an average of 10 per cage had been removed. By July 22 an average of 21 per plant had emerged. Another series of plants protected from beetles prior to the time that newly emerging beetles reached the field from plant beds were exposed to infestation during the period June 11 to 27 to obtain an indication of the importance of oviposition by the new-generation beetles coming from the plant beds. On the latter date the plants were caged again and all infesting beetles killed. Beetles began to emerge from these cages on July 10 and by July 23 an average of 23 beetles per

plant had emerged. A large proportion of these are thought to have developed from eggs laid by the new-generation beetles that emerged in tobacco-plant beds and moved to the field. The beetle emergence from field plants caged at intervals throughout the growing season was also determined. These studies showed that the peak of beetle emergence occurred during July and August. It was also found that large numbers of beetles emerged continuously for several weeks after the last leaves of tobacco had been harvested, indicating the possible value of cultural operations immediately following harvest to prevent further emergence of beetles in the field. For these studies 10 cages were used in each series and each cage covered an area of 1 square foot, being centered over and enclosing a tobacco plant trimmed so as to occupy the available space.

Wireworm infestation first year following alfalfa.--Field studies conducted by F. H. Shirck, of the Parma, Idaho, laboratory, showed that the infestation of wireworms, principally Limonius californicus Mann., may not increase during the first year on land returned to other crops following the growth of alfalfa for several years for reducing the infestation of wireworms. In some fields the numbers remained fairly stationary, whereas in others a further decrease in population was observed. The data obtained from 26 old fields of alfalfa showed an average population of 1.6 wireworms per square foot of soil surface when the fields were plowed up and only 1.9 wireworms per square foot following the first crop. The first-year crops following the plowing under of the old alfalfa included in this study comprised sugar beets, potatoes, wheat, oats, and corn. Similar counts made in 37 other old alfalfa fields showed an average infestation of 1.6 wireworms per square foot when the fields were plowed up.

Host preference of sweetpotato weevil.--K. L. Cockerham and O. T. Deen, of the Sunset, La., laboratory, report that in field-plot tests greater numbers of Cylas formicarius (L.) developed in the vines and crowns of sweetpotato plants (Ipomoea batatas) than in those of five wild-host species of the genus Ipomoea. The following tabulation shows the numbers of sweetpotato weevils found at the close of the season in the vines and crowns of each of the six species of plants included in this test.

<u>Host plant</u>	<u>Average number of C. formicarius per plant</u>
Sweetpotato-----	$\frac{1}{2}$ 35
<u>I. quamoclit</u> -----	8
<u>I. trichocarpa</u> -----	6
<u>I. hederacea</u> -----	9
<u>I. pandurata</u> -----	2
<u>I. barbiger</u> -----	12

$\frac{1}{2}$ An average of 57 additional specimens of the weevil per plant were taken from the roots of these sweetpotatoes.

The experimental plants were grown in plots containing four plants each, there being six plots of each host arranged in a Latin square. The

plants were transplanted to the plots in June and the plots were located in an area heavily infested with weevils. Examination of all plants to determine infestation by the sweetpotato weevil was made in October.

INSECTS AFFECTING MAN AND ANIMALS

Necessity of a low oxygen concentration for hatching of Aedes mosquito eggs.--E. F. Knipling and C. M. Gjullin, of the Portland, Oreg., laboratory, report that additional information has been obtained which indicates that, although other stimuli may exist which may influence the hatching of Aedes eggs, the reduction of dissolved oxygen is of itself capable of causing as rapid and as high a percentage of hatch as may be obtained by the best methods now known.

Beet molasses as a dispersing agent for phenothiazine.--Mr. Knipling also reports that beet molasses may be useful as a wetting agent for dispersing phenothiazine in water. When used in the same manner as is Turkey Red oil or other wetting agents, at the rate of 5 parts molasses to 1 part phenothiazine, a fair suspension of the phenothiazine was obtained.

Winter emergence of stable flies.--W. E. Dove and S. W. Simmons, of the Panama City, Fla., laboratory, report that recovery cages placed over infested peanut litter on December 14, have shown a continuous emergence of "dog flies," especially on warmer days. At the present time (March 7) some of these cages contain numbers of larvae that have not yet pupated.

Screwworm control program.--A press release on the general status of the screwworm for the United States was prepared by D. C. Parman, W. L. Barrett, Jr., H. M. Brundrett, and E. C. Cushing, of the Uvalde and Menard, Tex., laboratories. On the basis of data supplied to the Texas Extension Service, that organization made a radio broadcast on February 18 from College Station giving information to Texas ranchmen on the present status of screwworms in the State and advised procedures to avoid outbreaks of the fly during the coming season. The Ranch Management Screwworm Prevention Program of the Bureau was presented to entomologists by E. C. Cushing at a joint meeting of the Texas Entomological Society and the Cotton States Branch at Waco, Tex., on February 8.

FOREIGN PLANT QUARANTINES

"Gladiolus smut" not a smut.--Considerable numbers of gladiolus corms in large shipments from Netherlands inspected in March 1940 were found to be infected with a fungus similar to one found in a shipment in 1939 and determined then by J. A. Stevenson, mycologist of the Bureau of Plant Industry, and D. P. Limber as Papulospora sp. When the large volume of material arrived in 1940 Mr. Limber took some of it to Mr. Stevenson and called attention to the similarity of the fungus with one found on gladiolus corms in Pennsylvania, as pictured in Phytopathology (28:599, August 1938) and tentatively determined as Urocystis gladioli (Requien) Smith. They agreed that the fungus on imported corms was probably the same as the one in Pennsylvania and known as Urocystis gladioli. Upon learning that U. gladioli had been found on these corms

N. Rex Hunt requested specimens for use in obtaining illustrations to accompany a short write-up of the gladiolus smut ready for reproduction as one of a series of plant-disease papers being prepared for the information of inspectors. Microscopic examination confirmed Mr. Hunt's immediate impression that a species of Papulospora was present. No Urocystis was found. The importance of the problem from the quarantine and treatment points of view was such that it was believed desirable to have the whole matter taken up with specialists. After some discussion between H. S. Dean and W. A. McCubbin, as well as Stevenson and Limber, Mr. Hunt put the case into Mr. Stevenson's hands. The latter sent material and cultures to George L. Zundel, specialist in smuts, at Pennsylvania State College and to J. W. Hotson, specialist in bulbil-producing fungi, at the University of Washington. Dr. Zundel in turn had cultures of the fungus found in Pennsylvania sent to Dr. Hotson by the pathologist who had studied it. A letter from Dr. Zundel to Mr. Stevenson dated March 20, 1940, indicated that the fungus sent him from the imported gladiolus corms was not a Urocystis. A letter dated May 17, 1940, from Dr. Hotson to Mr. Stevenson stated that the fungus found on imported gladiolus corms at the Inspection House was Papulospora coprophila (Zukal) Hotson, but that the fungus found on gladiolus corms in Pennsylvania, also a Papulospora, was a different species which he might describe as new. We had not expected to issue this information in the News Letter until the results of more complete studies were published by Dr. Hotson and by the Pennsylvania pathologists. However, a note in Science (93:111, January 31, 1941) calls attention to the fact that the Pennsylvania fungus seems to be a Papulospora. It therefore seems desirable to note the findings incidental to the work of this Division without further delay. The specialists seem to doubt that a true smut has been involved at any time in the studies and reports of Urocystis gladioli in this country.

Entomological interceptions of interest.--Two living larvae of the trypetid Anastrepha serpentina (Wied.) were taken at El Paso, Tex., on February 13 in sapote in baggage from Mexico. Twenty living larvae of the trypetid Anastrepha mombinuraeoptans Sein were intercepted at New York on January 30 in Spondias dulcis in baggage from Puerto Rico. Larva of the pink bollworm (Pectinophora gossypiella (Saund.)) was taken at Miami, Fla., on January 1, in cottonseed in express on an airplane from Brazil. The coccid Ceroplastes rubens Mask. was found at Seattle, Wash., on January 17 on the stem of a camellia in cargo from Japan. A living adult of the pentatomid Mecistorhinus melanoleucus (Westw.) was taken at Mobile, Ala., on February 13 on banana in cargo from British Honduras. A pupa of the Mediterranean fruitfly (Ceratitidis capitata Wied.) was intercepted at New York on February 13 on a tangerine in baggage from Portugal. Living specimens of the aleyrodid Pealius hibisci (Kot.) were intercepted at San Francisco, Calif., on February 8 on Hibiscus sp. in baggage from Hawaii. Three specimens of the bruchid Bruchidius lividimanus (Gyll.) were found at the Inspection House, Washington, D. C., on February 11 in the seed of Genista sp. (?) in mail from Portugal. One living adult of the chrysomelid Chelymorpha comata Boh. was intercepted at New York on February 10 on mustard greens in cargo from Cuba. Living adults of the curculionid Dynatopechus aureopilosus (Fairm.) were found in parcel-post inspection at Honolulu, Hawaii, on January 10, in the seed of Mucuna gigantea. A living specimen of the mirid Fulvius quadristillatus (Stal) was

found at San Francisco, Calif., on January 8 on an orchid in cargo from Brazil. Two living adults of the lygaeid Scolopostethus decoratus (Hahn) were intercepted at Hoboken, N. J., on February 14 in moss used as packing for miscellaneous shrubs in cargo from England. Three living adults of the bruchid Bruchidius versicolor (Boh.) were taken in mail at San Francisco, Calif., on February 11 in seeds of Podalyria argentea from the Union of South Africa. A living adult of the lygaeid Orthaea scutellatus (Dall.) was intercepted at New York on February 3 on white greens in cargo from Cuba. Specimens of the citrus blackfly (Aleurocanthus woglumi Ashby) were found at Baltimore, Md., on February 4 on an orange leaf in cargo from the Bahamas. One living specimen of the pentatomid Schaefferella incisa H. S., was found at San Francisco, Calif., on January 8 on an orchid in cargo from Brazil.

Pathological interceptions of interest.--A Mexican tomato intercepted at Brownsville on February 12 and sent in for determination of the fungus found on a spot on the fruit was found to be infested with nematodes, apparently Aphelenchoides parietinus (Bastien) Steiner, and the fungus no longer prominent on the spot. Asterina delitescens Ell. & Mart. was intercepted at El Paso on February 17 on Persea borbonia leaves from Mexico. Bacterium citri (Hasse) Doidge was intercepted on February 5 at Seattle on Chinese oranges in baggage. Bacterium punctilans Bryan is being found more often on Mexican tomatoes this year, Nogales alone reporting 59 interceptions in February following 99 such interceptions in January. Ceratostomella ulmi (Schwarz) Buisman was found at the Bloomfield laboratory in elm wood taken at New York on January 17 from crates from England. Cerebella andropogonis Ces. and Fusarium heterosporum Nels. were intercepted on January 31 at New York on paspalum seed from Australia. Phyllosticta erythroxyli Graz. was intercepted on January 29 at New York on Erythroxyton coca leaves from Peru. At the same port radishes from Portugal were found to be infested with Pratylenchus sp. (near P. pratensis (de Man) Filipjev) and Tylenchus sp. (near T. filiformis Butschli), on February 8. Puccinia polygoni-amphibii persicariae (Str.) Arth. was found on Polygonum sp. used as part of the packing in a mail parcel from Canada intercepted on February 4 at Buffalo. A Rhabdaspora found infecting Ephedra vulgaris in a shipment from China, inspected at New York on May 10, 1940, has just been determined as R. kirghisorum (Thum.) Sacc. A peculiar form of citrus scab found at New York on February 26 on a lemon from Australia has been determined by Anna E. Jenkins as probably Sphaceloma fawcettii var. scabiosa (McAlp. & Tryon) Jenkins.

DOMESTIC PLANT QUARANTINES

Citrus canker found at Corpus Christi and Navasota, Tex.--Citrus canker was discovered at Corpus Christi about January 31 by a Texas State inspector in the regular course of nursery inspection. On being notified of this discovery, Federal and State inspectors immediately investigated the case and learned that the 43 infected Citrus trifoliata trees had been transported last fall from Navasota, in Grimes County, Tex., by a nursery-stock peddler, and further that he had brought in a second lot of such trees from the same source and planted them in a hedge on another property in Corpus Christi. Citrus canker was found on these trees also and the entire hedge was then destroyed, along with all the citrus trees on the

first-named property. An increased force of inspectors then inspected every nursery, heel yard, and flower establishment in Corpus Christi and is now conducting a property-by-property inspection of the entire city. To date no other cases of canker have been found in Corpus Christi. In the town of Navasota, intensive inspection was begun at once and citrus canker was found not only on the property from which the infected trees at Corpus Christi originated but also on 5 other properties, principally on hedges of Citrus trifoliata. It appears that trees of this species have been used in Navasota as hedges for fencing or for ornamental purposes for the last 25 or 30 years, and there are approximately 75 such hedges in the town. There are few other citrus trees, however, and the owners are giving splendid cooperation in permitting the destruction of these hedges, and crews of W. P. A. laborers are at work taking them out. County agents, both colored and white, are assisting in obtaining the consent of owners to the removal of these trees, and county and city officials are also cooperating. Every precaution is being taken to prevent the development of any seedlings or of recurring infections of canker. Before any laborers were allowed on the infected properties, the trees and surrounding soil were disinfected and gone over with a flame-thrower, and the soil to a depth of 1 inch was removed around the trees and buried in pits 8 feet deep, together with all fruit and seed that could be found. All seedlings were dug and burned and the large trees were pulled with a truck, and the areas where they stood were plowed under. After these operations were completed the ground was again sprayed with disinfectant. Corpus Christi is the southernmost point at which canker has been found since the work was placed on an intensive and expanded basis in 1935. At no time in these inspection and eradication activities of the last 7 years has citrus canker been found in either of these 2 counties, Nueces in the south or Grimes in the north.

Clean-up of citrus trees at Alta Loma, Tex.--Following the finding on December 4, of a tree infected with citrus canker, a program of clean-up and inspection of the town of Alta Loma, Tex., was conducted, because of the large growth of underbrush which could easily conceal wild-citrus growth. Nearly 200 dooryard or escaped citrus trees scattered over vacant lots were destroyed. On the property where the recent infection occurred, an intensified search resulted in finding 17 additional very small citrus trees, including 1 orange seedling growing under the residence. Citrus canker at Alta Loma has not been found, in current activities, to extend beyond the single tree found infected in December.

First highway post office in United States established.--As part of the Railway Mail Service, a highway post office, the first in this country, was established on February 6, operating between Washington, D. C., and Harrisonburg, Va. This highway post office, serving 23 post offices on the route and handling all classes of mail, including parcel post, constitutes another outlet for the interstate transportation of articles, restricted under the Japanese beetle and other quarantines, from a regulated area to points outside.

Inspector believes soil in cars picked up by electro-magnet loader.--From the transit inspector at Birmingham, comes the following interesting comment: "Carlot shipments of scrap metal from the white-fringed beetle area

continue to be a source of apparent violations. Although most of the cars carrying scrap metal do not have soil in the bottom, some do. The presence of soil in the cars may be due, in part, to the fact that much of the scrap metal is loaded by means of electro-magnets. During loading operations quantities of soil may be attracted to the electro-magnets, owing to the large amount of iron rust present in the top soil. At a local junk yard, in 1 year's time so much iron rust accumulated in the soil under a pile of scrap that after the scrap was removed the top soil was loaded into railroad cars by means of an electro-magnet and sold to local steel companies."

More shipping by air express.--From the Boston transit inspector comes the report of an increase in February of 200 percent in plant shipping by air exoress, as compared with February of last year. Cut flowers, miniature potted plants, and pussy willow cuttings were so shipped throughout the month, particularly at the valentine season.

Larvae of Laspeyresia species intercepted at Springfield, Mass.--Larvae from spruce cones taken from a shipment intercepted at Springfield, Mass., on December 6, as a violation of the gypsy moth quarantine, were recently identified as Laspeyresia youngana, and also the pine-shoot moth and the codling moth.

Peach mosaic conference at Denver.--On February 10, 11, and 12, a conference of Federal and State workers on peach mosaic disease was held at Denver to discuss the various phases of the control and research activities, particularly as they relate to conditions in Colorado. Representatives of the Bureau of Entomology and Plant Quarantine, the Bureau of Plant Industry, the Colorado and Utah State Departments of Agriculture, and the Colorado State College were present. The discussion revolved around a review of control and research accomplishments, with a view to determining future procedure in both these activities. It was pointed out that a phenomenon not yet known to be peach mosaic occurs in Colorado, and the consensus of opinion at the meeting favored marking such trees for future observation, with a provision that such marked trees would be removed by the cooperating peach mosaic control agencies only at the request of the grower, but that all definitely mosaic infected trees would be removed when discovered. The group recommended that research activities continue along the presently organized outlines, with minor suggestions for additional work with regard to symptomology, methods of transmission, methods of diagnosis, and possible methods of treatment.

Inspector's identification of peach mosaic upheld.--Infection found on a peach nursery tree in Bryan County, Okla., last fall, was identified by the inspector as peach mosaic. Some question as to the determination of the disease arose and the tree was later transferred to the laboratory of the Bureau of Plant Industry at Brownwood, Tex., and representatives of that Bureau now confirm the diagnosis as positive peach mosaic infection.

Mormon crickets hatch in February.--Mormon crickets were reported hatching early in February on the Warm Springs Indian Reservation in Oregon.

Later reports indicated some hatching in Baker County, Oreg. Arrangements have been made with the cooperating State agencies to make careful continued observations throughout areas of early hatch to determine the need and appropriate time for the initiation of control activities. Equipment, materials, and personnel are in readiness for any eventuality that may arise from the early hatch.

Legume weevil survey planned.--On January 13 the Secretary approved an allocation of funds for further work on the legume weevil Hypera brunneipennis Boh. and plans have been made for the reexamination of part of the areas surveyed last year in order to determine the present status of the infestations and to cooperate with the State of Arizona in an effort to eradicate the weevils in the vicinity of Tempe. The infestation at Tempe is light and isolated, but it is located in an important legume-growing region.

Parlatoria scale survey completed.--The survey, which was begun early in December, in cooperation with the Missouri State Department of Agriculture, to determine the area infested with Parlatoria chinensis Marl. in St. Louis and vicinity, was terminated at the close of January. Infestations were found on 850 properties in approximately 109 city blocks within the immediate vicinity of the Missouri Botanical Garden, and Tower Grove and Forest Parks. Heaviest infestations were found within, and immediately adjacent to, the Missouri Botanical Garden, decreasing in intensity to little or no infestation within a distance of several blocks to less than a mile in all directions. A number of inspections were also made in scattered areas throughout the city. Only one small infestation was found outside the above-mentioned localities. A survey of East St. Louis was also made, in cooperation with inspectors of the Illinois State Department of Agriculture, but no infestations of the scale were found.

Treatment method for white-fringed beetle larvae modified.--The method of treatment of balled nursery stock by methyl bromide solution for white-fringed beetle larvae was modified by a revision of circular B. E. P. Q. 503 dated February 28. As a result of further experiments by the Division of Control Investigations, it has been found that the prescribed treatment is effective on soil balls up to 8 inches in diameter in areas other than in New Orleans and vicinity. In these areas the consistency of the soil is such that the treatment can be used effectively only on soil balls having a diameter of not more than 7 inches.

CONTROL INVESTIGATIONS

Action of o-dichlorobenzene and naphthalene mixture as applied by new method.--W. N. Sullivan and E. R. McGovran, of this Division, and L. D. Goodhue, of the Division of Insecticide Investigations, have collaborated in this study and published their results in the February 1941 issue of the Journal of Economic Entomology. A new method was described for applying a mixture of naphthalene and orthodichlorobenzene, which consisted in rapidly volatilizing a solution of naphthalene in orthodichlorobenzene by spraying it on a surface heated to 375° C. An effective dosage was obtained in about 8 minutes and very little crystallization of the naphthalene followed. Eighty cubic centimeters of this solution was used

in a 216-cubic foot chamber in which flies and cockroaches were exposed for 24 hours. The mortality of the flies was 100 percent after 1 day, but more time was required to kill the cockroaches, the nymphs being more resistant than the adults. Over 95 percent were dead after 3 days and over 99 percent after 10 days. The use of these materials applied by this method offers promise for the control of household insects. Since this paper was submitted for publication further work on this subject has shown how to greatly increase the effectiveness of aerosols applied in this manner. These results will be published soon.

INSECTICIDE INVESTIGATIONS

Removal of lead and arsenic spray residues on apples.--At the meeting of the Western Cooperative Spray Project in Seattle, Wash., on February 13 and 14, C. C. Cassil, of this Division, and Edwin Smith and A. L. Ryall, of the Bureau of Plant Industry, presented the results of cooperative experiments on the removal of lead and arsenic spray residues from apples. The data presented in this report indicate that only fruit sprayed with relatively light spray schedules can be cleaned by washing once in cold acid. The use of somewhat heavier spray schedules requires the application of some heat in a single or dual washes for satisfactory cleaning. Fruit with heavy spray schedules can be cleaned to meet the new tolerances only by the application of relatively severe dual-process washes at temperatures which approach or are beyond the danger point of fruit injury.

Improved method for determining arsenic.--C. C. Cassil, in the February 1941 issue of the *Journal of the Association of Official Agricultural Chemists* (v. 24, No. 1: 196-202), described a procedure for the rapid determination of arsenic. This method is an extension of the micro method described by Cassil and Wichmann in May 1939 (*ibid.*, v. 22, No. 2: 436-445). The range of the rapid volumetric method for determining arsenic, previously considered as 5-500 micrograms, has been extended to 10 milligrams of As_2O_3 . It is possible to complete a determination in less than 10 minutes after the necessary sample preparation. This method involves an arsine evolution, absorption in mercuric chloride-gum arabic solution, and an iodine titration. Results presented show that the accuracy of the method is 99.26 percent, with a standard deviation of 1.14 percent.

BEE CULTURE

Nosema disease an important cause of winter loss.--C. L. Farrar, Madison, Wis., reports the presence of *Nosema apis* in 16.5 percent of 97 colonies examined and adds: "Diagnosis was made by examining the ventriculi of 6 to 12 bees from the top of the cluster and it is probable that other colonies contained a lighter degree of infection. Colonies showing infection of 50 to 100 percent of the bees in the sample were weak and showed strong evidence of dysentery. There was no relationship between *Nosema* infection and distention of the hind gut. Twenty-seven and 36 percent, respectively, of bees picked up from snow in the 2 yards were found infected. Caged samples of 800 to 1,000 bees inoculated with 5 ventriculi from diseased bees added to sugar sirup showed 100-percent infection within 5 days (based on small samples) and practically all the bees died within 2

weeks. Uninoculated duplicates showed a very light infection and these approached complete infection 2 weeks after the inoculated cages. The peak in the mortality curves occurred approximately 2 weeks later in the check cages. Thirty colonies used in the greenhouse for experimental feeding of pollen and pollen supplements all showed Nosema. The experimental colonies were started with 4 pounds of bees (approximately 14,000) and they reared up to 9,300 bees under the most favorable food conditions. They probably had not more than 3,000 to 6,000 bees at the close of the tests. Brood-rearing decreased rapidly as the infection built up and practically ceased after 6 to 8 weeks. The queens all continued laying throughout the 90-day test period. Nosema is apparently more serious under the close confinement of colonies in the greenhouse than in normal colonies wintered out of doors. Diagnosis of bees heavily infected with Nosema spores can be made by noting the color of the ventriculus, but a microscopic examination of a smear is necessary for light infections. A heavily infested ventriculus shows a milky-white color which becomes more evident in a water smear."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Injury to buildings by certain cossonine weevils.--Weevil specimens received from J. S. Houser, of the Ohio Agricultural Experiment Station, with the statement that they were reared from a door in a basement at Sterling, Ohio, have been determined as Stenoscelis brevis (Boh.), a common species of the Cossoninae which, however, is almost always taken out of doors. Its occurrence indoors is, therefore, of some interest, particularly as the weevil appears to have done considerable damage to this dwelling. The cossonine which is most often implicated in injury to timbers in buildings is Hexarthrum ulkei Horn, though Tomolips quercicola (Boh.) has been collected under conditions indicating that it also may occasionally damage woodwork or timbers indoors. The introduced cossonine, Pselactus spadix (Hbst.), has been reported at least once from damp wood in a basement at Brewster, Mass., and this species has been found also in pilings of wharves at Charlestown and East Boston, Mass.

Distribution note on the weevil Ceutorhynchus sericans Lec.--Among a small collection of weevils from White Heath, Ill., sent for determination by J. C. Dirks, was a single female of Ceutorhynchus sericans Lec. This little-known species was described in 1876 from Calaveras, Calif. It is represented in the National Museum collection by a single specimen from California, a few others from Idaho, Montana, Colorado, New Mexico, and Arizona, and a single male from Marietta, Ohio. Both the Ohio and Illinois specimens are larger and perhaps a trifle stouter than any of those from farther west (this reversing the condition observed in certain other species of weevils, in which the western form is larger), but so far as found they do not differ appreciably in other respects, and there seems no doubt as to the specific identity of all of them.

High parasitization of a leafhopper by a pipunculid.--Samples of Alconeura macra Griffith (Cicadellidae), submitted for identification in connection with investigations of the phony peach disease in Tennessee, were found to show an unusually high percentage of parasitization by an undetermined species of Pipunculidae (Diptera). Of the 97 specimens,

representing 10 samples submitted for identification, 23 specimens, or approximately 24 percent of the total, either contained parasites or showed unmistakable evidence of having been parasitized.

Observation on hibernation of northern house mosquito.--A sample consisting of a large number of mosquitoes, determined by Alan Stone as Culex pipiens L., was recently received from J. S. Houser, of the Ohio Agricultural Experiment Station. Dr. Houser explained that the specimens had been taken in the basement of an unoccupied farm dwelling in February. The walls of the basement were of stone and the floor was of earth. Ice had formed in depressions in the floor and frost crystals occurred in abundance on the overhead joists. The hibernating mosquitoes were found in enormous numbers resting on these joists.

Unusual parasitic Hymenoptera in a collection from Virginia.--Ichneumonidae and Braconidae taken at Mountain Lake, Va. (elevation 4,000 ft.), and referred for identification by L. J. Milne, of Randolph-Macon Woman's College, contained numerous forms which are of interest because they have been seldom collected. Included were 2 rare species of the braconid genus Meteorus, a long series of an undescribed leafhopper parasite belonging to Chelognus (family Dryinidae), several uncommon species of the ichneumonid genus Parabates, and about 100 specimens of Hybophanes nasutus (Cress.) (family Ichneumonidae) and 22 of a species of the related genus Neliopiathus, both of which are rare in collections.

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UNITED STATES
DEPARTMENT OF AGRICULTURE



BUREAU OF
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NEWS LETTER

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VOLUME VIII



UNITED STATES DEPARTMENT OF AGRICULTURE
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NEWS LETTER

FOR MARCH 1941

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May 1, 1941

ADMINISTRATION

Bureau Appropriations

The First Deficiency Act for the fiscal year 1941 was approved April 1. It includes two items which relate to the work carried on by the Bureau. These are (1) \$2,225,000 for the control of incipient and emergency outbreaks of insect pests and plant diseases, which is \$225,000 above the Budget estimate but is not the full amount recommended by the Department; and (2) \$18,000 under the item Foreign Plant Quarantines, appropriated for additional expenses in connection with the operation of the Inspection House at Hoboken, N. J.

The bill to provide appropriations to the Department for the fiscal year 1942 has passed the Senate and is now being considered in conference. As passed by the Senate the bill provides \$5,407,917 for the Bureau exclusive of the amount for white pine blister rust. The amount of the Senate bill is \$105,985 above the Budget estimate. The increases above the Budget estimate provided in the Senate bill are:

Dutch elm disease eradication-----	\$50,000
(This is \$50,000 less than the amount available for the current fiscal year.)	
Citrus canker -----	13,485
Barberry eradication -----	42,500

The Senate bill provides the full amount of the Budget estimate for the appropriation for white pine blister rust control and will increase the amount appropriated to the Bureau by \$100,000.

Study of Agricultural Chemicals Plays Part in Defense Program

Commissioner Chester C. Davis, of the Agricultural Division of The Advisory Commission to the Council of National Defense, has made arrangements with Secretary of Agriculture Claude R. Wickard under which the personnel of the Bureau of Entomology and Plant Quarantine will be available to the Agricultural Chemical Section of the National Defense Commission in

an advisory and consultative capacity. As a part of this a study is being made of the changing situation with respect to chemicals used for insecticides and fungicides, including technical and statistical information on the chemicals used. R. C. Roark is devoting special attention to these matters. Among the major questions under consideration are the type, quantity, and distribution of insecticides and fungicides; location of manufacturing plants; seasonal fluctuations in business; manufacturing practices; availability of raw materials; the price situation; and the possibility of switching from one type of insecticide to another in case of shortages in seasonal materials.

FRUIT INSECT INVESTIGATIONS

Peach mosaic vector research.--In cooperation with the United States Bureau of Plant Industry, Brownwood, Tex., and the California Citrus Experiment Station, Riverside, Calif., investigations to determine the vector or vectors of peach mosaic virus were instituted in 1938. The results of the first 3 years of test work conducted at San Bernardino, Calif., and at the sublaboratory at Brownwood, Tex., have been summarized by L. D. Christenson, L. S. Jones, D. D. Jensen, and O. H. Graham. To date, 2,703 tests, in which more than 177 different insect species were employed, have been made. The 1938 and 1939 tests provided negative results only. Due to a long incubation period of the virus in peach, the results of the 1940 tests cannot be determined until foliage is well developed on test trees in 1941. Included in the total number of tests are 33 with 3 species of Acarina, 126 with 6 species of Thysanoptera, 11 with species of Aleyrodidae, 887 with at least 30 species of Aphidae, 788 with more than 69 species of Cicadellidae, 55 with 8 species of Fulgoridae, 32 with 4 species of Araeopidae, 1 with 1 species of Cercopidae, 17 with 4 species of Psyllidae, 87 with 6 species of Membracidae, 6 with miscellaneous Homoptera, 233 with 11 species of Miridae, 32 with 1 species of Pentatomidae, 68 with 1 species of Piesmididae, 21 with 3 species of Tingidae, 68 with 7 species of Coreidae, 23 with 1 species of Anthocoridae, 94 with 7 species of Lygaeidae, 32 with 1 species of Pyrrhocoridae, 7 with 2 species of Neididae, 3 with 2 species of Cydnidae, 58 with 7 species of Coleoptera, and 21 with 3 species of Orthoptera. Approximately 15 tests have been made for each species employed. Although numerous insects on the peach mosaic survey list are still inadequately tested, most of the outstanding suspects have been worked with extensively, the green peach aphid (Myzus persicae (Sulz.)), for instance, being the subject of 191 careful and varied tests. In conducting the tests, the general method of transfer of large test populations of the insect with brush or aspirator from inoculum to healthy peach was supplemented by a free exchange type of test in which test insects were allowed unhindered access to inoculum and healthy peach tissue confined within a cage. Another method consisting of direct transfer to healthy peach of insects found on peach mosaic infected trees in orchards or reared on diseased trees at the laboratory was used in many instances. Allowances were made for an exceptionally long incubation period of the virus in the insect. In replicate test series, different sources of insects, types of inoculum and test tree tissues for feeding, ages of inoculum and test trees, and lengths of feeding periods were used whenever consistent with the ability of the test insect to stand the con-

ditions imposed. Tests were made at all seasons of the year and test activity was synchronized with the normal seasonal succession of insects in peach orchards as much as possible. Severe strain peach mosaic of demonstrated virulence was used as inoculum in most of the tests. A few involved the use of milder strains and field strains of unclassified virulence. Some of the mosaics in related stone fruits also served as inoculum.

Peach insect survey of western United States.---In March 1937 a mobile entomological laboratory was assigned to the work of exploring the field of peach mosaic vector possibilities as a prelude to a program of peach mosaic vector tests. L. D. Christenson, L. S. Jones, D. D. Jensen, and O. H. Grehan, of the San Bernardino, Calif., laboratory and Brownwood, Tex., sub-laboratory, summarized work accomplished by the survey unit thus far. More than 26,000 records of insect occurrence in peach orchard environments are now in survey files. Collections were made at more than 90 selected sampling stations in Oklahoma, Colorado, Texas, New Mexico, Arizona, Utah, California, Washington, and Oregon. The mobile survey unit traveled 54,711 miles without serious mishap during the 4-year period. Regular sampling stations in peach mosaic infected orchard districts were visited generally 3 or more times each year at different seasons, i.e., blossom stage, pre-harvest foliage stage, post-harvest foliage stage, and dormant stage of the trees. All orchard ecological strata were sampled, including the tree, cover, soil surface, and soil strata. In addition, associated trees, shrubs, and other stone fruits were given attention wherever they occurred within the boundaries of a sampling station. Incidental to the peach mosaic infected orchard surveys, work in relation to "X" disease of peach and choke-cherry, "Muir's" disease of peach, mottle-leaf of sweet cherry, and pink-fruit of sour cherry, was carried on. The Division of Insect Identification provided approximately 11,479 identifications during the 4-year period. In addition to furnishing a basis for objective vector research on peach mosaic and the other stone-fruit viruses mentioned, survey information has added much to present knowledge of the distribution of many species, provided the United States National Museum with adequate series of many insects previously poorly represented in collections, furnished specimens of numerous species new to science, and, finally, increased materially the fund of information relative to peach insects in the desert and semiarid areas of western United States.

MEXICAN FRUITFLY CONTROL

Status of fruitfly and citrus fruit harvesting in lower Rio Grande Valley.---Very heavy rains in January, February, and March materially delayed the harvesting of citrus fruit in the Rio Grande Valley of Texas this season. It is estimated that the harvesting period was more than 30 days delayed on this one account alone, and as there has developed a rather light infestation of the Mexican fruitfly in the area regulated under Quarantine 64, the harvesting season for grapefruit was extended from April 30 to May 31. The harvesting season for oranges had been previously extended to that date. Sterilization rooms have been installed in many of the packing houses, and as the vapor-heat treatment has proved so satisfactory, and as the process eliminates the possibility of spreading the infestation of the Mexican fruitfly through the shipment of infested fruit, the lengthening of the harvesting season no longer presents a serious insect hazard. At the close of March only 186 larval infestations had been found throughout the

entire season and during the month of March only 36 fruitflies were trapped in the regulated area. At the close of March shipments of fresh fruit amounted to 24,642.8 equivalent carlots. It is estimated that at that time there remained approximately 5,000 carloads of fruit to be harvested. In all probability less than 50 percent of this amount will be shipped as fresh fruit and the remainder will be processed at the juice plants.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Comparative susceptibility to borer injury of commercial and promising varieties of sugarcane.--During the past harvesting season, J. W. Ingram and others of the Houma, La., laboratory, determined the borer infestation in replicated Bureau of Plant Industry commercial variety test fields in three locations in plant cane and in three locations in stubble cane. Infestation counts were also made in a similar number of promising noncommercial variety test fields. Of plant cane commercial varieties, C. P. 29/103 was much more heavily bored and Co. 290 significantly less bored than any other varieties. Of stubble cane commercial varieties, C. P. 28/11 and C. P. 29/116 were much more heavily bored and Co. 290 significantly less bored than any other varieties.

Of the promising noncommercial plant cane varieties, C. P. 29/137, C. P. 33/324, and C. P. 33/243 were the most heavily bored and C. P. 34/79 and C. P. 33/409 were the least bored. In stubble cane noncommercial variety test fields, C. P. 33/224 and C. P. 33/243 were the most heavily bored and C. P. 32/206 and C. P. 33/253 were the least bored.

Hawaiian mealybug parasite well established.--E. K. Bynum and E. J. Charpentier, of the Houma, La., laboratory, during a recent trip (Feb.-Mar., 1941) to the sugar section of southern Florida found the Hawaiian sugarcane mealybug parasite, Pseudococcobius terryi, in good numbers in practically every location where examinations were made. During the fall of 1940, P. terryi was found in about normal numbers in Louisiana and in Georgia, which showed that the parasite survived the unusually cold winter of 1939-40. This parasite was introduced from Hawaii in 1932.

Sugarcane treated with cold water and hot water to destroy borers and mealybugs.--J. W. Ingram, E. K. Bynum, and others at the Houma, La., laboratory, conducted preliminary experiments during the fall of 1940 to determine the effectiveness of cold water and hot water in killing borers and mealybugs in and on sugarcane stalks. All borers and mealybugs were killed by soaking cane in water of ordinary temperature for 2 or 3 weeks. All mealybugs were killed by soaking for 1 week, but some borers survived this treatment.

Neither borers nor mealybugs survived treatment in water held at 52° C. (125.5° F.) for 20 minutes or 48° C. (118.5° F.) for 1 hour.

JAPANESE BEETLE CONTROL

Defense activities affect producers of quarantined materials.--Difficulties are being experienced in obtaining sufficient labor at classified establishments to carry on their spring digging and shipping activities. Men still employed at the nurseries are reported as already demanding a wage increase, with the managements contending that their businesses do not warrant such increase. Three nurseries in Maryland report that they have had difficulty in purchasing methyl bromide for use in their fumigation chambers, because of the extensive defense program.

New high in certification activities in Baltimore area.--Shipments of certified hydrangeas and dormant and rooted cuttings from the Baltimore area during March reached a new high for the past 10 years. At one establishment, 16,559 hydrangeas and 1,148 miscellaneous plants were fumigated with methyl bromide. Due to considerable snow and freezing weather during the early part of March, digging and shipping of nursery stock was far behind schedule. In the latter part of the month, ideal weather conditions prevailed and the establishments operated to capacity. Orders on hand are reported as the best in years. In the Glenn Dale section of Maryland work for the most part consisted of the inspection of material from the Government nurseries, from which small seedlings were shipped to all parts of the country for reforestation, experimental work, and soil conservation practices. A half million seedlings and transplants were shipped by the Soil Conservation Service Nursery alone. The Maryland State Forest Nursery also made numerous shipments of large quantities of trees to points outside the regulated area in Maryland. The Plant Introduction Garden of the Bureau of Plant Industry at Glenn Dale sent out thousands of certified chestnut trees to all parts of the country.

Rosy prospects in New Jersey.--New Jersey rose growers report orders exceeding their supply. Two establishments from which large quantities of roses are certified produced a total of 340,000 roses. By the end of March two-thirds of these had been shipped or were on order. Reports were that the remainder would move with little difficulty. Azaleas moved rapidly. The majority of the growers sold out well before Easter. The nursery shipping season in the State was delayed this year, as happened in 1940. Frost in the ground prevented digging. The nurseries, however, were able to ship perennials and small shrubs, trees, and roses. Treatment of stock with paradichlorobenzene and methyl bromide increased considerably over last year. Growers report a material saving in time through the use of fumigation, since much of the laborious and expensive operation of freeing roots from soil is eliminated. Methyl bromide as a general greenhouse fumigant is also being used satisfactorily by some growers.

Machine packing of inspected perennials.--A machine for packing small perennials, intended for the chain-store trade, was installed by a grower in the New York City area. An estimated 100,000 plants will be shipped from this establishment in the near future. A large portion of these will require inspection and certification. There was a slight increase in inspection and certification work in the New York City area during March.

Reports from inspectors working out of this office indicate that nurseries have orders on hand for large quantities of nursery stock to be moved as soon as digging conditions permit. In the Long Island area, growers anticipate the movement of some 20 carloads of material to points outside the Japanese beetle regulated area. An unclassified nurseryman on Long Island advised an inspector that he had found an adult Japanese beetle in his greenhouse on February 25.

Acceptance of methyl bromide fumigation varies.--A report from the district inspector at Middletown, Conn., indicates that the proprietor of a large nursery in that section does not plan to use his methyl bromide fumigation chamber this season since he is dissatisfied with the results thus far obtained. This news has been passed along to other nurserymen in the vicinity and it is doubtful whether the other growers will utilize this chamber as they have previously done. On the other hand, 120,895 plants were fumigated with methyl bromide during March throughout the entire area. A nursery at Mentor, Ohio, has started construction of a chamber. Two nurseries in the Baltimore, Md., area plan to construct chambers after Easter, and a nursery at Bound Brook, N. J., will enlarge its chamber after the Easter rush. A nursery at Pittsville, Md., has just placed in operation a new 400-cubic foot chamber. A fumigation chamber at a large central New Jersey establishment was in almost continuous use during the last week in March.

Growers' comments on methyl bromide fumigation compiled and published.--A list of plants that have been fumigated with methyl bromide by growers in the Japanese beetle regulated area has been compiled from records furnished by the growers. The list includes 2,024 plant species. One or more reports were received covering injury to 195 varieties, or 9.6 percent of the total. This list is now available to interested growers and to investigators working with this fumigant.

Beetle warning issued to Marylanders.--George S. Langford, of the Maryland State Horticultural Department, has issued a statement advising Maryland residents, especially those in the heavily infested sections, that 1941 will be a banner year for the Japanese beetle. For those in the cities, who intend to have gardens, he advises using plants that are immune or are least susceptible to attack by the beetle.

Portable fumigation chambers demonstrated at Virginia nursery.--Representatives of the treating section of the Division visited a large nursery in the Norfolk, Va., area twice during March with their portable methyl bromide fumigation chambers for the purpose of carrying on experimental treatments on various kinds of plants and nursery stock. On one of these visits 3,000 small azaleas were fumigated for certification.

Hundreds of gypsy moth egg clusters removed from inspected materials.--Two carloads of lumber inspected by gypsy moth inspectors during the month yielded 114 egg clusters each during the course of piece-by-piece inspection. The first of these was inspected at Concord, N. H., for shipment to Camden, N. J., and the second was loaded at Derry, N. H., for movement to Caraquet, New Brunswick, Canada. Infestations totaling 515 eggs

masses were found in 42 shipments of forest products inspected during the month prior to movement to nonregulated territory in Connecticut, New Jersey, New York, Vermont, and Canada. During the latter part of the month shipments of lumber were somewhat curtailed because thawing of the roads made many of the lumber yards inaccessible to trucks. State laws limiting the load limits during the thawing season also restricted the transportation of lumber.

Additional inspectors employed.--Two temporary inspectors were employed on lumber inspection in the Concord, N. H., district during the month. On March 1 it was necessary to employ another temporary inspector on nursery inspection work at Newport, R. I. Two extra inspectors were employed for nursery and greenhouse inspection work in Delaware. They were first assigned to one of the larger classified nurseries in the State to gain experience. Personnel working in the Salisbury, Md., area was increased by the addition of six inspectors during March.

Beetle-infested material collected for culturing.--During the past 6 weeks, 30 men have been collecting elm material infested with Hylurgopinus rufipes Eich. and Scolytus multistriatus Marsh. for the Bloomfield culture laboratory. In the laboratory the material is caged in individual cans and held at temperatures favorable for beetle emergence. These beetles are then cultured for the presence of the Dutch elm disease fungus. The scouting was all done outside of the known diseased area. Routes and sections where elms are known to be common or bark beetles prevalent were selected for special attention. In order to make the survey more representative, there were also included routes where the above conditions were less common, but where there was considerable travel from the major area. It is estimated that 4,000 miles of roadways, railroads, and streams were surveyed. The area can be roughly bounded by a line drawn from Boston to Pittsfield, to Glens Falls, to Schenectady, to Syracuse, to Ithaca, to Harrisburg, and to Baltimore. Excluding the major work area, this area comprises about 40,000 square miles. Thus the coverage of only 10 linear miles in a 100-square mile area shows how superficial the survey really was. Furthermore only about 800 man-days were devoted to the scouting at a rate of 50 square miles per man-day. Only 400 sets of specimens were collected at the rate of 1 specimen per 100 square miles or 1 specimen per 2 man-days. S. multistriatus was reported as found in most of the area except between Springfield and Boston and in the section north and east of Binghamton. The results of the laboratory cultures will not be known for several weeks. The culturing of this material must await completion of culturing of similar material collected from detached areas earlier in the winter.

Elm material collected for spraying experiments.--Experiments are being carried on in cooperation with the Morristown, N. J., research laboratory of the Division of Forest Insect Investigations in spraying elm logs and wood piles with an orthodichlorobenzene-fuel oil mixture for the purpose of testing under actual field conditions the recommendations of the research laboratory for the killing of bark beetles in elm bark and for repelling insects from the wood so sprayed. It is planned to test out these sprays at certain centralized locations in New Jersey and New York, and also possibly on a few large properties. In Connecticut, it is planned to carry

on the experiments at such locations as the State clears for the work. From regular cutting operations, crews are hauling in "run of the mill" elm material instead of burning it on location. The wood piles are being accumulated at a number of the county office yards, at burning pits, and selected field locations where the material will be reasonably safe from theft and other dangers minimized. Members of the laboratory staff are demonstrating to district supervisors the correct procedure in applying the spray material to logs and wood piles. The entire project may involve the spraying of approximately 10,000 pieces at the centralization points. About 1,500 gallons of spray have been made up and distributed to the field. Regular knapsack fire fighter sprayers are used to apply the spray. Federal and State research men will check on the work and collect what data are to be had. It is anticipated that the work will be completed by May 15 next.

Daily broadcast of fire-hazard conditions in Connecticut.--The Connecticut State Forest Fire Warden has inaugurated a daily radio broadcast emanating from his office at 7:30 a. m. to indicate whether the day is considered a high, medium, or low fire-hazard day. Burning of elm material removed by eradication or sanitation workers is permitted with certain restrictions on the low-hazard days. Unlimited burning is permitted only on rainy days. The Connecticut Dutch Elm Disease State Leader has advised all district supervisors that arrangements must be made to secure the fire-hazard report each morning, and govern the burning of elm material accordingly. In every case, all of the wood that can be hauled must be burned at dumps where unlimited burning is permitted by the fire warden of that district.

Woodpecker work in Montgomery County, Pa.--Evidence of recent woodpecker work has been reported from various sections of Montgomery County. This has apparently occurred during the past 3 or 4 weeks. As a result, a considerable amount of infested material is now being discovered that was missed during the regular scouting for beetle material in December and January. All sections involved will be rescouted in April. This situation affords additional evidence that the months of March and April are favorable for an effective beetle material survey.

Pennsylvania lumbermen cooperate.--A number of lumbermen engaged in the cutting of shoring and blocking material for a large steel corporation in Pennsylvania have been contacted and have expressed their willingness to cooperate with the Dutch elm disease eradication project by discontinuing the cutting of elms. They have agreed to permit periodic inspections of their operations at any time.

Scolytus multistriatus found in Orange County, N. Y.--Scattered evidence of S. multistriatus has been observed in the Neversink Valley at a point northeast of Port Jervis. Beetles are very scarce in this vicinity and apparently have attacked only choice material, such as hangers resulting from storm damage.

FOREST INSECT INVESTIGATIONS

Effectiveness of overwintering adult *Hylurgopinus rufipes* Eich. as transmitters of *Ceratostomella ulmi* to normal elms.--R. T. Webber, Morristown, N. J., has presented additional data on the effectiveness of *H. rufipes* in the transmission of the Dutch elm disease fungus to normal elms. In an experiment started in 1939, 11 normal elms were infested with overwintering adults of *H. rufipes* artificially contaminated with *C. ulmi*. Six of the trees became infected. Of these only 1 developed external symptoms and vascular discoloration throughout; in 5 the infection was localized. The absence of infection in 5 trees and the localized infection in the other 5 is believed due to the fact that most of the xylem contacts were made early in the season prior to the formation of the new vascular system. According to information obtained from the Division of Forest Pathology, such contacts are likely to prove ineffective.

Field studies on distribution of crotch injuries in elm made by *Scolytus multistriatus* Marsh.--In the late summer of 1941, D. O. Wolfenbarger and the late T. H. Jones, of the Morristown, N. J., laboratory, conducted experiments to determine the relative abundance of elm twig crotch injuries in the vicinity of (1) logs where *Scolytus multistriatus* were emerging, and (2) where trap trees attracted them for breeding. Brief summaries of the results are given in tables 1 and 2.

Table 1.--Injuries near emergence locations

Distance from emergence logs, feet	Liberty Corners:		Bedminster	
	Crotches		Crotches	
	Examined	Injured	Examined	Injured
	Number	Percent	Number	Percent
0-50 -----	6,595	17.0	4,162	16.6
50.1-100 -----	6,374	1.2	4,536	1.8
100.1-150 -----	9,348	.3	Not counted	
Total number beetles emerged at each point	3,185	--	10,024	--

Table 2.--Injuries near trap trees

Results at points	Total No. of galleries in trap trees*	Distance from trap trees, feet			
		0-50		50.1-100	
		Crotches		Crotches	
		Examined	Injured	Examined	Injured
		Number	Percent	Number	Percent
A-----	978	13,263	.3	12,791	.02
B-----	343	7,911	.3	Not counted	
C-----	409	6,734	.02	Not counted	
D-----	723	5,576	.02	Not counted	

*These figures also denote approximately the number of female beetles attracted to the points, but there is no known method of determining the number of male beetles.

The points A, B, C, and D were placed at 278 feet E., 310 feet W., 640 feet S.E., and 744 feet N.W., respectively, of the Bedminster dispersion point given in table 1. These observations showed that (1) there were many injuries near beetle dispersion points, and (2) few injuries near points of convergence (trap tree location points) in comparison with trees farther away. The numbers of beetles dispersing from points of origin and those converging to points of attraction varied, but no conclusions were drawn from the few points under observation. Statistical computations showed that there are likely to be as many injuries in one direction of the compass as in any other.

Analysis of square-foot duff samples taken at European spruce sawfly (*Gilpinia polytoma* Htg.) study plots during 1939 and 1940.--P. B. Dowden, of the New Haven, Conn., laboratory, reports as follows on an analysis of cocoons in duff samples from permanent spruce sawfly plots: "During the last two seasons square-foot duff samples have been taken at nine study plots throughout New England in order to determine the number of hibernating European spruce sawfly cocoons present and thus make some estimate of the sawfly population within each plot. The following table presents the results of an analysis of these square-foot samples:

Locality	Time of sampling	Number of Samples taken	Total : cocoons recovered	Cocoon classification		
				Living	Emerged	Killed by predators, disease, etc.
		Number	Number	Number	Number	Number
T 12 R 16	: Spring 1939:	100	: 1,206:	87	: 279	: 840
Maine-----	: Spring 1940:	100	: 1,030:	88	: 248	: 694
T 11 R 15	: Spring 1939:	50	: 97:	6	: 46	: 45
Maine-----	: Fall 1940:	50	: 102:	7	: 37	: 58
Tshp. 30	: Spring 1939:	100	: 667:	62	: 363	: 242
Maine-----	: Spring 1940:	100	: 880:	197	: 378	: 305
Dublin,	: Spring 1939:	100	: 12,125:	8,471	: 871	: 2,783
N. H.-----	: Spring 1940:	100	: 14,231:	410	: 8,148	: 5,673
Marlboro,	: Spring 1939:	100	: 14,027:	197	: 10,312	: 3,518
Vt.-----	: Spring 1940:	100	: 18,650:	22	: 13,089	: 5,539
Woodford,	: Spring 1939:	50	: 183:	1	: 123	: 59
Vt.-----	: Fall 1940:	50	: 185:	2	: 118	: 65
*Pharsalia,	: Spring 1939:	50	: 119:	16	: 73	: 30
N. Y.-----	: Fall 1940:	50	: 155:	17	: 100	: 38
*Westfield,	: Spring 1939:	50	: 135:	16	: 54	: 65
Mass.-----	: Fall 1940:	50	: 315:	46	: 114	: 155
*Orange,	: Spring 1939:	50	: 307:	0	: 199	: 108
Conn.-----	: Fall 1940:	50	: 396:	3	: 267	: 126

*Plantations.

At most of the plots there has been a very light infestation during the two seasons in which these observations were made. The Dublin, N. H., plot is a notable exception, for it was severely infested in 1939. The Marlboro, Vt., plot was severely defoliated in 1938, one year before duff

samples were taken. The spring samples were collected before the living, hibernating cocoons produced adults. The count of living cocoons was, therefore, an indication of the severity of the infestation anticipated for that year. The count of emerged cocoons is of interest when counts are made over successive years, for emerged cocoons will remain in good condition in the duff for several years after adult sawflies have issued. Yearly counts thus give a rather clear picture of the history of an infestation.

Relation of mild winter temperatures to plant and insect development.--H. J. Rust, of the Forest Insect Laboratory at Coeur d'Alene, Idaho, reports that following the mild winter of 1940-41 in the Inland Empire region, plant and insect life is far in advance of normal seasonal development. Records of plant and insect development have been maintained at this laboratory during the past 10 years. During this period the earliest plant development recorded was in 1934; however, on March 3, 1941, a number of plants were from 10 to 15 days ahead of that season. Bark beetle development shows the same advanced condition, with new attacks of Ips oregoni being recorded on March 21. It is expected that during the spring season cooler temperatures will produce conditions comparable to the 1934 season.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

March storms cause comparatively little lost time on gypsy moth work.--Conditions were generally satisfactory for gypsy moth work during the first week in March. Severe storms on March 8 and 11 resulted in an accumulation of new snow ranging from 1 to 2 feet in depth throughout the western New England, eastern New York, and northeastern Pennsylvania areas where gypsy moth work is conducted. The workers were obliged to resort again to the use of snowshoes and working conditions in dense woodlands were so unsatisfactory, due to a thick coating of wet snow adhering to the tree growth, that scouting work was temporarily transferred to more open country. However, the snow settled quickly, and many workers were able to discontinue using snowshoes by the end of the week. Large accumulations of brush and other waste wood resulting from selective thinning work at infested locations were burned during this period. Winds of gale force blew steadily during the first 3 days of the week ending March 22, and the penetrating cold forced the discontinuance of work by several gypsy moth crews. Drifting snow hampered travel on rural roads in many localities, and the use of snowshoes again became necessary in some sections.

Gypsy moth work curtailed in Vermont.--The accomplishments of the greatly reduced force of workers remaining was relatively small during March. General scouting was necessarily suspended, and attention was concentrated almost entirely on the examination of wood lots where white birch was being cut by local operators, or where cutting operations were about to begin. These wood lots are widely scattered over the area, and many are located at a considerable distance from traveled highways. Practically all of the birch logs cut are transported by truck to a woodworking mill in Berlin, Rensselaer County, N. Y., where they are manufactured into bobbins, dowels, handles, and various sorts of wood novelties. In

addition to the work in birch lots, the workers also examined a large amount of pulpwood cut in Rutland County for shipment to Corinth, Saratoga County, N. Y.; and small lots of hardwood logs from several localities in Rutland County were also examined before they were transported to a woodworking mill in Granville, Washington County, N. Y. In both cases the logs already cut were carefully examined, and the wood lots where cutting operations were still in progress were scouted. Information was also secured relative to the origin and proposed movement of saw logs and cordwood in the barrier-zone area, which will be valuable in preventing the spread of gypsy moth infestation. Considerable preliminary information was obtained by the supervisory personnel engaged in reexamining infested woodlands concerning the ownership, property boundaries, and other details, preparatory to securing written permits for the spraying of gypsy moth infested areas. A large proportion of the infested properties are combinations of woodland and pasture, and they are frequently poorly fenced. In such cases an agreement is reached with the property owners so that the temporary fences erected to exclude livestock from the areas that are to be sprayed may be satisfactorily located.

Gypsy moth work in Massachusetts progresses satisfactorily.--Although a moderate curtailment of the gypsy moth force in Massachusetts became necessary early in March, all field work progressed satisfactorily during the month. The volume of the work accomplished was, of course, less than the amount planned for the full force of employees. Fifteen crews of intermediate W. P. A. workers were detailed to scouting work; 6 crews of laborers to thinning work at infested locations; and 1 crew of laborers continued the ground work in an infested area, creosoting egg clusters above the snow line and burning brush and other trash wood. Many of the scouts were detailed to examine birch lots. It was also necessary to scout a number of other lots where considerable volumes of white pine, hemlock, maple, and other species of trees were being cut. While much of this wood was consumed locally, there was sufficient movement of the products to warrant a close examination of the logs or wood lots. Many of the scattered egg clusters found in the Massachusetts area were broken by various agencies. Ice falling from encrusted tree trunks and branches carries eggs and parts of egg clusters to the ground, birds picking at the clusters dislodge eggs, and the whipping about of branches in high winds often breaks the clusters and scatters the eggs. As the individual eggs and parts of egg clusters cannot be found when mixed with the dead leaves and debris on the forest floor, spraying with lead arsenate is necessary if the insect is to be eliminated from areas where broken egg clusters are present.

Several small gypsy moth infestations found in Connecticut.--No reduction of the W. P. A. gypsy moth force in Connecticut is likely to be necessary, as the number of workers carried on the pay-roll during the present fiscal year has averaged less than 60 percent of the quota set up for that State, and ample funds are available for the continuation of the work through next June. During the 8-month period extending from July 1, 1940 to March 1, 1941, the W. P. A. gypsy moth personnel dropped steadily in numbers despite all efforts to obtain replacements. The force diminished from a peak of 120 workers at the start of the fiscal year to a total of

only 70 employees on March 15. It is doubtful if the force can be maintained even at this low level, with the continuous expansion of manufacturing industries providing increased opportunities for private employment and the prospective increase in all types of construction work with the approach of mild weather requiring additional labor. Six crews were engaged in gypsy moth scouting work in the townships of Cornwall, Litchfield, Salisbury, and Warren, in Litchfield County during March. Several additional infestations were located in the barrier-zone area of Connecticut, but the colonies were generally small, with the egg clusters scattered singly through the woodland. A small force of experienced workers scouted heavily wooded areas on high elevations, where work of this type had not been conducted for 3 or more years. Although a large percentage of the growth consisted of several varieties of oaks and other plants favored as food by the gypsy moth, only a small number of egg clusters were found and creosoted. An effort will be made to complete the scouting of all the large woodland blocks in which crews are now working before the first of May, so that the extent of infestations warranting spraying work can be definitely established and final arrangements completed before the beginning of the spraying season, which usually starts about June 1. In preparation for spraying and banding work during the approaching larval season, 3 ground crews and 2 thinning crews continued intensive treatment work at important infestations in Litchfield and New Haven Counties. Work at many of the infestations located early in the winter has been completed, and the stands of tree growth are in excellent condition for spraying.

Quarantine inspection work not curtailed in Pennsylvania.--Although gypsy moth scouting work was continued on a greatly reduced scale by the small number of workers available in Pennsylvania after the temporary reduction in personnel late in February, the quarantine inspection work suffered no curtailment during March. As gypsy moth work in Pennsylvania is directed toward the extermination of the insect, it is of vital importance that the spread to uninfested territory, or to areas where persistent exterminative treatment has eliminated the pest, be prevented. The continuous movement, both within the quarantined area and from points within the quarantined area to other destinations, of mine timbers, rough lumber, scrap metal, surface stone, and other materials that are liable to carry infestation necessitates the maintenance of an adequate inspection service at all times. Scouting work was conducted in the township of Plains, Luzerne County; Kidder, in Carbon County; and Clifton and Madison, in Lackawanna County during March. A gypsy moth infestation covering a considerable acreage on the upper slopes of a heavily wooded ridge was found in Madison. Intensive work is in progress at this infestation, and it will be continued for the remainder of the fiscal year if it is necessary in order to accomplish the extermination of the colony. Due to the reduction in field activity, many regular employees ordinarily detailed to the general supervision of W. P. A. crews were available for special assignments during March. Several of these employees were assigned to secure permits for spraying work in residential areas. This necessary work must be started well in advance of the beginning of actual spraying work because of the time required to obtain the large number of permits that must be secured in order to spray a comparatively small area.

C. C. C. gypsy moth work drastically reduced.--A severe reduction in the number of 6-hour man-days used by the C. C. C. on gypsy moth work east of the barrier zone under the supervision of this Bureau, from a high of 1,562 man-days to only 884 man-days during the last week of the period, occurred during March, and drastic further reductions are in prospect. The current losses of time were caused by the necessity of training new enrollees in gypsy moth work, including the use of sharp-edged tools; training the men in fire-fighting technique; and the impossibility of filling and maintaining the camp quotas, even though the quotas have been gradually reduced from 207 to about 140 men per camp. Many men who would normally be available for C. C. C. work have entered the Army or Navy, and many others have been absorbed by the National Defense Program. Notice has been received that approximately 15 camps in this Corps Area are soon to be discontinued, among them being several where crews have been available for gypsy moth work. About 75 percent of the enrollees in one of the Vermont camps which is to be abandoned have been engaged in gypsy moth work; and the entire personnel of a similar camp in Massachusetts has been detailed to gypsy moth work continuously, with the exception of a 16-month period following the hurricane of September 1938. While approximately 6,000 6-hour man-days were used on C. C. C. gypsy moth work during February, the abandonment of the camps will result in a reduction of about 70 percent, leaving approximately 400 man-days per week available for gypsy moth work. It will also be necessary to reduce the overhead and supervisory personnel, and a considerable number of trained men with long experience in gypsy moth work will be lost. During the latter part of March, crews in the areas affected by the prospective abandonment have concentrated on finishing work already in progress. This included the burning of accumulations of brush from thinning operations and creosoting as many egg clusters as possible at infestations near camping and lunching areas, and at another site used by a trucking concern, in order to reduce the infestations in localities from which the insects are most likely to be carried on vehicles. At the end of March gypsy moth foremen and crews were still working from 3 camps in the northern part of Connecticut, 2 camps in Massachusetts, and 1 in Vermont.

Sprayers loaned for C. C. C. gypsy moth work.--Arrangements have been made for the loan of three high-powered spraying units by the Bureau of Entomology and Plant Quarantine to the C. C. C. for gypsy moth spraying work during the approaching larval season. One of the sprayers will be used in Massachusetts and two in Connecticut. The State Gypsy Moth Organization in Connecticut will loan another sprayer for use in that State, and will assist in supervising the work. The C. C. C. will supply the lead arsenate, fish oil, and labor. All of this equipment cannot be used to fullest capacity, as sufficient labor to operate the sprayers on a double-shift basis will not be available at several of the camps.

PLANT DISEASE CONTROL

C. C. C. workers used on winter canker removal project.--A winter project for C. C. C. workers located near a heavily infected stand of reproduction in the Scott Creek drainage on the Coeur d'Alene National Forest is canker and infected tree elimination. This work, outlined by the Forest Service, is the first step in an attempt to salvage an excellent white pine area from which about 60,000 board feet of white pine per acre was removed nearly 25 years ago. Excellent reproduction from 5 to 20 feet in height now covers most of the area but infection, started about 1927, has made deep inroads. The present work is being completed in three steps. First axemen, working in strips, remove all trees with trunk cankers. Following this a pruning saw crew eliminates all branches up to breast height. The final step is the removal of all other cankered branches by a crew equipped with long-handled saws. The first Ribes eradication will be done early this spring following the pruning work. A second pruning job will be necessary in about 2 years, at which time any latent infection, now invisible, and any old cankers that were missed will be eliminated. It is expected that as a result of pruning and Ribes eradication some of the present crop will be saved and the treeless openings will be filled by a new crop.

Over 10,000,000 Ribes eradicated in Northeastern States during 1940.--During 1940, a total of 701,838 acres was cleared of 10,971,271 wild Ribes and 12,348 cultivated bushes in the Northeastern States. This work gave protection to 253,082 acres of pine from blister rust and provided 139,239 man-days of employment. About 80 percent of the total acreage was worked by W. P. A. and C. C. C. labor. Local cooperators expended over \$31,000 on Ribes eradication.

Early aecial production in the Inland Empire.--In the course of infected tree pruning and slashing in the Scott Creek drainage on the Coeur d'Alene National Forest, the first protruding aecial sacs were observed on March 16. On the following day more advanced protrusions with ruptured membranes and freed aeciospores were noted. This is not unexpected since a mild winter with unusually warm weather since early in February has stimulated all plant life to early activity. This condition plus the accompanying situation of abundant moisture throughout the region suggest the probability of heavy Ribes infection this year.

Safety prevention conference.--On March 27th a joint conference was held by the Forest Service and the Blister Rust Control Office at Spokane, Wash., to consider accident prevention. Constructive steps have been outlined under which it is hoped that the number and frequency of accidents in blister rust control camps can be reduced.

Blister rust damage to large, second-growth white pine.--A detailed study of a series of quarter-acre pine plots, comprising 14.5 acres of the old Cross Clearing Camp Site at Harrietstown, N. Y., in the vicinity of Tupper Lake, has yielded some interesting information concerning blister rust damage to merchantable-size pine growing in mixture (46 percent

white pine, 37 percent other conifers, and 17 percent hardwoods). The principal source of blister rust infection was apparently skunk currants. The 1,037 white pines examined averaged 14.6 inches d. b. h. and 72 feet in height. In 1940 the percentage of infection was 61, that is, 629 pines had blister rust or had been killed by the disease. Less than 2 percent of the total trees had branch cankers only. A total of 161 pines had died from the rust, 339 had live stem cankers, and 112 had dead tops due to girdling by the disease. Of the total volume of the stand (305,757 bd. ft.), 175,311 bd. ft., or more than 57 percent of the 1940 volume, is a potential loss within the next decade, exclusive of growth loss due to infection. It is fortunate that further infection has been reduced to a minimum by removal of the beds of skunk currants.

Blister rust display.--C. C. Perry, in charge of blister rust control work in Massachusetts, reports that a blister rust display was arranged by District Leader R. E. Wheeler in connection with the annual Recreation Conference held at the Massachusetts State College at Amherst on March 14. A lively interest was evidenced by those viewing the display. Special interest was noted on the part of students who, by coincidence, had just been studying the blister rust fungus in their biology course. On the following day Mr. Perry attended the Forestry Section of the conference. One of the attending foresters, in speaking on the topic "Forest Prospects in Massachusetts," predicted that in spite of the hurricane, white pine will continue to be the one species upon which the future of forestry in New England will depend. He based his predictions on the demonstrated ability of white pine to succeed itself. History records four hurricanes in New England, each of which destroyed many mature pines, but the species has always reestablished itself with increased vigor.

Nursery inspection work in 1940.--In 1940, 63 nurseries applied for permits to ship barberry bushes into States protected by Quarantine No. 38. During the course of the inspection, which was made to determine whether or not these nurseries were eligible for permits, 608 barberry bushes were destroyed. According to L. M. Ames, this figure may be compared with 13,214 bushes destroyed in 1939 and 23,750 in 1938, indicating that nurseries interested in interstate shipment of barberry bushes are gradually eliminating other than rust-immune species. A survey of nursery catalogs on file in the Department of Agriculture Library indicates that there are fewer than 100 nurseries in the United States that in 1939-40 were advertising for sale species of barberry susceptible to attack by the stem rust fungus. The demand for such species is gradually diminishing and it is expected that they will soon be eliminated from interstate trade.

Control work progresses rapidly in western Minnesota counties.--In briefly summarizing progress that was made in barberry eradication in Minnesota in 1940, L. W. Melender states that 1,741 barberry bushes

were found and destroyed during the year as a result of initial survey in Scott, Le Seuer, McLeod, Meeker, Kandiyohi, Swift, Chippewa, Big Stone, and Pope Counties. Of these, 969 (of which 187 were fruiting bushes) were located on new properties. Of 792 bushes found on 123 properties previously reported, only 100 were fruiting. Much of the work done in Minnesota in 1940 was in western prairie counties. Some resurvey, or subsequent survey, was conducted in Olmsted, Fillmore, Goodhue, and Winona Counties.

Farm operators and local governments support barberry eradication.--

Aid furnished by local agencies contributed in an important way toward the success of the field program in several States during the past year. Trucking and storage facilities valued at \$4,653 were furnished by Olmsted, Winona, Dakota, Meeker, Kandiyohi, Swift, Pope, and Chippewa Counties in Minnesota. Property owners in Pennsylvania contributed labor, hauling, and storage, valued at \$8,429, and county aid in Iowa exceeded \$5,000 for the year.

Extensive program approved for Pennsylvania for next 12 months.--

Two State W. P. A. projects in barberry eradication have been approved recently for operation in Pennsylvania. These will provide for the employment of approximately 300 men for a period of 12 months. Henry P. Antoine, barberry eradication supervisor in Pennsylvania, contacted more than 100 farm operators in the Columbia Cross Roads and Wetona areas of Bradford County, where an extensive infestation of barberry bushes was brought under control in 1937 and 1938. The object was to obtain the cooperation of property owners in making a resurvey of this area. Mr. Antoine found in talking with farmers that yields and quality of grain in this area had been greatly improved since bushes were brought under control and that, generally speaking, property owners were anxious to cooperate in any way to prevent reinfestation.

COTTON INSECT INVESTIGATIONS

Influence of date of planting cotton on pink bollworm population.

A test to secure information on the influence of the date of planting cotton on the pink bollworm population was continued in 1940 at the Presidio, Tex., laboratory by A. J. Chapman, O. T. Robertson, and W. L. Lowry. A large screen-covered cage, divided into three sections of about one-fourth acre each, was used to prevent interference from outside infestations. Cotton was planted in the different sections on March 28, April 20, and May 15, respectively, representing early, medium, and late planting dates. When the test was commenced in 1939 the pink bollworm infestation was started by plowing under infested cotton bolls and allowing the moths to emerge naturally. An extremely heavy infestation developed in cotton planted on all dates. After the crop was harvested the stalks were cut and the crop debris collected by hand and burned. This clean-up was probably more thorough than is practicable under field conditions. Examinations in March of 1940 showed an average of 0.65 pink bollworm larva per square yard was present in the soil of the section planted on March 28, 1.05 larvae in the section planted April 20, and 4.60 larvae in the section planted May 5. Despite the larvae hibernating in the soil, no infestation developed in any of the blooms during the first 3 weeks of blooming in 1940, indicating that the fall clean-up was more effective as a control measure, or that the larvae hibernating in the soil were of less importance in maintaining the infestation than previously thought. Since it appeared that no survival had occurred, 75 pairs of pink bollworm moths were liberated in each section of the cage. Releases were made 21 days after the first blooms appeared on the cotton planted on each date, or on June 26, July 11, and July 25, in the respective sections. Records were made of the seasonal pink bollworm populations and after harvest the stalks were cut with machetes and burned as soon after picking was completed as would be practicable under field conditions, or on October 1 for the March 28 planting, October 27 for the April 20 planting, and December 3 for the May 15 planting. The bolls and crop debris that shattered to the ground were not collected by hand. Examinations of the surface trash and of the soil were made after the clean-up to determine the numbers of hibernating larvae remaining from each date of planting. The data on yields and overwintering populations are shown in the following table.

Date planted	Yield of seed cotton per acre	Date of last picking	Overwintering pink bollworm population per square yard*		
			In surface trash	In soil	Total
Mar. 28-	1,831	Sept. 26	4.45	1.50	5.95
Apr. 20-	1,773	Oct. 26	31.23	5.67	36.90
May 15--	1,783	Nov. 20	36.69	8.19	44.80

* Surface trash collected December 4-6, soil samples December 10-11.

The results show that the later the cotton was planted and the later the stalks were cut and burned the higher the overwintering population. The different sections of the cage will again be planted on the same dates in 1941 to determine the infestations that develop naturally from the overwintering larvae remaining in the surface trash and soil.

Ground trash examinations for hibernating boll weevils.--

The examination of ground trash from woods near cottonfields for hibernating boll weevils that was started in 1935 seems to give more reliable data on weevil survival than the examinations of Spanish moss previously used. The surface trash consisting of leaves, twigs, and other forest debris with about 1 inch of the top soil is carefully collected from known areas and passed through specially designed shaker machinery to remove a large part of the coarse and fine material. The remainder, consisting mostly of particles approximating the size of boll weevils, is then examined by hand or placed in screen trays in a warm room so that the live weevils will become active and more easily collected. Many other insects are also present and a list of those found in the examinations in South Carolina during the winters of 1937-38 and 1938-39 was recently published in Circular E-528 by C. F. Rainwater.

During the fall of 1940, 104 samples of 2 square yards each examined at Tallulah, La., contained 31 live and 7 dead weevils (81.6 percent alive), or 721 weevils per acre. In March of 1941, 100 samples from the same locations yielded 30 live weevils, indicating that very little mortality had occurred during the winter of 1940-41. An additional 100 samples from near other fields were examined in the spring of 1941 and 46 live weevils and 18 dead weevils were found. The 200 samples examined in the spring of 1941 contained an average of 920 weevils per acre, which is a much larger number than has been found in previous spring examinations. The percentage alive was 80.9 percent, or practically the same as found last fall. Heavy rainfall occurred in November 1940 prior to collecting the ground trash and left the ground very unfavorable for taking the samples, but rainfall was below normal during the winter and the March samples were collected under more favorable conditions. The weevil population was heavy in all fields around Tallulah, La., in the fall of 1940 but a severe freeze on November 14 and 15 caught many weevils still in the fields. Many dead weevils were found in the fields but others probably dropped to the ground for protection and moved into the woods-trash shelter after the fall examinations were made.

Examinations were also made of 200 square yards of woods trash at Florence, S. C., this spring. A total of 81 live weevils, or an average of 1,960 per acre, were found. A comparison of the number of live weevils per acre found in the spring woods-trash examinations for the past 4 years at both localities is shown in the table below.

Spring of--	Live weevils per acre	
	Tallulah, La.	Florence, S.C.
1938-----	186 ± 96	1,476
1939-----	226 ± 71	3,582
1940-----	190 ± 69	176
1941-----	920 ± 130	1,960

Very little damage was caused to cotton in the vicinity of Florence last year following the severe winter of 1939-40, but the weevil population increased greatly late in the season and survived the winter in fairly large numbers as shown by the trash examinations.

Correction in survey of hemipterous insect damage to cotton in Arizona.—In the News Letter (Vol. VIII, No. 4, for Feb. 1941) the figures given in the table on page 21 for percentage of bolls punctured in short staple cotton in Arizona for 1940 represent the 7-year average for the counties. The correct figures for 1940 are 70.7 percent punctured bolls for Yuma County, 41.1 percent for Maricopa, 26.7 percent for Graham, 30.7 percent for Pinal, 10.3 percent for Santa Cruz, and 12.6 percent for Pima. The State average for 1940 of 33.4 percent punctured bolls, as given in the table, is correct.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild-cotton eradication.—A number of years ago it was found that wild cotton, which was growing in great abundance in southern Florida, was heavily infested with the pink bollworm, from which this dangerous cotton insect was making its way northward to domestic cotton plantings. Consequently, a project was inaugurated designed to eradicate this pest through the destruction of this wild cotton plant upon which it depends for sustenance. Conditions for wild cotton eradication work throughout most of the present season have been unfavorable owing to an unusual amount of rain, resulting in bad roads and a very troublesome mosquito situation. However, there was less rainfall during March, and consequently, working conditions were greatly improved. Approximately 2,200 more acres were covered during March incident to the destruction of wild-cotton plants than during February, but approximately 48,000 less plants were found during March than during the previous month. In the Bradenton-Fort Myers subdistrict, the crews in Collier, Lee, and Charlotte Counties were working toward the completion of the second cleaning for the season, whereas the crews in Manatee, Hillsborough, and Pinellas Counties completed the second cleaning with perhaps the exception of a few locations reached by boat, and devoted considerable time to clearing the wild-cotton colonies of other vegetation to permit the penetration of air and sunlight and thus hasten germination of dormant wild cottonseed. In the Cape Sable area the second cleaning of the season was brought to a conclusion with the exception of one or two small areas, and, in addition, 700 acres was covered toward a third cleaning of the season. Approximately 3 plants per acre were found during this third cleaning. The houseboat crew attached to the Cape Sable area completed the cleaning of Dade County mainland colonies and then gave attention to the keys in Florida Bay. The second cleaning of Key Largo was completed during the month. This brought to a close a second cleaning of all the Main Keys group. Approximately 4 plants per acre were found on Key Largo during March. The houseboat crew attached to the Keys subdistrict completed the first cleaning of the season, together with a considerable amount of scouting work. This crew then began the second cleaning of the season by first giving attention to the Dade County mainland in the vicinity of Madeira Bay. In the Marathon-Key West section,

Boca Grande Island was completed for the second time. During this second cleaning, 15,000 seedlings, but only 4 mature plants, were found. During March a total of 7,861 acres was covered, from which were removed 877 plants with mature bolls, 41,341 seedling plants, and 36 sprout plants.

Planting of the 1941 cotton crop in the lower Rio Grande Valley.—As a control measure for the suppression of the pink bollworm in the lower Rio Grande Valley of south Texas, State regulations were inaugurated for the 1941 cotton crop designed to retard cotton planting in that region so that the majority of overwintering pink bollworms would emerge in the spring prior to the fruiting of the crop. The date for planting was fixed between February 1 and March 15; however, excessive rainfall during both February and March resulted in only about 50 percent of the crop being planted at the end of March, and it was estimated that at least half of that must be replanted. Consequently, in order to enable Valley growers to complete the planting of the crop, the State Department of Agriculture extended the planting period to April 20.

Destruction of sprout and volunteer cotton.—Because of the mild climate and all-year growing season in the lower Rio Grande Valley of south Texas, the cotton plant affords continuous sustenance for the pink bollworm. Consequently, to successfully combat this destructive cotton insect in that region it is necessary to deprive it of material on which to propagate during the normal noncotton-growing period. The first phase of the program to accomplish this condition is the destruction of all cotton stalks as soon as the crop is picked out. However, portions of the roots are invariably left in the ground following plowing operations, which sprout throughout the year and furnish food for the build-up of infestation. Therefore, in order to maintain a host-free period, it is necessary to carry on an intensive campaign for the destruction of such plants from early fall until the fruiting of the subsequent crop. Field activities in connection with the removal of sprout plants were very limited during March owing to unfavorable weather conditions. Fields were too wet to enter during the greater part of the month, and the grubbing of sprouts was restricted to sandy, well-drained fields. However, abnormally cold nights retarded the sprout-cotton growth, and very little grubbing was necessary to maintain the host-free status.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Reaction of smotherweed to curly-top virus.—The results from incomplete tests using the beet leafhopper (Eutettix tenellus (Bak.)) as a vector, being conducted at the Twin Falls, Idaho, laboratory, by H. C. Hallock, in cooperation with A. M. Murphy, of the Bureau of Plant Industry, indicate that smotherweed (Bassia hyssopifolia (Pall.) Kuntze) does not act as a reservoir of the curly-top virus, confirming the results previously obtained by H. H. P. Severin in California. The acreage occupied by this weed is increasing in waste areas and adjoining irrigated sections in southern Idaho and field studies have

shown that under certain conditions it is a favorable summer breeding host of the beet leafhopper. In conducting these tests gravid leafhoppers that were viruliferous were confined on the snotherweed for a period of 7 days. One week later other leafhoppers known to be non-viruliferous were confined on these plants for a period of 4 weeks, after which they were transferred to sugar beet seedlings of a variety susceptible to curly-top and observations were made to determine whether the beets developed curly-top. Similar records were obtained by confining leafhopper nymphs on beet seedlings which had developed on the snotherweed plants from eggs deposited by the viruliferous adults which had previously been confined on the weed. In these tests, conducted under suitable conditions in the greenhouse, snotherweed was not susceptible to curly-top and the virus was not recovered from inoculated plants. This plant is grown readily under greenhouse conditions and will make an excellent host for rearing nonviruliferous beet leafhoppers.

Funigation of tobacco at reduced pressures with hydrocyanic-acid gas.— In funigation experiments recently completed by R. W. Brubaker and W. D. Reed, of the Richmond, Va., field laboratory, it has been shown that dosages of hydrocyanic-acid gas as low as 1 pound per 1,000 cubic feet produced a high mortality among the larvae of the cigarette beetle (Lasioderma serricornis (F.)) under conditions of reduced pressures and an exposure period of 3 hours. The average mortalities obtained among larvae placed at varying depths in bales of imported tobacco from exposure to dosages ranging from 1 to 4 pounds of hydrocyanic acid per 1,000 cubic feet of space were as follows: 4 pounds—100 percent mortality; 3 pounds—99.8 percent; 2 pounds—99.7 percent; 1 pound—97.2 percent. By means of test spikes 25 well-grown larvae of the cigarette beetle confined in perforated gelatin capsules were placed in each bale of tobacco at depths of $1\frac{1}{4}$, $3\frac{1}{4}$, $5\frac{1}{4}$, and $9\frac{1}{4}$ inches. The bales were placed in a small vacuum funigation chamber and the pressure reduced to about 29 inches on a standard mercury gauge before introduction of the funigant. After 3 hours' exposure the bales were removed from the chamber but the test insects were not removed from the bales until 72 hours following treatment, after which daily observations for 7 days were made to determine the percentage of larval mortality. In these tests there were 6 replicates of each treatment, each replicate embodying the funigation of 2 bales of tobacco containing a total of 250 beetle larvae. The temperature of the tobacco was about 70°F. for all tests and the moisture content of the tobacco around 13 percent.

Antimony compounds other than tartar emetic effective against gladiolus thrips.— Additional tests conducted by G. V. Johnson, of the Beltsville, Md., field laboratory in 1940, have shown that calcium antimony tartrate (powder) and antimony lactate (liquid) show promising indications as substitutes for the tartar emetic in the spray formula recommended against the gladiolus thrips (Taeniothrips simplex Morison). The results of tests conducted on replicated field plots of gladiolus indicate that a spray mixture consisting of 2.2 pounds of calcium antimony tartrate and 4 pounds of brown sugar to 100 gallons

of water was as effective against the gladiolus thrips as a spray mixture containing 2 pounds of tartar emetic and 4 pounds of brown sugar. However, when white sugar was substituted in the formula, the efficiency of the spray was reduced. Calcium antimony tartrate is slowly soluble in cold water and was unsatisfactory in this respect as compared to tartar emetic. In another test using only a single large plot of gladiolus 93.5 percent of the flowers produced were uninjured by thrips following treatment with a spray mixture consisting of 8 pounds of antimony lactate and 4 pounds of brown sugar to 100 gallons of water, while gladiolus, treated with an equivalent tartar emetic-brown sugar spray, produced 92.3 percent uninjured flowers.

INSECTS AFFECTING MAN AND ANIMALS

Mosquito surveys at Camp Stewart, Ga. and Camp Davis, N.C.--

At the request of the Office of C. C. C. Activities of the Forest Service, G. H. Bradley, of the New Smyrna Beach, Fla., laboratory, inspected the area for mosquito breeding in the vicinity of Camp Stewart, Ga. and Camp Davis, N.C., March 27-April 1 in company with Marion Lamb of the Forest Service. The surveys were made for the purpose of determining the need and preparing estimates and a working plan for a C. C. C. Camp near each Army Cantonment. The following species of mosquitoes were taken at the time of survey: Aedes vexans, Culex restuans, Anopheles crucians, and A. punctipennis.

Tests to determine distance of flight of stable flies.--

Colored flies were released by W. E. Dove and S. W. Simmons, of the Panama City, Fla., laboratory, at six separate localities varying from 20 to 40 miles from coastal bays and paralleling the shoreline of northwest Florida for about 100 miles. Two marked flies were recovered on February 6 and 13, respectively, a distance of about 52 miles from the point of release. These individuals had been "colored" on January 3, or before, which was 33 and 40 days, respectively, prior to their recovery.

Synthetic resins as an adhesive base in combination with tickicides in the control of the Gulf coast tick.--E. B. Blakeslee, of the Panama City laboratory, reports that of 100 new mixtures tested, only 11 were capable of killing 90 percent of the ticks in 48 hours. Of these, 7 were in fair condition after 15 days exposure on the ears of animals, and 1 was in very good condition. Applications were without injury to the skin of the animals.

Office of Menard, Tex., laboratory burns.--Early on the evening of March 19 the office of the Menard, Tex., laboratory was completely destroyed by fire of an undetermined origin. The loss was complete and included valuable experimental data, several microscopes, and all office records and equipment.

Cube-sulphur dust as a control of cattle grubs.-- For the control of cattle grubs in small herds of cattle, E. W. Laake, R. W. Wells, and W. G. Bruce report that a mixture of equal parts of cube powder and wettable sulphur applied as a dust has given excellent results. They state that the treatment is simple, rapid, efficient, and inexpensive.

Cattle grub control demonstration.—E. W. Laake reports that in cooperation with the Extension Entomologist of the Texas A. & M. College and local county agents, demonstrations were given on cattle grub control by the personnel of the Dallas laboratory in Anderson and Cherokee Counties in eastern Texas. As a result of these demonstrations there followed a great deal of cattle grub control activity in Anderson County.

Wettable sulphur a desirable substitute for soap in cube-sulphur wash for cattle grubs.—It has been shown by R. W. Wells, E. W. Laake, and W. G. Bruce, of the Dallas, Tex., laboratory, that 6 ounces of wettable sulphur is a desirable substitute for the 2 ounces of soap per gallon of cube wash for cattle grubs, and that soft water is not essential when the sulphur is substituted. Results obtained with the sulphur-cube wash were better than those obtained with the soapy cube wash. The need for hot water to dissolve the soap is eliminated and the cost is not increased.

Breeding areas of *Aedes vexans* and *A. lateralis*.—E. F. Knipling and C. M. Gjullin, of the Portland, Oreg., laboratory, report that preliminary soil sampling of the flood-water mosquito breeding areas showed a concentration of approximately 45 percent of the eggs around obstructions in one place and about 80 percent in another. The area covered by obstructions in each case represented about 5 percent of the total area sampled. The obstructions cited were fallen logs, dense brushy areas, and stumps.

FOREIGN PLANT QUARANTINES

Another smuggler thwarted.—On February 12, A. H. Malcolm, of the customs service at Miami, Fla., who has a reputation for detecting would-be smugglers, got two small mango plants from the sleeves of a lady's sweater when the owner returned from Cuba. The plants were infested with *Chrysomphalus dictyospermi* (Morg.), *Howardia biclavis* (Const.), and *Leucaspis indica* Marl.

Entomological interceptions of interest.—Three living adults of the bruchid *Bruchus* sp., probably *guttalis* Rey., were intercepted at New York on November 22, 1940, in vetch seeds in cargo from Portugal. A living adult of the curculionid *Colecerus narmoratus* Horn was found at Brownsville, Tex., on March 7, 1941, with lettuce in baggage from Mexico. A living larva of the pink bollworm (*Pectinophora gossypiella* (Saund.)) was taken at New Orleans on February 13, 1941, in cottonseed in mail from Brazil. Nine living larvae of the Asiatic rice borer (*Chilo simplex* Btl.) were intercepted at Corpus Christi, Tex., on March 14, 1941, in rice straw in cargo from Japan. A living adult of the pentatomid *Mornidea collaris* Dall. was found at Laredo, Tex., on March 17, 1941, with an orchid plant in baggage from Mexico. Living specimens of the bruchid *Bruchus ramicornis* Er. were intercepted at the Inspection House at Washington, D. C., on March 17, 1941, in *Vigna sinensis* seeds in express from Brazil. Four living larvae of the trypetid *Anastrepha nonbinpraeoptans* Sein were taken at Newport News, Va., on February 5, 1941, in mango in

stores from Haiti. Living specimens of the bostrichid Dinoderus brevis (Horn) were intercepted at New Orleans on February 21, 1941, in bamboo strips used as dunnage from India. A living adult of the coreid Leptoglossus chilensis (Spinola) was taken at New York on March 18, 1941, with excelsior packing for grapes in cargo from Chile. Specimens of the coccid Aonidiella eugeniae (Hempel) and the whitefly Aleuroplatus sp., apparently an undescribed species closest to graphicus Bondar, were intercepted at the Inspection House, Washington, D. C., on January 17, 1940, on leaves of Eugenia cauliflora in freight from Brazil. A living adult of the nabid Nabis punctipennis Blanch. was taken at Norfolk, Va., on February 21, 1941, with cabbage in stores from Chile. Specimens of the coccid Aspidiotus degeneratus Leon. were intercepted at Seattle, Wash., on January 9, 1941, on camellia leaves in cargo from Japan. Living workers and nymphs of the termite Coptotermes sp. were found at Portland, Oreg., on January 25, 1941, in taro in cargo from China. T. E. Snyder states that this termite is very destructive and is not found in the United States. A living adult of the cucujid Laemotmetus rhizophagoides (Walk.) was intercepted at Norfolk, Va., on March 21, 1941, in bamboo dunnage from the Dutch East Indies. Living specimens of the Argentine ant (Iridomyrmex humilis Mayr.) were collected in the field in Hawaii on January 6, 1941, on hibiscus blooms. M. R. Smith, who made this determination, states that this is the first record of the Argentine ant becoming established in Hawaii.

Pathological interceptions of interest.--Aphelenchoides sp., near A. linberi Steiner, Aphelenchus avenae Bastian, Hexatyclus sp. near H. latus Thorne, and Paraphelenchus pseudoparietinus Mic. were found January 1 at New York in leaves and stems of dried sage (Salvia officinalis) in a shipment of 40 bags from Spain. Bacterium citri (Hasse) Doidge was found on oranges from China January 21 at San Pedro and on sour lines from Java March 28 at Boston. Claviceps paspali (Schw.) Stevens and Hall was found at New York March 12 in paspalum seed from Canal Zone. Colletotrichum orchidearum All. was intercepted at San Francisco January 17 on Phalaenopsis grandiflora from the Philippines. Coniothyrium sp. with spores larger than in species described on orchids was found at San Francisco January 15 on Epidendrum aurantiacum from Guatemala. Helicoma olivaceum (Karsten) Linder, an interesting and unusual saprophyte, was found on Paeonia noutan from Japan December 4, 1940, at Hoboken. The fungus causing a leaf spot on camellia leaves from Mexico intercepted at Hoboken August 12, 1940, has been determined as Hendersonia canelliae Pass., although the spores are rather long. Linospora sp., as well as other fungi, was found on an avocado from Mexico intercepted February 2 at Brownsville. Phyllosticta sp. unlike species reported on orchids was intercepted January 15 at Hoboken on a Cattleya (?) sp. leaf from Brazil. Phytophthora sp. was found on an eggplant fruit from Cuba March 19 at New York. Rhabdospora sp. and Robillarda sp., no species of either genus reported on peony, were found on Paeonia noutan from Japan December 27, 1940, at San Francisco. Sporonema phacidioides Desm. was found on alfalfa leaves in mail from Mexico January 28 at Hoboken. Thielaviopsis paradoxa (DeSeyn) v. Hoehn. was found on Pandanus sp. seed from Colombia March 20 at New York. Ustilago nuda (Jens.) Kell. & Sw. was found on barley from Mexico March 1 at El Paso. Spotted wilt virus was found on a tomato in cargo shipment from Cuba March 24 at Baltimore.

DOMESTIC PLANT QUARANTINES

Mormon crickets hatch early and control operations begin.--Mormon crickets began hatching in the Oregon counties of Wasco and Jefferson early in February and by March 15 it was estimated that 250,000 acres, most of which is on the Warm Springs Indian Reservation, was infested with first to third instars. Control operations were begun in March with baiting and dusting materials provided by the Bureau and applied by the Agency. By March 15, field observers found the hatch was approximately 85 percent complete in the above counties and in progress in two other counties in Oregon, two in Washington, and three in Nevada. Last year the first hatch was reported on March 8 as compared with February 8 this year. In Washington, cricket hatching was first observed this year in Franklin County on March 3. By March 29 hatching was 90 percent complete in that county and well advanced in Klickitat County. In Utah, on March 12, hatching was observed in Tooele County and first instars were found the same week in Juab and Utah Counties. In Nevada, a 25-percent cricket hatch was reported in the Copper Canyon area of Lander County on March 14, and on the same date nymphs were seen in Pershing and Humboldt Counties. By the close of the week of March 22, a 50-percent hatch had occurred near Wells, Elko County. Control materials have been moved into the infested areas and active control operations were expected to begin April 1. In Idaho, crickets were hatching on the south-facing slopes in Washington County by March 20.

Grasshopper development.--Examination of egg pods in the South Dakota counties of Spink, Beadle, and Tripp at the close of March showed that egg development ranged from the coagulation stage to the early segmentation stage. In western Kansas counties, examinations indicated that the eggs had overwintered in good condition and some had reached the eye-spot stage.

Plans for grasshopper control.--Grasshopper bait materials were transferred during March from areas where there are surplus materials, or where control is not contemplated, into areas having a deficiency of materials. Supervisors in key positions were returned to duty status and began to organize the work for the 1941 control season. The operations on grasshopper and Mormon cricket control this year are provided for under memoranda of understanding entered into between the Bureau and the States, wherein the responsibilities of each are agreed to. Meetings have been held with officials of the various States and memoranda of understanding completed with 22 infested States.

Bureau assists in cutworm control.--Because of reports of serious outbreaks of cutworms in Kansas, Colorado, Nebraska, and Utah, Federal assistance has been authorized in counties where outbreaks are such as to warrant assistance and where control is beyond the means of local communities. The release of grasshopper bait materials to farmers for combating the cutworms has been authorized. The outbreak in Kansas is reported by plant pest-control officials to cover 30 or 40 counties in the western part of the State. The Colorado and Nebraska infestations are contiguous to the outbreak in northwestern Kansas. In Utah heavy infestations are reported in two centrally located counties. State leaders in the grasshopper control program in these States are investigating this outbreak to

determine if the species of cutworms in these areas can be combated with grasshopper bait.

White-fringed beetle control program.--At a conference held at Gulfport, Miss., on March 12 by the Federal and State agencies concerned with the white-fringed beetle control program, the results of the survey and control activities since the initiation of the project were given full discussion and consideration, and a program of work for 1941 was submitted to the cooperating agencies and approved. It is proposed under this program to determine more accurately the effect of suppressive measures on selected areas of infestation by applying one or a combination of such practices throughout the entire period of beetle emergence. On other areas from which there exists appreciable danger of artificial or natural spread of infestation, suppressive measures will be conducted only during the period of peak emergence or for such additional time as is necessary to reduce risk of spread to a minimum. Such a modified program will, it is believed, effectively control artificial as well as natural spread of the pest; will provide commercial control to infested agricultural areas; and will give further opportunity to determine the effectiveness of suppressive measures on isolated areas of infestation, which will be conducted throughout the entire period of beetle emergence.

Treatment methods for white-fringed beetle further modified.--The requirements for treating nursery stock and potting soil for shipment from the white-fringed beetle area have been modified by recent revisions of circulars B. E. P. Q. 486, 489, and 503. The releases on methyl bromide make available treatments for movement of stock which previously has been restricted to shipment within the regulated areas.

Legume weevil resurvey.--A resurvey for the legume weevil, Hypera brunneipennis Boh., was completed early in April. The survey was confined principally to areas in Arizona which were found infested last year, to determine the spread and the present status of the infestation. A few spot surveys were also made in several areas in California where infestations were not found last year but where it was thought that the weevils might have since become established. No new areas of infestation were found. However, considerable spread was noted in the Yuma area, and considerable increase in the intensity of the infestation attributed principally to climatic conditions which were apparently particularly favorable to the development of the weevil this year. At the University of Arizona Experimental Date Garden at Tempe, Ariz., where infestations of the weevil were located last year, eradication measures were conducted in cooperation with the State. Despite some delay caused by unseasonable weather it is felt that the measures were applied in sufficient time to forestall an increase in the infestation and it is hoped that eradication may have been accomplished. A number of methods were tried including the use of herbicides, flame-throwers, mowers, and the disking of the soil. Due to the wet condition of the soil following heavy rains, it was found necessary to use a combination of these methods. A survey of the agricultural areas in Mexico adjacent to the Yuma infestation was made in cooperation with inspectors of the Mexican Government. No infestation was found.

Sweetpotato weevil control conference at Gulfport.--The sweetpotato weevil has apparently been eradicated from 13 counties in Alabama, Mississippi,

Georgia, and Texas since the cooperative project was begun in 1937, according to a statement by the project leader, T. R. Stephens, at a conference of Federal and State officials and others held at Gulfport, Miss., on March 13. Initial and systematic surveys have been conducted, he stated, in 184 counties of 6 States. B. M. Gaddis outlined the primary objectives of the project and gave a resume of the various operations of the several States. Avery S. Hoyt, J. C. Holton, and J. H. Lloyd attended this conference, as well as the one relating to the white-fringed beetle work, and participated in the discussion.

1941 work programs proposed. Expansion in Mississippi.--Following the above conference, programs for sweetpotato weevil control work in each State were developed and it was agreed that the activities in each State would be carried on along the same general plan as heretofore, except in Mississippi. In that State it seems probable that eradication is being approached in the commercial-producing areas, and it was considered advisable to extend the eradication measures to the Gulf coast counties.

Peach mosaic work programs for 1941.--Work programs for peach mosaic operations this year in the various infected States are being prepared in conferences with the respective pest-control officials. In the mosaic-infected States where grower cooperation has been satisfactory, it is planned to make careful and complete inspections of nurseries, budwood sources, and their environs; to inspect previously infected and adjacent properties; and to make every effort to remove diseased trees as discovered.

Nursery inspection for peach mosaic under way in Texas.--Early in April Federal-State inspection of the extensive peach nurseries in Texas was begun with a view to completing the work by May 15 as provided in the uniform quarantines pertaining to the peach mosaic. The large number of nurseries involved requires that the work be undertaken early in the season and that as many Federal and State inspectors as possible be assigned to that phase of the activity. Prior to beginning nursery work, inspectors were congregated for a preliminary "brush up" on peach mosaic symptoms in relatively concentrated commercial peach orchards in San Saba County. Several hundred mosaic infected trees were found during the first few days, giving our personnel an opportunity to review their contact with this disease before beginning the nursery inspection. This phase of peach mosaic inspection and the control is conducted under a work program and memorandum of agreement between the cooperating Federal and State agencies in which the undertakings and responsibilities of each party are clearly defined, and which provide for intimate understanding and cooperation of the Federal and State Departments of Agriculture. In other States, the nursery inspection work is of less volume and will be undertaken as the season advances, followed with delimiting surveys and diseased-tree removal.

Blossom inspection in California for peach mosaic.--The blossom inspection of trees of the large-flowered variety for peach mosaic disease was begun late in March in infected areas in California. In the Yucaipa district a high percentage of trees was found infected in some orchards while in other areas only scattered trees were found diseased. Peach mosaic disease research workers have approved this method of inspection in large-flowered varieties, in which symptom expression in leaves is not pronounced.

Minnesota establishes terminal inspection.--The State of Minnesota has established terminal inspection with facilities at St. Paul for the inspection of the following plants: All wild and cultivated trees, shrubs, and woody vines; perennial roots, such as peonies and iris; small-fruit plants, such as strawberries and raspberries; herbaceous perennials, such as hollyhocks and other hardy flowering plants; cuttings, buds, grafts, and scions for or capable of propagation. Provision has also been made under the terminal inspection procedure for the enforcement of the Minnesota quarantines relating to the alfalfa weevil and certain diseases of raspberry plants. The postal regulation giving notice of this action is dated March 7, 1941.

Airplanes being purchased.--Bids have been accepted for the purchase of two airplanes to replace the two White Standard biplanes that were burned in the Monroeville, Ala., fire last year. Bait hoppers are now being installed in the new planes and it is expected that they will be ready in April for use on Mormon cricket control activities in Nevada, and later, on white-fringed beetle and grasshopper control in the event the need develops for use of such planes in distributing either bait or dust by this means.

Mr. Sheals heard at Central Plant Board meeting.--R. A. Sheals attended the joint meeting of the Central Plant Board on March 26 at Columbia, Mo., and presented a paper on the activities of the white-fringed beetle project.

Mr. Roberts assigned to Washington.--R. A. Roberts, Assistant Project Leader on Mormon cricket control, was temporarily assigned to the Washington office of the Division of Domestic Plant Quarantines beginning April 1.

Interesting interceptions.--A miniature hotframe containing 10 pounds of soil from the Japanese beetle area was reported in March by a New York inspector. This is the second interception of its kind in New York, each from a different source. Corn borer larvae in a shipment consigned from a point in China to a pet shop at a point in Missouri were recently found by the transit inspector at St. Louis on his regular tour of duty. The shipment was called to the attention of the port inspector at Chicago. An express shipment of uncertified cottonseed from the pink bollworm area, which was intercepted at Dallas in March, is believed to be the first shipment of cottonseed in quantity moving in violation of Quarantine No. 52, that has been found by a transit inspector.

CONTROL INVESTIGATIONS

Fumigation schedules for nursery stock for Japanese beetle larvae.--In cooperation with the Japanese Beetle Control Division and the Division of Fruit Insect Investigations, H. C. Donohoe, of the White Horse, N. J., laboratory, has completed experimental work on two more fumigation schedules for nursery stock for Japanese beetle larvae. This makes a total of seven treatments with methyl bromide at temperatures varying from 50° to 70° F. now available. In six of these treatments, ranging from 50° to 63°, inclusive, the dosage of 2½ pounds of methyl bromide is maintained constant, and the time and temperature varied from 2½ to 4½ hours in half-hourly increments. At 70°, a dosage of 2 pounds is used. Work is under way at the White Horse laboratory on treatments at lower temperatures and with varying dosages.

The application of methyl bromide in the greenhouse and the effect of relative humidity on efficiency.—Further studies by H. H. Richardson and A. H. Casanges, of the Beltsville, Md., laboratory, have again shown that the fast spray and slow pan methods of vaporization of methyl bromide are of about equal efficiency in greenhouse fumigations under wet conditions. Vaporization by spraying required 1 to 3 minutes while pan vaporization was adjusted to 90 to 110 minutes. Under fairly dry conditions, the results slightly favored the fast spray method. From a practical standpoint, the spray method seems preferable. For vault fumigation previous work indicated a fast type of vaporization to be more effective than a slow vaporization in 6-hour exposures. High and low relative humidity were again shown to have little effect on efficiency against the common red spider or Mexican mealybug, but higher efficiency was obtained at high humidity against the confused flour beetle.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

The Argentine ant in Hawaii.—In January of this year a number of specimens of the Argentine ant, Iridomyrmex humilis Mayr, were collected at Honolulu, Hawaii, by W. C. Goolsby and J. D. Gomez in the soil of a vegetable garden from an infestation reported as heavy. G. F. Callaghan collected a second series on Hibiscus blossoms. This is the first time that the species has been recorded from Hawaii. It is likely that the climate of the Islands is such that the ant will establish itself and become a serious pest. Although specimens have been taken several times from airships plying between the United States and the Pacific Islands, the species is not known to occur on any of the latter.

A species of Tetrastichus parasitic on thrips.—B. D. Burks, of the Illinois Natural History Survey, temporarily engaged by the Bureau of Entomology and Plant Quarantine to revise the Nearctic species of the chalcidoid genus Tetrastichus, has concluded that Tetrastichus tatei Dozier (Jour. Agr. Univ. Puerto Rico, 21, 1937, p. 129) described from Puerto Rico as a parasite of Gynaikothrips uzeli Zimm., is identical with Tetrastichus thripophonus Waterston (Bul. Ent. Res. 13, 1923, p. 453) recorded from Liothrips urichi Karny on Clidemia in Trinidad, British West Indies. The record by Mason (Ent. News 33, 1922, p. 199) of Tetrastichus n. sp. from Cryptothrips laureli Mason in Florida is also referable to T. thripophonus. It seems probable that the species is quite widely distributed. Tetrastichus thripophonus was introduced into Fiji with Liothrips urichi when the latter was introduced there in an attempt to control Clidemia.

An earwig new to the United States found in New Jersey.—Three specimens of the earwig Marava wallacei (Dohrn) were recently submitted for identification. The material is said to have been collected in a wholesale bakery at Dumont, N. J. Dumont is located in extreme northeastern New Jersey, near the Hudson River, north of New York City. The finding of this earwig is of interest because it is a widely distributed species of the Australian Region, frequently intercepted in quarantine but not known to be established in the United States. It inhabits New Guinea and various other islands, as well as the mainland of Australia, and when intercepted is usually associated with logs. Interception has often occurred at Middle Atlantic ports, and this fact suggests that the specimens taken at Dumont may have been introduced in this way. Marava wallacei belongs to

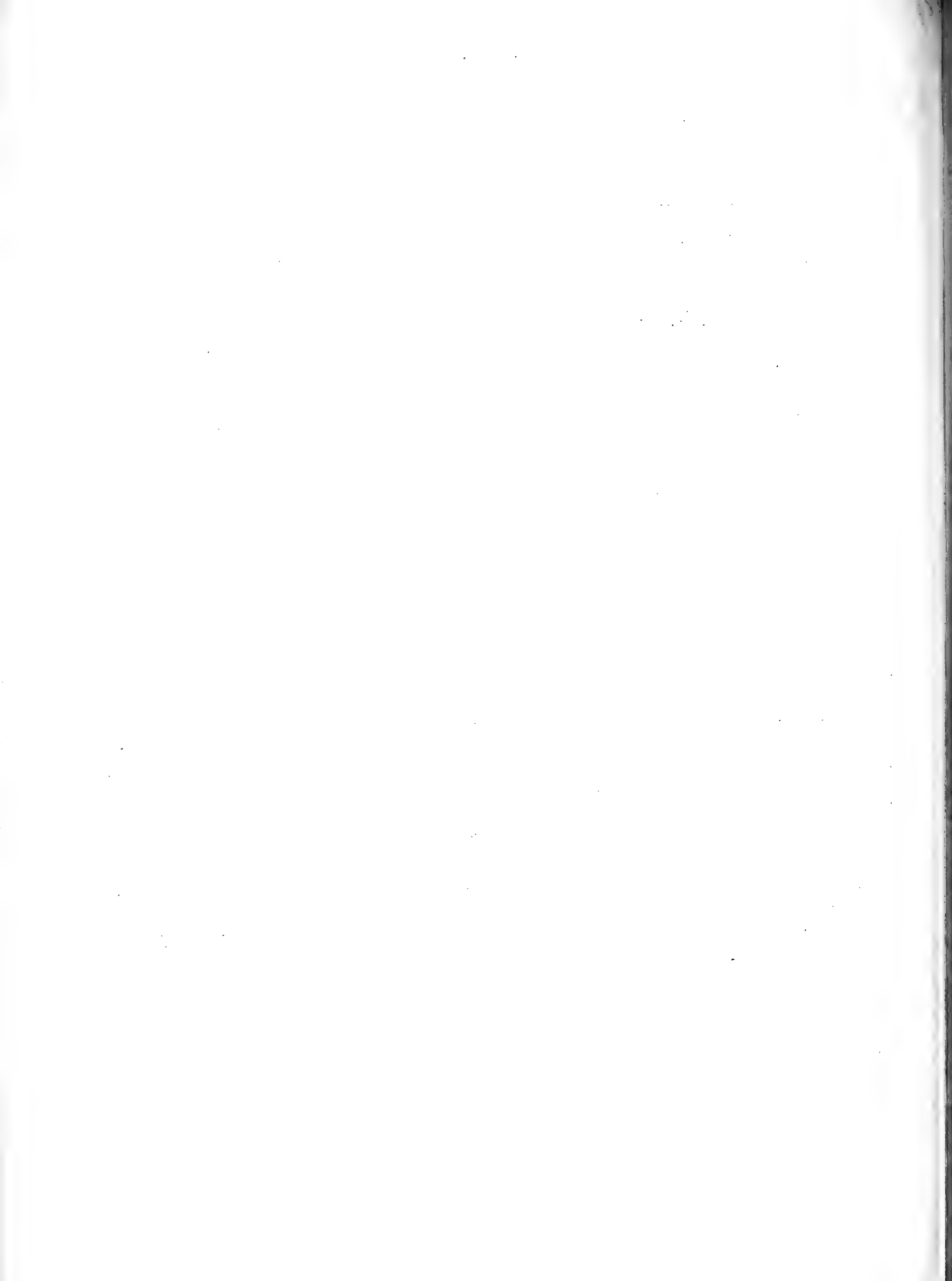
the family Labiidae and resembles Prolabia arachidis (Yersin), differing from the latter especially in that the coloration is much darker and in that wallacei frequently is long-winged, with conspicuous orange spots near the ends of the wings.

Food plant records for two hemipterous insects.--Food plant records for two hemipterous insects from Hawaii may prove of interest as they are apparently new records, or at least have not received special notice as potential economic pests. The specimens (four of each species) were submitted to the Bureau of Entomology and Plant Quarantine and determined by H. G. Barber as Orius persequens (White), an anthocorid taken on green corn at Waimea, Oahu, T. H., on February 25, 1931, and Teleonemia scrupulosa Stal (= T. lantanae Dist.), collected on potato leaves at Waipahu, Oahu, February 15, 1941.

A new aleyrodid record for the United States.--L. L. English, of the Agricultural Experiment Station, Alabama Polytechnic Institute, submitted for identification several specimens of an aleyrodid collected on Azalea indica at Spring Hill, Ala. The species has been identified by Louise M. Russell as Pealius rhododendri Takahashi, described in 1935 on Rhododendron sp. from Osaka, Japan. Apparently this is the first record of its occurrence in North America. Pealius rhododendri is found only occasionally, and up to the present at least has not developed dense, injurious populations as is true in the case of Aleyrodes azaleae B. & M.

Food habits of some Neotropical Japygidae.--To most entomologists the food habits of the apterygotan insects of the family Japygidae are completely unknown. In fact it has been established only recently that these insects are predaceous. They use the powerful pincers on the end of the abdomen to hold the prey while parts of the same, or possibly the complete body, are broken up with the mandibles and maxillae and swallowed after but little mastication. Inside the alimentary canals of five japygids from the Neotropical Region the following arthropods, or their parts, were found: The head of an adult fungus gnat, Mycetophilidae, determined by A. Stone; partial remains of a beetle larva of the family Staphylinidae and part of the body of a beetle larva, probably of the family Carabidae, both determined by W. H. Anderson; the thorax of an adult beetle; some of the legs and other parts of a beetle mite, superfamily Oribatoidea, and partial remains of a predaceous mite of the family Parasitidae; the last tarsal segment of an insect leg bearing two equal claws and a pulvillus together with other miscellaneous parts. Further studies of the food habits of the japygids are planned.

Xylaplothrips subterraneus Cwfd. in Oregon.--Specimens taken at Toronto, Canada, on lily bulbs from Oregon, sent in by J. McDunnough, included two specimens of Xylaplothrips subterraneus Cwfd. The latter was originally described from England on lily bulbs. This is the first record of this species in North America.



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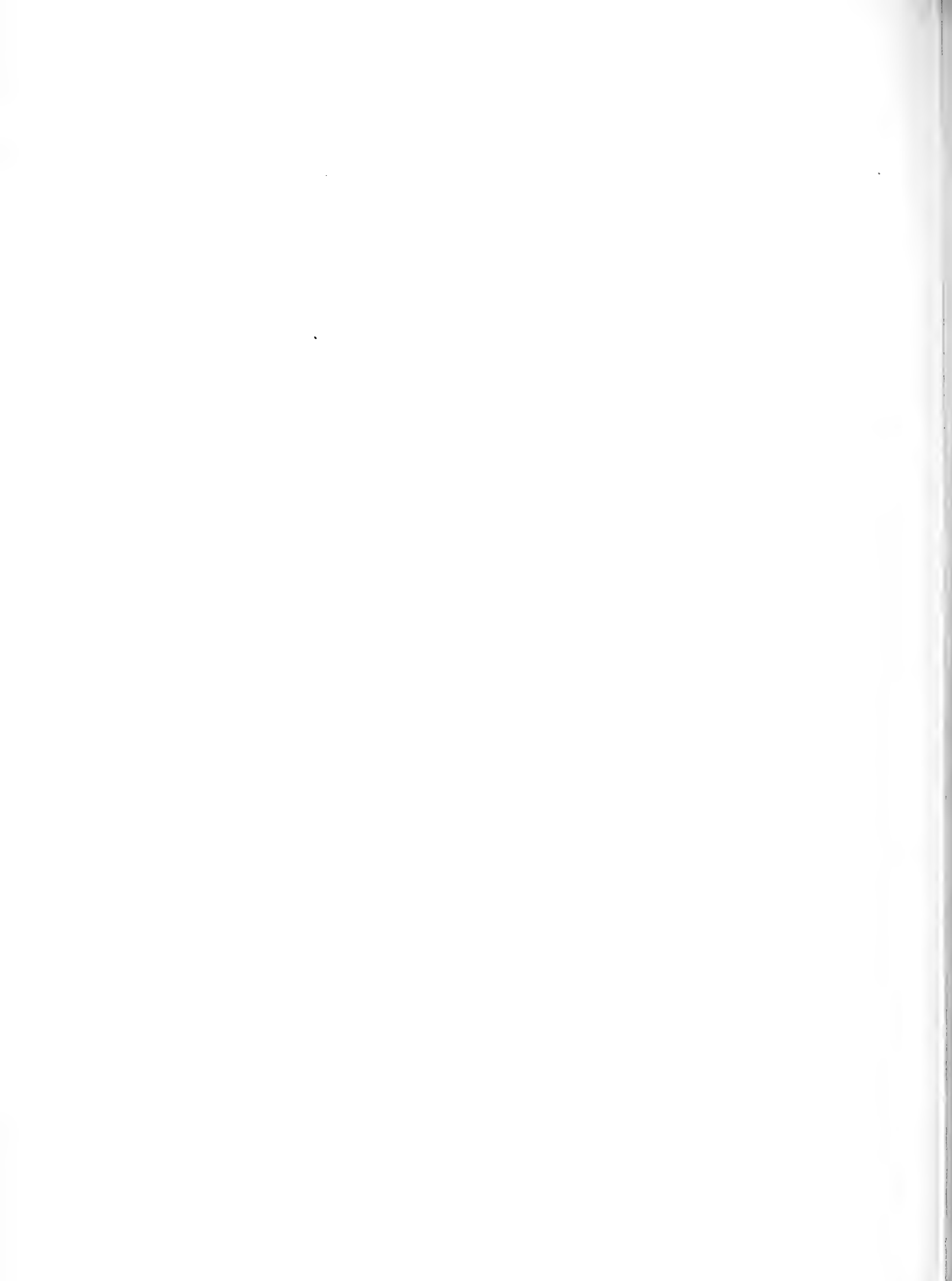
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FRUIT INSECT INVESTIGATIONS

Control by tree-injection tried on peach insects.—Tests of materials claimed to be effective against the peach borer and other insects by injection into the trees were made at Starke, Fla., by Oliver I. Snapp, of the Fort Valley, Ga., laboratory. The materials consist of oil of peach, 5 percent; oil of rose geranium, 2 percent; oil of sassafras, 1 percent; oil of citronella, 2 percent; and spirits of turpentine, 90 percent. The treatment was made by boring a hole into the heartwood of the tree at the ground line with a brace and bit, after which the hole was plugged with a cork stopper and from $1\frac{1}{2}$ to 2 cc. of the formula injected into the hole with a hypodermic syringe, the needle of which was inserted through the cork. The top of the cork and surrounding bark of the tree was then painted over with ordinary blue paint. The originator of the treatment claimed that the rising of the sap would take the materials throughout the tree, killing all borers, scales, and other insects. Each of the 40 borers removed from these trees was alive 23 days after treatment, although the originator claimed that the formula would kill peach borers in about 9 days. All of the young scale on a peach tree used for the test were alive. Most of the old scales had been parasitized. The treatment caused serious injury to the cambium, bark, and heartwood of 4 of 14 trees examined for tree injury. At the time of the examination, this injury was confined to the area where the materials had been injected into the tree.

Removal of small darkling beetles from excelsior traps.—Use of the chloropicrin separator for removing small darkling beetles, chiefly Blapstinus rufipes Casey, from excelsior traps has proved successful, as reported by Dwight F. Barnes and Charles K. Fisher, of the Fresno, Calif., laboratory. The separator was first described in ET 21, by Donohoe, et al., as an apparatus for separating nitidulids from infested host material. About 13 drops of chloropicrin was used for each run. In 9 test runs with exposures of 1 and 2 hours, 1,679 of the beetles, or 97.8 percent of the 1,717 present, were separated from the trap contents. The average separation in 2 tests with exposures of 2 hours each was 97.4 percent and in 7 trials of 1 hour each it was 98.1 percent. The results of the individual tests are listed below. The only difficulty experienced was with 1 sample, not listed, which was water-soaked when placed in the separator. Separation of this lot was about 53 percent.

Lot No.	Material (excelsior)	Exposure (hours)	Adults removed	
			Number	Percent
1---	Pads	2	538	96.5
2---	From bag traps	2	194	100.0
3---	"	1	209	99.5
4---	"	1	121	97.6
5---	"	1	125	99.2
6---	"	1	73	96.1
7---	"	1	88	96.7
8---	"	1	153	96.8
9---	"	1	128	99.2
Total		--	1,679	--
Average		--	--	97.8

MEXICAN FRUIT FLY CONTROL

Conditions in the lower Rio Grande Valley.—Larval infestations were found on 343 properties in April. This number of infestations is somewhat below normal for this period of the year, and the number of infestations found throughout the regulated area for the entire season is slightly less than for the same period last year. The infestation this season is approximately 25 percent of that of two seasons ago. At no time during this year have traps taken flies in such numbers as to indicate that there was a very high fly population present in the groves. Fruit shipments declined to only 1,618 cars for the month. The total for the season, as of April 30, amounted to 26,216.8 carlots, 362.1 cars below the figure for the same period in 1939-40. More than the normal amount of rainfall in every month since December 1940 has resulted in many groves being flooded for considerable periods of time. Harvesting of fruit in certain areas of the valley has been delayed materially, and in some instances serious damage to the groves is feared because of the excess water that could not be promptly drained.

JAPANESE BEETLE CONTROL

Reduced dosage of lead arsenate for treating nursery plots.—In supplement No. 4 to Circular B.E.P.Q. 499, effective May 1, 1941, administrative instructions to inspectors on the treatment of nursery products, fruits, vegetables, and soil for the Japanese beetle were modified to reduce the dosage of lead arsenate applied to nursery plots containing growing plants and to coldframes, plunging beds, and heeling-in areas from the previous rate of 1,500 pounds per acre to 1,100 pounds per acre (or 26 lbs. per 1,000 sq. ft.) for initial treatments. On subsequent retreatments, sufficient lead arsenate must be applied to restore a concentration of 1,100 pounds per acre, as determined by chemical analyses, except that determination by chemical analyses of a concentration of 1,000 pounds per acre will be acceptable without retreatment. This revised schedule was authorized by the Chief of the Bureau after a restudy had been made by representatives of the Divisions of

Fruit Insect Investigations, Control Investigations, and Japanese Beetle Control of the early investigational data on which the original dosages were based. It was found that the margin of safety originally prescribed was in excess of present needs and that a reduction of approximately 25 percent would be warranted. Inasmuch as analyses of representative soil samples taken over an extensive area may vary as much as 100 pounds of lead arsenate per acre in indicating the content, a determination by analysis of a 1,000 pound-per-acre content was considered acceptable without further retreatment. If the lead arsenate content is shown by analysis to have fallen below 1,000 pounds per acre, it must be restored to the full 1,100 pounds. This reduction in dosage is expected to result in more extensive utilization by nurserymen of the lead arsenate treatment of soil plots in which stock eligible for Japanese beetle certification may be grown. The bulk of soil samples from treated plots now maintained by nurserymen were obtained by inspectors during April, with only a few scattered samples yet to be taken. Some 650 samples were collected during the month. This is considerably less than in previous years.

Classified growers report good Easter trade.--Classified nurseries and greenhouses from all parts of the Japanese beetle regulated area reported very good Easter business, in most cases with complete sell-outs of all blooming plants. Many dealers claimed that it was their best year since 1929. Some shortages of plants for the Memorial Day trade were predicted. Thirty carloads of nursery stock were certified in the New York City area during the month and 29 of these, originating on Long Island, were consigned mostly to the States of Michigan and Illinois. Most of the stock in 9 carloads shipped by 1 nursery was dug from a lead arsenate treated plot. Fumigated balled stock also made up a portion of this establishment's shipments. In addition to carload shipments there were odd lots of shrubs and small trees, and numerous truckloads of stock, all of which had to be certified. One Long Island nurseryman plans to grow 20,000 certified azaleas in a cloth-screened house this summer. These will be started in a certified greenhouse, and will be planted in a lead arsenate treated area under cloth before the season of adult-beetle flight. If this method proves successful for this grower, a larger number will be grown in this manner next year. Inspection of soil-free Japanese iris roots that had been washed under water pressure disclosed that Japanese beetle grubs were still lodged at the base of the roots. It was necessary to break the clumps into small divisions before thorough inspection could be made. During visits to New Jersey nurseries and greenhouses during the month, inspectors heard such statements as: "Mail orders increased 100 percent over last year." "An increase of 75 percent in express orders over 1940." "The best April in our history." "All azaleas sold and prices 20 to 40 percent higher--can't buy them anywhere." "Had to run 7 days a week for the past 2 weeks." "All stock from our lead-arsenate-treated plots sold--must buy in certified stock to fill our orders." "Entire stock cleaned out during April, the first time this has ever occurred." Certified shipments from the central Pennsylvania district reached the highest peak since 1937.

Tourists increase shipments from Mount Vernon.---Certificates issued to the Mount Vernon Ladies Association for shipment of plant material from the George Washington Estate indicate that the association is making more shipments than ever before. This is attributed to the increase in number of tourists and new workers in the Washington area. The Washington Cathedral, in the District of Columbia, has required the services of an inspector twice a week to inspect and certify herb plants sold there to tourists. Inspections in the area surrounding the District were extremely heavy during the first part of April. The larger shippers were the Government establishments and the Maryland State Forest Nursery. Daily inspections were required at these places. Shipments ranging from 50 to 50,000 soil-free trees were certified. Inspection work in the District of Columbia was heavy during the month, since department stores selling evergreens, trees, and shrubs are all unclassified and actual inspection must be made of any stock to be shipped out of the regulated area by these dealers.

Additional fumigation chambers approved.---Several methyl bromide fumigation chambers were constructed during the month and approved after tests were made by the treating section. A Maryland nursery built a chamber with a 400-cubic foot capacity. This readily accommodated a single treatment of 1,785 plants with soil balls from 3 to 10 inches in diameter. A nursery in northern Ohio completed a chamber 8 by 4 by 6 feet, having a capacity of 192 cubic feet. It is constructed of 14-gauge metal, electrically welded inside and out. It is very well constructed and has an excellent hinging device on the door. A fumigation chamber used by the Bureau of Plant Industry at Beltsville, Md., was also approved during the month. This box, now fitted as an atmospheric chamber, was one of the old vacuum fumigation chambers installed at the Plant Quarantine Inspection House at 12th Street and Constitution Avenue, Washington, D. C., before the Inspection House was razed and transferred to Hoboken, N.J.

Advancing plant growth hastens spring shipping season.---The unusually mild weather during the month started the nursery shipping season with a rush. Many nurseries were a month ahead of their usual shipping schedule. In the New York City area, record-breaking high temperatures after Easter resulted in the most active shipping season ever experienced in that district. In some instances, nursery employees worked night and day in an attempt to get out orders before the stock became too advanced for shipment. In spite of increased personnel and working hours, several nurseries were forced to cancel orders because of advanced growth. In New Jersey the warm weather in the middle of the month shortened the shipping season by 3 to 4 weeks. A large Pennsylvania nursery reported that it has been 33 years since they had experienced a spring as advanced as this year's.

Spring soil treatments for Japanese beetle control.---Applications of arsenate of lead to several isolated infestations in Indiana were completed during April. Treating in Indianapolis began on March 31 and was finished April 22, with coverage of 70.95 acres. At New Castle, 4.5 acres was treated from March 31 to April 3, inclusive. On April 4 and 5, 0.9 acre was treated in Richmond, after which 0.25 acre was treated in Warsaw on April 8. The total area treated in the State during this period was 76.6 acres.

Retired gypsy moth district inspector passes away.--Irving B. Newbegin, senior scientific aid and district gypsy moth inspector at Lynnfield, Mass., until his retirement because of failing health on April 1, 1937, died on April 19. Mr. Newbegin was born in 1873. He began work with the Federal Bureau of Entomology in 1907 on the gypsy moth project. For 30 years he was employed in connection with various phases of gypsy moth and brown-tail moth control work. He also handled Japanese beetle inspection and certification work while serving as district inspector in charge of the Lynnfield district. He is survived by a son and a daughter, both of Lynnfield.

Advanced gypsy moth hatching season.--While in the performance of their regular duties, district inspectors observed the hatching of gypsy moth eggs at various points in the New England infested areas. The hatching season was approximately 3 weeks earlier than in 1940; in fact, reports indicate one of the earliest hatching seasons on record. Hatching was first observed on April 20 in Massachusetts and on April 21 in New Hampshire and Vermont. The first hatching noted in Maine was on April 26; consequently, the regulation relating to the lining up and spraying of nursery stock presented for inspection was made effective on April 23. Brown-tail moth larvae were first observed feeding at Poland, Maine, on April 21. Webbing by tent caterpillar was first reported by the district inspectors in Massachusetts and Rhode Island on April 17, in Connecticut on April 21, in Vermont on April 26, and in Maine on April 27.

Temporary inspectors assist in gypsy moth inspection.--Twenty-one temporary inspectors were employed on nursery inspection work in the New England States during April. One of these, assigned to lumber inspection early in the month, was later transferred to nursery work. Eight inspectors were assigned to inspection work at a forest nursery in western Maine; 1 inspector was employed to handle work at nurseries in eastern and western Massachusetts; and 11 inspectors assisted in inspection of stock at nurseries in Connecticut and Rhode Island.

Inspectors help fight forest fires.--Owing to lack of rain throughout the New England States during April, there were many serious forest fires. At Fryeburg, Maine, more than 1,000,000 board feet of lumber was destroyed. The nursery inspectors stationed at Fryeburg were on two different occasions commandeered to fight forest fires.

Violation of intrastate Dutch elm disease quarantine reported to State authorities.--During the early part of April, Dutch elm disease crews discovered that beetle-infested elm wood had been removed from wood piles which they had prepared in Bethlehem Township, Albany County, a State quarantined area, and transported to Cohoes, N.Y., a point outside the regulated zone, by an individual engaged in the sale of stovewood. The point to which the elm wood was transported is approximately 15 miles north of the present disease area. The elm material in the woodyard at Cohoes was found to be heavily infested with Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich. This wood had been cut into stovewood lengths. Many pieces were beetle infested and from some of them beetles had emerged. From information supplied by the owner of the yard, it is believed the beetles had emerged before the wood was moved from Bethlehem

Township. All elm wood in the owner's present supply was peeled and the bark burned before any further emergence occurred. A lumber mill was also located in the Albany area in which a good portion of elm slabs were found to be beetle infested. This waste lumber, with a large part of the bark remaining on it, had been purchased by the Cohoes dealer. The matter was referred to W. H. Rankin, of the New York Department of Agriculture and Markets, who ordered an investigation.

Emergence of adult Hylurgopinus rufipes.--Activity of hibernating adult H. rufipes was noted in Connecticut in mid-April. Although no actual entrance holes were found, adults were observed flying and crawling on the outer bark. A change from lighter to darker shades was also noticed in overwintering larvae. In Sullivan County, N.Y., it was noted that this species was active this year at a much earlier date than in the past. On April 21, while removing a tree that had been tagged as potential beetle material, the men noted in the rough bark numerous entrance holes containing fresh frass. The females were well along in the construction of their brood gallery, some channels an inch in length having been constructed.

Clean-up necessary after logging operations.--In the wake of a logging operation carried on in the black-dirt section of Warwick Township, Orange County, N. Y., several acres of ground were left littered with large quantities of slash, intermingled with hundreds of elms ranging in diameter from 4 to 10 inches. Since all of the elm was potential beetle material, permission was obtained to sort the elm from the other material in order that it might be destroyed. This work was started early in the month. It was soon found that it involved a more lengthy operation than was first anticipated. Approximately 4 weeks of the sanitation crew's time will be needed to complete the clean-up operations.

Fire hazard.--The fire hazard in woodland areas was very acute during the month, owing to the continued dry weather. Field employees in various sections of the work area were summoned by those in authority to assist in extinguishing and preventing the spread of forest fires. A scout crew working along Chadwick Lake, in Orange County, N.Y., was summoned by a State Trooper to aid in extinguishing a small forest-and-grass fire in the vicinity of the lake on April 8. This fire, apparently set by the property owner, threatened to cause considerable damage, but hasty action by the scouts quickly extinguished the blaze.

District offices closed.--The Bridgeport, Conn., district office and garage were discontinued because of constant loss of W. P. A. personnel, a good part of which has been absorbed by the industries in the Bridgeport area engaged in producing materials for National defense. The Morrisville, Pa., district office and garage were also closed on April 30, as the reduced W. P. A. force did not warrant the retention of the garage in this district. The men formerly operating out of the Morrisville garage will now work out of the Philadelphia field headquarters.

Trucker intercepted with contraband.--A truck hauling elm wood into the town of Derby, Conn., was intercepted and the driver of the truck upon request returned the load of elm wood to the Dutch elm disease infected area, where it was burned at one of our burning sites. An investigation of the matter revealed that the driver did not know the difference between elm and other wood and that he was an unwitting violator.

Surface stripping for coal produces beetle material.--In the course of elm-sanitation operations in the Wilkes-Barre, Luzerne County, Pa., area, it was found that surface stripping for coal at one location had caused the breakage of numerous limbs, as well as entire elm trees, and had produced wood highly suitable for bark-beetle invasion. This wreckage was cut and destroyed late in the month.

Owners overestimate their fuel requirements.--A spring check-up of elm wood left for fuel under fuel agreements was completed during the first week in April in Ulster and Albany Counties, N.Y. It was found that only 49 piles were disposed of out of 131 piles left under agreement.

FOREST INSECT INVESTIGATIONS

Termites and national defense.--R. C. Brown and B. H. Wilford, of the New Haven, Conn., laboratory, have visited defense housing projects of the U. S. Housing Authority and Public Building Administration, and U. S. Army cantonments and Naval and Air bases in New York and New England to confer with officials relative to construction and maintenance of buildings to prevent termite attack. In some instances an opportunity has been afforded to discuss construction details while the projects were in the blueprint stage and to make recommendations for proper termite-proof construction. In other cases, notably Army cantonments, where construction has been completed, recommendations have been made concerning the maintenance of the buildings to minimize termite attacks. It is believed that these contacts have already resulted in considerable savings in initial construction expense and have also reduced maintenance costs appreciably.

Large demonstration for control of white pine weevil.--S. F. Potts, New Haven, reports that several hundred acres of white pine plantations were treated with concentrated spray for control of the white pine weevil (Pissodes strobi Peck), in Connecticut and New York, in cooperation with the Connecticut State forester and New York Conservation Department. These areas were covered at the rate of about 3 acres per man-day, using approximately 4 gallons of lead arsenate concentrate per acre, at a total per acre cost of about \$2. For most of this work the equipment consisted of an ordinary knapsack sprayer or fire pump to which was attached a simple but special type of extension rod and a nozzle for finely atomizing the spray in the form of a narrow, solid cone.

Conifers treated for control of Pales weevil.--According to Mr. Potts, good control of Hylobius pales (Hbst.) was obtained by the application of concentrated spray to conifers in plantations, beds, and heeled-in bundles. The cost of treatment was about \$1.50 per 1,000 trees in plantations and about 25 cents per 1,000 trees in beds and bundles.

More parasites for LeConte pine sawfly outbreaks.--W. F. Sellers, New Haven, reports that during April this laboratory supplied from 300,000 to 400,000 Microplectron fuscipennis Zett., a gregarious chalcid parasite, for release in the pine plantations of the Tennessee Valley Authority that have been severely infested by the native LeConte's sawfly in the vicinity of Wilson Dam, Ala. This introduced parasite of the European spruce sawfly will attack practically all species of Diprion and Neodiprion

sawflies. LeConte's sawfly cocoons are readily attacked by M. fuscipennis under laboratory conditions. This shipment is intended for release in newly discovered infestations, but at the same time will supplement the 30 colonies supplied by the New Haven laboratory last November for release in the same general area.

Dispersion of Hylurgopinus rufipes.--D. O. Wolfenbarger, of the Morristown, N. J., laboratory, has obtained data on the hibernating activities of the native bark beetle (H. rufipes Eich.) near points of emergence. Observations were made at two different points in two different years. One locality, Allamuchy, N. J., was characterized by an unusual abundance of beetles. The other, at Lanesboro, Pa., had a normal beetle density. Beetle density was estimated by the amount of beetle-infested logs or trees at the source, and by the numbers of beetles in the trees about the source. The data indicate that H. rufipes enters nearby trees for hibernation and, as the distance from the source increases, the number of beetles decreases. This is shown in the tabulation below.

<u>Distance from source</u> <u>(feet)</u>	<u>Beetles found per</u> <u>square foot of bark</u> <u>area (number)</u>
<u>Allamuchy, N. J.:</u>	
0	23
60	11
320	2
816	1
<u>Lanesboro, Pa.:</u>	
2	16.5
30	1.9
66	0.7
71	0

In obtaining the above data the outer bark of green healthy elm trees was carefully cut away in order to locate any hibernating beetles. One or more square feet of bark area per tree, at diameter breast height, was shaved and examined.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Working conditions for gypsy moth work.--Working conditions during April were unusually fine. The snow melted rapidly under the warm sun early in the month, but the streams did not rise beyond normal flood stage in any area where Federal gypsy moth work is in progress. Country roads improved quickly as the daily high temperatures and warm winds drew the frost out of the ground and dried the mud. By the middle of the month the drying-out process had proceeded so far that a serious fire hazard existed in the woodlands. Lack of rain caused this hazard to continue until the end of the month, and smoking or building fires in the woods was prohibited. During the latter part of April the State authorities in Massachusetts and Connecticut proclaimed the woods closed to the public, and it became imperative to

immediately withdraw nearly all workers from the woodlands in both States and to confine gypsy moth work to open areas. Practically all streams in the barrier zone area were at such a low stage by the end of April that evidently there will be a serious water shortage by the time spraying work starts, unless there is a substantial rainfall in the first half of May.

Early emergence of gypsy moth.--Hatching of gypsy moth egg clusters was reported from several widely scattered localities on April 21 and 22, indicating that a general hatch may be expected much earlier than for many years. General emergence of the eastern tent caterpillar had already occurred throughout the area extending from northern Vermont to the Pocono Mountains in eastern Pennsylvania.

Gypsy moth work in Vermont during April.--Many logging operators were engaged in cutting white birch in Vermont during the winter months for shipment to wood-novelty manufacturers outside of the barrier zone. Birch logs cut after the sap rises in the trees are not accepted by the manufacturers, because an excess of sap causes the rapid discoloration of the wood, therefore most of the logging was terminated by the first of April. Gypsy moth supervisory personnel, which had been detailed to the inspection of the birch trees and logs after the suspension of W. P. A. gypsy moth work in Vermont, was released for other assignments preparatory to the opening of the spraying season. Wooded areas where spraying work is planned were examined to determine the accessibility and adequacy of water supplies for spraying machines, the condition of existing fences, and the possible necessity of erecting additional temporary fences to prevent livestock from grazing in areas where arsenical spray may be applied. Several members of the supervisory personnel were detailed to the reexamination of areas found to be infested by regular scouting crews during the winter months when the snow was deep and covered low-situated egg clusters. Numerous additional egg clusters were found and creosoted on rocks, dead-wood, small bushes, and stumps.

Gypsy moth work in Massachusetts.--The number of W. P. A. workers engaged in gypsy moth work in Massachusetts has been steadily reduced as men have resigned to accept employment in private industry, and considerable difficulty is being experienced in maintaining a satisfactory working force. Most of the crews were undermanned at the end of April, despite all efforts to obtain additional workers. Fourteen W. P. A. crews were engaged in scouting for the gypsy moth in Massachusetts on the first of April. Every effort is being made to reduce the high and exposed infestations in Cummington and Chester so as to eliminate, so far as possible, the wind dispersion of small caterpillars into neighboring towns within the barrier zone.

No heavy gypsy moth infestations in several Berkshire County towns.--A small force of experienced supervisory gypsy moth employees cruised through large isolated tracts of woodland in Berkshire County, Mass., to determine whether heavy infestations existed in areas that had not been scouted for a year or more. Although several hundred acres were examined, no serious infestations were located. The small number of scattered egg clusters found thus far are not sufficient to warrant extensive

spraying operations in these woodlots.

Lack of workers reduces volume of W. P. A. gypsy moth work in Connecticut.--The scouting work for the current fiscal year will not be completed in the Connecticut barrier zone area as planned, primarily because it has not been possible to maintain a full quota of men needed for the work since early last fall. On the first of April only five crews were available for gypsy moth scouting work and these crews were frequently undermanned because of the resignations of the workers, particularly in the intermediate and skilled grades, to enter private employment. Replacements failed to keep pace with the resignations during the month.

Sawdust mill operated in Connecticut.--A brush-disposal machine has been in continuous operation at gypsy moth infested sites in Cornwall Township, Litchfield County, since early in April, and has reduced large quantities of brush to small chips which were broadcast over the forest floor. The machine disposes of approximately 10 cords of compactly piled brush per day. It was originally designed for the manufacture of sawdust from mill waste in the woodworking industry, but was adapted by this activity several years ago for the disposal of brush by reducing it to coarse shavings or chips. The crew operating this machine was permitted to continue work in the State forest, acting as State agents, after the other crews had been withdrawn from the woods because of the fire hazard.

Gypsy moth field work reduced in Pennsylvania.--During April a moderate amount of field work was accomplished in the Pennsylvania area, where only a skeleton force has been working since early in March. It was necessary to drastically curtail the force at that time, as the W. P. A. funds allotted for the first 8 months of the current fiscal year had been practically exhausted. Some scouting, thinning, and ground work was done, but practically no burning was permitted, as the fire hazard was so serious that it was necessary for the State Department of Forests and Waters to open the fire towers much earlier than usual. Numerous sprayer set-ups at suitable sources of water supply have yet to be prepared, wood roads must be repaired and improved in order that heavy spraying equipment may be moved to suitable sites in or near woodland infestations, and long lines of hose should be laid in order to conserve time after spraying begins.

Permits for spraying in residential areas in Pennsylvania.--A total of approximately 2,300 permits have been obtained for gypsy moth spraying work at infested sites in residential areas in Kingston, Exeter, and Pittston in Luzerne County, and in Old Forge, Lackawanna, and Scranton in Lackawanna County, Pa. Many of the infestations are small and confined to one or two house lots but, because of overhanging shrubs, trees, and vines, permits must also be obtained from all abutting properties, in order to perform the spraying work thoroughly. The preliminary preparations for residential spraying work also included making necessary arrangements with the water company for the taking of water from their hydrants. This company has been very cooperative since the beginning of gypsy moth work in the residential sections of the gypsy moth infested area in Pennsylvania.

Further reductions in C. C. C. gypsy moth work.--There was a serious reduction in the number of man-days made available for C. C. C. gypsy moth work east of the barrier zone under the supervision of this Bureau in April. The largest number of man-days used during any week was 223, and this was reduced to only 153 6-hour man-days for the week ended April 26. A total of only 795 man-days was used on gypsy moth work during the entire period. The reductions occurred in all three States where C. C. C. gypsy moth work is performed under the supervision of this Bureau. One camp in Vermont where most of the men had been available for gypsy moth work was closed, and gypsy moth work was discontinued at another camp where a large proportion of the personnel had been engaged in this work during the winter months. Owing to the present low enrollment, to the recent loss of camps, and to a possible further reduction toward the end of the fiscal year, plans have been abandoned for manning the U. S. D. A. buildings at Fairlee, Vt., for gypsy moth work and it is understood that the buildings will soon be salvaged. The volume of C. C. C. gypsy moth work in Massachusetts was greatly reduced when the gypsy moth camp at Westfield was abandoned early in April, and a further reduction was caused by the removal of the camp at Chester. Two crews from this camp have performed gypsy moth work east of the barrier zone for several years. The loss of work east of the barrier zone from this camp will be offset to some extent by the transferal of the two gypsy moth foremen to camps within the barrier zone, where they will be given small crews to carry on gypsy moth work in areas that can be reached from the new camps. The same number of crews performed gypsy moth work in Connecticut as during March, but the volume of work accomplished was reduced because of the smaller enrollments and the restricted areas where work could be performed.

Gypsy moth work accomplished by C. C. C. in April.--Scouting, creosoting, and selective thinning work was continued during April when men were available, with special emphasis placed on scouting work to locate infestations where spraying will be most important in June. The scouting work in one town east of the barrier zone and bordering on the Connecticut River in Connecticut showed a considerable increase in infestation. Scouting by the C. C. C. in this town was requested by the State gypsy moth organization, as numerous nurseries are located in the town and the State authorities wished to have the heaviest infestations existing in the neighborhood of the nurseries located so that they could be given consideration in arranging the State spraying program for the approaching larval season. Sites for spraying equipment at selected locations were cleared, and water holes and roads were prepared for the coming of the sprayers where such work was necessary. Salvaged barbwire, loaned to the C. C. C. about a year ago to exclude livestock from sprayed areas, was removed and returned to the Greenfield storehouse, together with three rolls of new wire supplied by a property owner to replace Government-owned wire which he did not wish to have removed from the fence. The volume of all types of C. C. C. gypsy moth work was greatly reduced during April by the necessity of holding some of the crews at the camps, or of confining their work to locations near the camps, so that they would be immediately available for firefighting if necessary, as the early warm and dry weather made the woods especially susceptible to forest fires during most of the month.

Gypsy moth less abundant in Massachusetts and Connecticut but increased in Vermont.--C. C. C. gypsy moth scouting work during the first 9 months of the current fiscal year showed a decided reduction of gypsy moth infestation in the area between the Connecticut River and the barrier zone in Massachusetts and Connecticut, as compared with the previous year. Slightly over 263,000 gypsy moth egg clusters were treated during the 9 months ended March 29, 1941, while more than 1,226,000 egg clusters were treated during the corresponding portion of the previous fiscal year. Conditions were found to be quite different in Vermont, where heavy concentration of gypsy moth infestations have been found in the Connecticut River Valley towns, and the indications are that considerable areas in that section will suffer severe defoliation later in the season.

PLANT DISEASE CONTROL

Spokane staff develops public-speaking ability.--For the last 2 years some members of the blister rust control staff of the Spokane, Wash., office have been meeting at luncheon once a week and devoting attention to experience in public speaking. Recently five of the staff members joined the Toastmasters' Club of Spokane and subsequently they have taken part in a local toastmasters' speaking contest. The public-speaking experience has had a beneficial effect on the public contacts of the blister rust control staff and regional forest officers and others have recently made particularly favorable comments concerning the ability of the blister rust personnel to express themselves clearly and readily in joint conferences.

Regular stringing versus prestringing in ribes eradication.--L. P. Winslow, of the methods development unit, reports that in the sugar pine region during the field season of 1940, a study of the relative merits of regular stringing and prestringing of crew lanes for Ribes eradication was planned and executed under the joint supervision of the operations and methods groups. Data were obtained to determine the difference, if any, between the laying of string for crew work lanes by the crews themselves as they worked the strip (regular stringing), and the laying of string for crew work lanes in advance of crew work (prestringing) by one or more men especially assigned to this work. A checkerboard system was used for the randomization of the samples. An analysis by several methods, including a "variance" analysis of the data from 103 samples comprising 14,411 acres indicates a very slight advantage for the regular stringing method. The practical efficiency of the two methods of work was determined from the final regular check maps and the differences were not significant. In general, it can be assumed that an administrative choice of method of stringing can be made safely on the basis of such factors as brush density, topography, season of year, type of labor, and amount of available supervision.

Phenological data.--In the Northeastern region the leafing out of Ribes and other vegetation was at least 2 weeks ahead of normal. C. C. Perry reports on April 28 that in Massachusetts the unprecedented heat wave in April resulted in the further advance of Ribes foliage. Cultivated Ribes plantations in the vicinity of Boston were in quarter leaf. Patches of skunk currants in Hubbardston, Mass., showed about half the plants with leaves one-half size. In the same location, however, buds of R. hirtellum were still tightly closed. In Buckland, Mass., on April 25, R. hirtellum leaves were about three-quarter size. Fruiting cankers on pine were found on that date in Buckland, with empty sacs which indicated that aeciospores were liberated as early as April 20 in that particular section. The hot weather, accompanied by a marked deficiency in moisture, resulted in one of the worst fire seasons in recent times. During the week beginning April 14, fires occurred in the State on an acreage almost equal to the entire fire-damaged area during the year 1940. W. O. Frost of Maine writes that the aecial stage of blister rust was well advanced on April 20 and will be disseminating spores much earlier than usual.

New blister rust infections in Virginia.--J. G. Luce, Jr., reports the finding of 2 white pine infections in Bath County, Va. The infections were discovered by Agent Martin Q. Miller, in charge of control work in that county. On one area 10 trees were examined, and 3 branch cankers were found on 1 tree. On the second area 139 trees were examined and 25 were found to be infected. Twenty-four branch cankers were reported and 1 stem canker. All trees examined were native growth.

Blister rust informational work.--During March and April, Mr. Luce prepared several blister rust news items. These were published in local newspapers. W. V. Zimmer is still making good use of the Georgia blister rust moving picture film. Recently Mr. Zimmer, with the aid of the assistant State entomologist, took pictures of logging operations in Rabun County, Ga., which he plans to add to his blister rust film strip.

Annual meeting of State blister rust leaders in southern Appalachians.--The annual blister rust conference of State leaders was held in Asheville, N. C., on April 17 and 18. Each State leader gave a short summary of the work in his State and at the close of the meeting prepared a brief work plan for the remainder of the calendar year. J. F. Martin attended the meeting and discussed many points which were of interest to all. Two important points discussed were the necessity of using chemicals in conjunction with hand eradication to prevent sprouting, particularly in rocky situations, and the careful evaluation of white pine stands to make certain the pine is of sufficient present or potential value to warrant the expenditure of funds for control. L. I. Barrett, of the Southern Forest Experiment Station, attended the second day of the meeting and discussed in general the importance of white pine in the South. He called to attention the rapid growth rate of white pine in the region, how well it responds under a careful management plan and why, because of its high value, this tree species should be protected and widely propagated.

Barberry bushes found in Sandhill counties of western Nebraska.--Since January 1, rust-spreading barberry bushes have been found on 10 properties in Cass, Cherry, Johnson, McPherson, Nemaha, Otoe, Thomas, and Scotts Bluff Counties in Nebraska. The remains of a hedge approximately 150 feet long, which was planted in Thomas County in 1902, was recently destroyed. Many of the bushes had died as a result of the drought in 1934 but those that remained have been fruiting heavily. Bushes found recently in McPherson County were planted prior to 1906. It became necessary to alter survey plans somewhat in Nebraska this spring because of the lack of men waiting assignment in certain counties scheduled for survey. According to Marion E. Yount, in charge of control work, on May 1 there were 3 eradication units in the field, 1 working in Kinball and Scotts Bluff Counties, another in Hooker, McPherson, Thomas, and Cherry Counties, in west-central Nebraska, and a third in Cass, Otoe, and Johnson Counties.

Berberis chinensis found in Edgar County, Ill.--A barberry infestation of unusual interest was found in Edgar County, Ill., in the latter part of March. Some 750 bushes and sprouting bushes were located in the midst of a dense stand of silver poplar, gooseberry, and buckbrush, where

farm buildings had stood some 70 years ago. Many of the bushes ranging up to 12 and 14 feet in height were dead as a result of a brush fire that swept this particular area about a year ago. Sprouts springing from the old roots covered an area about 60 by 36 feet. According to Harold B. Busdicker, assistant leader in Illinois, this location aroused considerable interest among crew members because the bushes were Berberis chinensis rather than the commonly found B. vulgaris.

Berberis vulgaris eradicated in West Virginia counties bordering Ohio and Pennsylvania.--Federal Agency (emergency) funds remaining available for expenditure in West Virginia during the current fiscal year have been budgeted for work in Brooke and Marshall Counties, where about 40 men are now employed. The project is under the immediate supervision of Stove P. McNeill, with temporary headquarters at Moundsville. Both Brooke and Marshall Counties, according to Wm. M. Watson, leader in charge in West Virginia, are located in the B. vulgaris area of the State. To date no native barberry bushes have been found in either county. Approximately 100 men are now employed on a Bureau-sponsored project in the State W. P. A. program in the B. canadensis area of southeastern West Virginia.

Berberis vulgaris widely distributed in Augusta and Rockbridge Counties, Va.--Although no extensive infestations of B. vulgaris have been found in Augusta or Rockbridge Counties, more than 17,000 bushes and seedlings have been destroyed since the survey of these counties was undertaken. George W. Eade, State leader in charge, reports that practically all wild bushes located have been found within a radius of 1 mile of planted bushes. These counties are out of the area in which B. canadensis thrives.

COTTON INSECT INVESTIGATIONS

High boll weevil emergence.--The high survival and large numbers of hibernating boll weevils found in the ground trash examinations this spring were reported in the May 1, 1941, News Letter. Reports from field stations of the Division where hibernation cages were installed last fall also indicate the highest survival in several years. Cages containing Spanish moss, cornstalks, oats straw, broom sedge, or woods trash for shelter were installed at Florence, S. C., McIntosh, Fla., Tallulah, La., and Waco, Tex. Surviving weevils were removed from the cages as they became active after May 1. The percentage of emergence through May 9 at the different localities, in comparison with the previous 2 years, is shown in the following table.

Locality	Emergence in--		
	1939	1940	1941
	Percent	Percent	Percent
Florence, S. C-----	0.47	0.02	4.2
McIntosh, Fla-----	---	2.50	2.4
Tallulah, La-----	<u>1/</u> .41	<u>1/</u> .	2.3
Waco, Tex-----	2.14	<u>1/</u> .09	5.5

1/ Total emergence for season; 1939 records for College Station, Tex.

At Florence over 200 times as many weevils emerged during the first 9 days of May 1941 as in 1940. At McIntosh the emergence was about the same, but was heavy in both years. At Tallulah the percentage of survival is already 230 times as great and at Waco more than 60 times as great as for the whole season in 1940. Emergence will continue through May and June and the indications are that weevil conditions may become serious. The damage will depend largely on weather conditions during June and July. Hot, dry weather may check their development while damp, cool weather will favor their increase.

Effect of calcium arsenate on cotton aphid multiplication.---Several applications of calcium arsenate for boll weevil control often cause the cotton leaf aphids to increase to injurious numbers. The reasons for this increase are not fully understood. It was formerly thought that the destruction of the parasites and predators by the arsenical was the principal factor, but more recent work by E. W. Dunnam and J. C. Clark, of the Stoneville, Miss., laboratory, has indicated other factors were playing a part in the accelerated multiplication of aphids. Apparently the calcium or arsenic in the insecticide is absorbed by the leaves and roots, and one or both of these elements in the cotton leaf fluids upon which the aphids feed act as a stimulus to aphid reproduction. The hydrogen-ion content of the soil and of the cell sap of plants was increased in plots dusted with calcium arsenate. Associated with this increase of pH were earlier maturity and shedding of leaves. The prereproductive period of aphids was shortened and the number of young born daily and the total number of young were increased when aphids were reared on dusted plants. Caged aphids protected from parasites and predators reproduced faster on cotton dusted with calcium arsenate containing 13.9 percent water-soluble arsenic pentoxide than on plants dusted with calcium arsenate containing 0.7 percent water-soluble arsenic. Reproduction was also slightly higher on plants dusted with hydrated lime than on the checks. In field tests at Tallulah, La., R. C. Gaines, M. T. Young, and G. L. Smith found a significantly larger number of aphids developed in plots of cotton dusted with calcium arsenate containing 10.3 percent water-soluble arsenic pentoxide than in plots dusted with calcium arsenate containing 0.5 percent water-soluble arsenic. These facts indicated that the amount of water-soluble arsenic in the calcium arsenate was the most important factor but that the lime in the calcium arsenate also contributed to the aphid increase. Tests were begun in 1939 and continued in 1940 to improve calcium arsenate so as to reduce or eliminate the build-up of aphids. Plants were dusted and sprayed with a number of substances with different degrees of pH to observe the reaction on the plants and the aphids. Plants dusted with zinc arsenate (pH 6.40) had fewer aphids and were in better condition at the end of the season than plants dusted with calcium arsenate (pH 11.80), a commercial mixture of paris green reacted with calcium arsenate (pH 11.61), magnesium arsenate (pH 9.61), and lead arsenate (pH 7.56). These results indicated that among the materials that could be used for buffering purposes, zinc salts would probably be the most suitable for use with calcium arsenate for cotton insect control. Tests are being continued with mixtures of calcium arsenate and zinc salts and calcium arsenate with ferrous salts. As a result of these investigations one of the large insecticide companies last year tested a calcium arsenate in which a zinc salt was included in the process of manufacture. Their first season's results in field tests

were so satisfactory in holding down the aphid population that the zinc-safened calcium arsenate is being produced commercially on a large scale this year.

Abutilon berlandieri, a possible host plant of pink bollworm.--Plants of A. berlandieri were grown at Presidio, Tex., from seed obtained at Brownsville, Tex. On September 3, 1940, L. W. Noble placed pink bollworm eggs on the seed pods of some of these plants and on September 13 he found two second-instar larvae in the pods. In another test pink bollworm moths were released during the period from October 2 to 16 in cages set over A. berlandieri plants. On November 6 each of three pods were found to be infested with a second-instar larva. Robert F. Martin, of the Bureau of Plant Industry, verified the determination of this malvaceous plant. He states that "this species is very closely related to, if not identical with, two other species--A. permolle Sweet and A. lignosum (Cav.) Don. If these species are the same, A. lignosum appears to be the oldest." Although these tests in cages at Presidio indicate the possibility that this plant might serve as a host of the pink bollworm, in all of the observations and collections thus far made in the lower Rio Grande Valley no pink bollworms have been collected or reared from this plant.

Pink bollworm in lower Rio Grande Valley in April.--A. J. Chapman, et al., of the Brownsville laboratory, report that although resting-stage larvae of the pink bollworm were found in open cotton bolls on the soil surface in January, February, and March, none were found in the examination of 30 open bolls in April. The bolls were badly decomposed and scarce because of the heavy rains during the winter months. On September 25, 1940, about 70 cotton stalks bearing 300 open and green bolls were placed standing in a cage so that the bolls would be off the ground. On February 3, 1941, or 131 days after this cage was installed, an examination of 2 of the bolls disclosed 1 pink bollworm; on February 28, or 156 days after the cage was installed, an examination of 6 bolls disclosed 2 pink bollworms; on March 31, or 187 days after installation, the examination of 3 bolls disclosed 2 pink bollworms; and on April 29, or 216 days after installation, the examination of 3 bolls disclosed 5 larvae and 1 pupa of the pink bollworm. One pink bollworm moth was also found in this cage on April 28, or 215 days after installation. This high survival of pink bollworms on standing cotton emphasizes the importance of cutting all cotton stalks in the fall, even though all the bolls on the ground cannot be destroyed. Between August 20 and December 10, 1940, open and green cotton bolls and cotton squares were installed in 151 hibernation cages. During March and April a total of only 7 pink bollworm moths emerged. This emergence took place in 7 different cages from resting larvae in open cotton bolls on the soil surface, green bolls on the soil surface, and green bolls buried from 1 to 2 inches. The period between installation and emergence ranged from 133 to 207 days. In the first case, open bolls were placed on the soil surface in a cage on October 28 and the adult moth appeared on March 10. In the latter case, open bolls were placed on the soil surface on September 26 and the adult moth made its appearance on April 21. Owing to heavy rains, all of the hibernation cages were covered with water for a period of from 3 to 5 days from December 22 to 27, 1940, and again for 3 or 4 days between March 23 and 27, 1941. For this reason very little emergence of moths was expected from these cages. Many fruiting forms of 10 different species of malvaceous plants were examined or caged for emergence of moths during April,

but no pink bollworms were found. In the Big Bend area of Texas and in the Laguna district of Mexico many pink bollworms survive the winter in loose cocoons in the soil. Apparently the pink bollworm differs in its habits in the lower Rio Grande Valley, as the examination of soil from heavily infested fields during the last 2 winters has failed to disclose a single pink bollworm free in the soil. All that have been found in or on the soil of cottonfields have been in bolls, locks, or cottonseed.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Planting of the 1941 cotton crop.--Planting and replanting of the cotton crop was in progress in all of the regulated areas in Texas, New Mexico, and Arizona at the end of April, and difficulties are being encountered in obtaining stands of cotton because of heavy rains followed by cool weather unfavorable to seed germination. The planting of the cotton crop was completed around the middle of April in the Coastal Bend district of south Texas, with a good stand being obtained over the area as a whole; however, during the last few days of April heavy rains throughout that district destroyed a great deal of the young cotton. Cotton planting began in the lower Rio Grande Valley of Texas on February 1, in accordance with State regulations; however, abnormal rainfall during February and March necessitated several extensions of the closing date for planting, originally set at March 15. The deadline for planting was finally extended to April 20, and it was estimated that approximately 96 percent of the crop had been planted at the close of that date. Special permits were granted, upon request, for the planting of the balance of the crop, and in the 10-day period ended April 30, permits were issued to 356 farmers for the planting of 6,247 acres which had been too wet for planting prior to April 20. In some instances, however, additional rains interfered with planting after permits were issued, and at the close of April approximately 99 percent of the 230,000 acreage had been planted. In the Mexican quarantined areas adjacent to the lower Rio Grande Valley of Texas, where similar regulations prevail in regard to cotton planting, rainfall did not interfere with the planting of the crop to such an extent as on the American side, and the entire crop had been planted at the close of April. Cotton planting was begun in the Presidio-Ojinaga area of the Big Bend of Texas and Mexico on April 20, in accordance with regulations in effect in that region, and by the close of April most of the acreage had been planted; however, rains which occurred in that area around the latter part of the month will probably necessitate some replanting. The controlled planting date for the lower Rio Grande Valley and the Big Bend, designed for the purpose of bringing about a delay in the fruiting of the cotton crop, is considered one of the most important factors in pink bollworm control in those particular areas, as through this medium attack is made on the insect at the most vulnerable point in its life cycle--spring emergence from overwintering larvae. Moths emerging in the absence of a host on which to oviposit will die within a short time without propagating the species.

Destruction of sprout cotton.--To successfully combat the pink bollworm, there must be a considerable period throughout the year during which no food is available for build-up of infestation. Under the very favorable climatic conditions in the lower Rio Grande Valley cotton bears fruit throughout the year if not destroyed; consequently, an effort is made to kill

all stalks immediately after the crop is harvested. Great difficulties are met, however, in attempting to destroy cotton in this region, and sprout plants develop throughout the year from roots left in the ground during plowing operations, thus making it necessary to carry on an intensive campaign for the destruction of sprout cotton until the fruiting of the subsequent crop. During April, 875 man-days were expended in grubbing out sprouts which gave evidence of producing blooms prior to the fruiting of the planted crop. At the end of April young squares were beginning to appear in a good many of the earlier 1941 planted fields, but it is not believed that blooms will become general until around the first of June. The Mexican Department of Agriculture is carrying on a similar program in regard to the destruction of sprout cotton in the lower Rio Grande Valley of Mexico, and work in that area was continued during April with satisfactory results. In the Anahuac region of Mexico, opposite Laredo, Tex., funds have been made available by the Mexican Government for the removal of sprout and volunteer cotton from approximately 1,200 acres of abandoned cotton land as a pink bollworm control measure, and at the end of April approximately 5,000 acres of land had been cleaned. Plans are to complete the cleaning of all acreage some time in May before the 1941 crop begins fruiting. A survey of the cotton acreage in the Coastal Bend district of south Texas during April resulted in the finding of some sprout cotton in Duval County, which it is believed will reach the fruiting stage in advance of the 1941 planted cotton. The farmers involved were contacted, and have promised cooperation in the removal of this cotton. Some abandoned fields of sprout cotton were also located in Duval and Maverick Counties. The one field in Maverick County had been cleaned at the end of April, and it is of interest to note that living pink bollworms were found hibernating in a few dry bolls. It is planned to use Bureau labor to destroy the sprout cotton in the abandoned fields in Duval County.

Wild-cotton eradication in Florida.--An effort has been under way for a number of years to eradicate the pink bollworm from southern Florida through the destruction of the wild cotton plant which harbors the insect, and thus prevent its spread northward to domestic cotton plantings. Very gratifying progress has been made in this undertaking. A great part of this work has been accomplished through Work Progress Administration allotments, and during the last two seasons a C. C. C. Camp has been set up at Cape Sable to aid in this work. For the month of April the quota of 102 W. P. A. workers was reduced to 94; however, the C. C. C. Camp, consisting of about 200 enrollees, was at full strength about half of the month. Working conditions were favorable during April throughout the entire district. The third cleaning of the season was completed in the Cape Sable area toward the close of April, and the work in that region was terminated for the season. This is the first time the Cape Sable area has been covered three times in one season, and this was possible on account of having sufficient man power furnished by C. C. C. and W. P. A. agencies. Almost half a million fewer plants were found in the Cape Sable area this season than last, indicating a reduction in the number of dormant seed in the soil. A third cleaning of the season is in progress in the Bradenton-Fort Myers subdistrict and the third cleaning for the Main Keys area made good advancement during April. The houseboat crew of the Cape Sable subdistrict was engaged in a second cleaning of the Ten Thousand Islands section during April, and the houseboat crew of the Keys subdistrict was engaged in cleaning colonies along the Dade County mainland. During April a total of 9,692

acres was covered, from which were removed 3,588 mature plants, 44,456 seedlings, and 81 sprout plants. In addition to the acreage cleaned, more than 11,000 acres was scouted and no plants were found thereon.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Performance of narcissus bulbs treated for control of bulb fly during the growing season.--Using bulbs from field plots of narcissus which had received during the growing season of 1940 various insecticidal treatments for the control of the narcissus bulb fly (Merodon equestris (F.)), Ralph Schopp and Paul M. Eide, of the Sumner, Wash., laboratory, found that none of the treatments employed had a detrimental effect on the forcing performance of the bulbs in the greenhouse during the latter part of the winter of 1940-41. The sample bulbs were from four experiments, two of which involved application of the lead arsenate-mineral oil emulsion spray mixture known as "Dynamite", one employing the application of naphthalene flakes, and the fourth from the use of several miscellaneous materials. The first of the experiments with the "Dynamite" spray was to test the effectiveness of the ingredients by eliminating one at a time from the complete formula, while the second was to determine the effectiveness of each ingredient when used separately. The third experiment involved sprinkling dry naphthalene flakes on the soil around the necks of the bulbs at rate of 1/2, 1, 1-1/2, and 2 pounds per 100 feet of row. The experiment employing miscellaneous materials included application of spray mixtures containing mineral oil emulsion, amyl acetate-mineral oil, carbon disulfide-mineral oil, and dust mixtures of cube and sulfur and cube and bentonite. Untreated plots were included in all of the experiments. To determine any effect of the treatments upon the utility of the bulbs for forcing in the greenhouse, data were obtained on the length of time required for flowering, on the measurements of the flower stem and flower parts, and the general condition of the flower. Twenty sample bulbs were taken from each treatment in the field and used for the forcing tests. The bulbs were planted in flats and buried outside on October 9, 1940, and transferred to the greenhouse for forcing on December 30.

Performance of narcissus bulbs treated for control of bulb fly after digging.--F. S. Blanton, of the Babylon, N. Y., laboratory, found that narcissus bulbs could be forced in the greenhouse following treatments used to control the narcissus bulb fly in the bulbs after digging. Different lots of bulbs were subjected at intervals of 1 week for a period of 10 weeks after digging to each of the following treatments: (1) Calcium cyanide at a dosage of 16 ounces to 100 cubic feet for 4 hours; (2) sodium cyanide at a dosage of 7 ounces to 100 cubic feet for 4 hours; (3) vapor heat at 110° F. for 2 hours, exclusive of the 1-hour approach period; and (4) hot water at 110° F. for 1 hour, exclusive of 1/2-hour approach period. The period during which treatments were made was August 8 to October 10. There was no apparent injury to the flowers from any of the treatments but there was slight foliage injury on those given the hot-water treatment at the 8th, 9th, and 10th weeks, and the number of flowers produced by those receiving the hot-water treatment was somewhat reduced. At the time of planting there was some damage apparent on the bulbs receiving the cyanide treatments for the first, second, and third weeks. This injury was evidenced by a charred appearance, which was followed by the fungi Rhizopus and Penicillium. There was a yield of 171 flowers from the bulbs receiving

the calcium cyanide treatment, 169 from the sodium cyanide treatment, 174 from the vapor heat, 140 from the hot water, and 167 from bulbs not treated, the total number of bulbs forced being 250 for each treatment or 25 from each weekly application of each treatment.

Control of cabbage caterpillars on commercial plantings.--The tests conducted by W. J. Reid, Jr., of the Charleston, S. C., laboratory, on fields of fall-growing cabbage during the fall and winter of 1940 showed that effective control of cabbage caterpillars including the cabbage looper (Autographa brassicae (Riley)), the imported cabbage worm (Ascia rapae (L.)), the diamondback moth (Plutella maculipennis (Curt.)), and Agrotinae, and their damage, was obtained under commercial conditions by employing the control program found to be most effective in experiments previously carried out on small-plot plantings of cabbage. The control program used consisted of making applications of insecticides to the cabbage at intervals of 10 days throughout the growing period, the ones prior to the time heading began consisting of dust mixtures of cryolite or arsenicals, with those during the heading period being dust mixtures containing rotenone, pyrethrum, or both of these ingredients. The insecticides used, the numbers of applications, and the percentages of cabbages damaged by caterpillars at harvest for each of the 10 commercial plantings included in this experiment are shown in the following table.

Farm No.	Planting	Number of applications of arsenicals or cryolite before heading	Applications after heading	Cabbage damaged by caterpillars at harvest
			Number : Insecticide	Percent
1-----	A	4	3 : Derris-pyrethrum	1.5
	B	4	3 : Derris	4.5
2-----	A	3	3 : Derris-pyrethrum	2.5
	B	3	3 : Derris	2.5
3-----	A	$\frac{1}{3}$	3 : Derris-pyrethrum	4.5
	B	$\frac{1}{4}$	3 : Derris	3.5
4-----	A	4	3 : Derris-pyrethrum	7.2
	B	4	3 : Derris	9.0
	C	4	3 : Pyrethrum	7.1
	D	Untreated	Untreated: --	53.1

1/

Through error the first application consisted of a derris-dust mixture containing 1 percent of rotenone.

These data show that, except for one farm, adequate commercial control of the caterpillar damage was obtained by the use of an arsenical or cryolite dust during the preheading stage followed during the heading period by applications of derris or derris-pyrethrum dusts. On the one farm the dusting schedule was not continued quite long enough for the control to be entirely adequate, but even in this instance (Farm No. 4) the net profit resulting from use of the insecticides ranged from \$69 to \$73 per acre.

Corroborating the results obtained from previous experiments of a similar nature the derris-pyrethrum dust showed a tendency to be slightly superior to the derris dust in certain respects. The insecticides applied prior to the time when heading of the cabbage began were the same for any one farm and consisted of cryolite and a diluent (1-2), or of arsenicals as preferred by the grower, while those after heading began were derris dust containing 1 percent of rotenone or derris-pyrethrum dust containing 0.5 percent of rotenone and a 0.15-percent Pyrethrins I and II content, or a pyrethrum dust containing 0.3 percent of Pyrethrins I and II. There were three or four preheading applications at rates of 10 to 15 pounds per acre per application with three post-heading applications at rates of 15 to 25 pounds per acre per application. All dust applications were made by traction dusters. Each planting of cabbage on Farms Nos. 1, 2, and 3 was 1 acre in size, whereas those on Farm No. 4 were 1/2 acre.

Hemipterous-insect damage to sugar beets grown for seed.--Field isolation-cage studies were conducted by O. A. Hills at Phoenix, Ariz., during the 1940 season to determine the amount of damage to sugar beets grown for seed attributable to feeding by various species of Lygus and of Chlorochroa sayi Stal. (Say's stinkbug). Studies in 1939 showed that these insects did not reduce the yield of seed, but rather were responsible for a reduction in the percentage of viable seed produced. Germination tests of the beet seed produced under caged conditions in 1940 were completed during January and show that individual adults of C. sayi damaged an average of over 200 seed balls during the developmental period of the seed, while the damage by individuals of the species of Lygus averaged 62 to 91 seed balls during the same period, the total number of seed balls produced per cage being about 400. These studies also showed that L. elisus Van Duzee was responsible for significantly less damage than L. hesperus Knight or L. pratensis oblineatus (Say) and that the females and nymphs of all species were responsible for more damage than were the males of the same species. The data further indicate that Lygus feeding renders the entire seed ball nonviable, whereas C. sayi, in addition to rendering a larger number of seed balls nonviable, may also affect one or more seed of a seed ball without rendering the entire ball nonviable.

Potato psyllid fails to overwinter on red cedar.--The results of cage studies conducted by R. L. Wallis at the Scottsbluff, Nebr., laboratory last winter corroborate those of similar studies which he carried out during the winter of 1939-40, in that they showed that adults of the potato psyllid (Paratrioza cockerelli (Sulc)) did not overwinter on red cedar trees, although this tree had been previously reported as the natural overwintering quarters of this pest. In the series of experiments conducted last winter no living psyllids were found at any examination. In similar experiments the previous winter no live psyllids were found after December 26, 1939; however, 84-percent mortality had occurred prior to that date during comparatively mild weather. In the winter of 1940-41 subzero weather occurred early in November and again early in December and this probably accounts for the early mortality last season. In these tests 100 adults of the psyllid were confined during the latter part of October in each of the cages placed around branches on red cedar, one of the cages being removed each week during the period December 2, 1940, to March 24, 1941, to determine whether it contained living psyllids.

Impregnated pyrethrum dusts effective against tobacco thrips.--From an experiment carried out during 1940 on replicated small plots at the Windsor, Conn., laboratory, A. W. Morrill, Jr., concludes that impregnated pyrethrum dusts containing 0.5 percent of Pyrethrins I and II, using exhausted pyrethrum flowers as the carrier, shows considerable promise against the tobacco thrips (Frankliniella fusca (Hinds)) when applied to infested cigar-wrapper tobacco growing under shade. Evaluations of damage by thrips on the cured leaves of tobacco from plants that had received 7 applications of this insecticide showed that an average of only 7 percent of the potential yield of cigar wrappers was damaged, as compared to 59 percent of the wrappers of leaves taken from plants that received no insecticidal treatment. The percentage of wrappers damaged by the thrips on plants receiving 7 similar applications of a cube-tobacco dust mixture containing 1 percent of rotenone was 18, whereas for plants treated alternately with this dust mixture and the pyrethrum dust, only 12 percent of the wrappers was damaged by feeding of the tobacco thrips. Two spray mixtures containing pyrethrum and rotenone were less effective in reducing damage by the thrips than the dusts. The dusts were applied by rotary hand-operated dusters at an average rate of about 8.5 pounds per acre per application and the sprays were applied by knapsack sprayers at an average rate of 37 gallons per acre per application, the 7 applications of each insecticide being made at semiweekly intervals beginning July 2. The 6 treatments were replicated on 36 plots 1/40 acre in size arranged in a Latin square, and the effectiveness of the treatments was determined by examining after curing and classifying as to the presence of thrips damage to the leaves from 10 plants per plot.

INSECTS AFFECTING MAN AND ANIMALS

Mosquito survey at Savannah air base.--At the request of the Public Health Service, G. H. Bradley, of the New Smyrna Beach, Fla., laboratory, spent the period April 22 to 24, inclusive, in making a mosquito survey and estimating the needs for a W. P. A. mosquito-control project in the vicinity of the Savannah, Ga., air base.

Creosote spray for sandfly control.--In preliminary tests made by J. B. Hull and S. E. Shields, of the St. Lucie, Fla., laboratory, 200 feet of ditch was sprayed with creosote oil at the rate of 1 gallon of creosote to 100 feet of ditch. Only 1 larva was isolated from three 1-quart samples 18 days later. From an untreated ditch 150 feet away almost 100 larvae were isolated from each sample.

Dog fly breeding places.--W. E. Dove and S. W. Simmons, of the Panama City, Fla., laboratory, report that a survey was made for breeding places of dog flies in the dairies of Bay County, Fla. Of 14 dairies inspected, breeding was found in 6.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Two living and 28 dead larvae of the Mediterranean fruitfly (Ceratitidis capitata (Wied.)), were taken at Seattle on April 25 in apples in ship's refrigerator from Queensland. Living specimens of the endonychid Trochoideus americanus Buq. were intercepted at Hoboken, N. J., on April 3 with Cattleya sp. in cargo from Colombia. A living adult of the colydiid Sosylus cursorius Pasc. was taken

at New York on April 10 on a primavera log from Mexico, and S. duplicatus Pasc. was taken at New York on April 11 under the bark of a primavera log from Guatemala. A living specimen of the lygaeid Ozophora gracilipes (Stal) was taken at Hoboken, N. J., on April 4 on Cattleya sp. in cargo from Venezuela. One larva of the gelechiid Gnorimoschena lavernella (Chamb.) was found at El Paso, Tex., in husk tomato in baggage from Mexico. A living adult of the curculionid Pyropus sapphirinus Gyll. was intercepted at New York on March 24 on mustard greens in cargo from Cuba. Specimens of the coccid Ceroplastes ceriferus (And.) were intercepted at San Francisco on March 7 on Canellia sasangua in baggage from Japan. A living adult of the lyctid Lyctoxylon japonum Reitt. was intercepted at Norfolk, Va., on April 15 in bamboo dunnage in quarters from Java. Specimens of the bruchid Bruchus dentipes ochreassignatus Heyden were found at the Inspection House, Washington, D. C., on April 22 in Vicia hybrida seeds in express from Iran. Although the specimens were dead, H. S. Barber stated that they were the first good specimens received here. A living adult of the cydnid Galgupha schulzii (F.) was found at San Francisco on March 31 on Oncidium splendidum in cargo from Guatemala. A living larva of the curculionid Metanasius sp. was found at Presidio, Tex., on March 2 in a sugarcane stalk in baggage from Mexico. A living adult of the lygaeid Ozophora pallescens (Dist.) was intercepted at New York on April 9 with string beans in stores from Cuba. Specimens of the bruchid Bruchus hamatus Miller were intercepted at the Inspection House, Washington, D. C., on April 18 in unidentified seeds of a forage plant in express from Iran.

Pathological interceptions of interest.--Ceratostomella ips Rumbold was found on April 17 at Hoboken on a pine cleat in cargo from England. C. ulni (Schwarz) Buis. was intercepted on April 3 at New York in elm wood in a crate from England. Cercospora coffeicola Berk. & C. was intercepted on March 4 at Hoboken on coffee leaves in baggage from Mexico. Cumminsiiella sanguinea (Peck) Arth. was intercepted on March 12 at Hoboken in Mahonia leaves from British Columbia. Dendrodochium lycopersici Marsh, a little-known fungus described in Belgium in 1901, was intercepted on tomatoes from Mexico April 10, 1940, and on February 15, 1941, at Brownsville. Gloeosporium lebbece Syd. was intercepted on February 24 at New Orleans on Albizia lebbece pods from Honduras. Heterodera marioni (Cornu) Goodey was intercepted on March 28 at Seattle on Anemone pulsatilla vernalis from Canada. Kellermania sp. and what appeared to be immature Asterina mexicana E. & E. were intercepted on March 19 at El Paso on maguay leaves in baggage from Mexico. Phyllachora naydis Maubl. was found on March 24 at New York on corn leaves in cargo from Guatemala. Peridermium sp., material too scanty for a specific determination, was found on March 3 at El Paso on needles of Picea sp. in baggage from Mexico. Peronospora effusa (Grev.) Ces., common on spinach from Mexico, was found in March at Nogales on Chenopodium sp. in baggage from Mexico. P. pisi (De Bary) Syd. was found on April 15 at New York on peas in stores from Portugal. Uredo guacae Mayer was intercepted on January 10 at Hoboken on Epidendrum sp. entering under special permit from Venezuela. U. jucunda Sacc. was intercepted at Hoboken on February 21 on Philodendron sp. in mail from Costa Rica. Uredo sp., none found reported on Miltonia, was intercepted on March 26 at Brownsville on Miltonia vexilans from Mexico.

DOMESTIC PLANT QUARANTINES

Grasshopper development.--Hatching of Melanoplus mexicanus Sauss. was reported at the close of April as complete in two Arizona counties. Two mixing stations were in operation in Yuma County, Ariz., and demands for bait were increasing. Hatching of this species was also in progress in northern Texas, Oklahoma, Kansas, Nebraska, South Dakota, and the vicinity of Ames, Iowa. M. bivittatus Say, according to reports, was hatching at Ames the latter part of April, and Aeoloplus turnbullii Thos. in Texas, Oklahoma, and Kansas. A light and general grasshopper hatch was reported from many counties in Utah. Infestations of moderate intensity in southern California were present and baiting operations were expected to begin early in May in San Bernardino and Kern Counties.

Mormon cricket migration stopped.--A Mormon cricket band with a front 6 miles wide was recently observed moving into cultivated areas at Warm Springs, northwestern Oregon, within 150 yards of the town. The application of sodium fluosilicate bait with power equipment in advance of the crickets completely stopped the migration. After feeding on the bait they failed to advance more than 150 feet, a 98-percent kill was effected, and no damage to crops resulted.

Other Mormon cricket control work.--The hatching of Mormon crickets is almost complete in areas of low altitude throughout the infested region. In areas of high altitude the hatch will continue for some time. Adult crickets were observed at the close of April in Washington and Oregon. In Nevada the hatch was somewhat retarded by storms early in the month. In Utah heavy populations of crickets which had not migrated from the egg beds were effectively dusted, resulting in an 85- to 95-percent kill, in some sections 100 percent. Such early dusting of crickets while they are still concentrated on the hatching grounds, is a most economical type of control. In Oregon large-scale cooperative control operations have been conducted in Wasco and Jefferson Counties, and on the Warm Springs Indian Reservation and land adjacent thereto. Power-dusting was begun in Nevada on April 21, and extensive preparations are being made for large-scale applications of both sodium-arsenite dust and sodium-fluosilicate bait. A considerable number of pick-up trucks, power bait-spreaders, and bait mixers have been transferred to the areas in Nevada and Oregon where extensive control operations are anticipated. During April a total of more than 3,000 acres was dusted and nearly 20,000 acres spread with cricket bait.

White-fringed beetles show early development.--Field employees of the white-fringed beetle control project, working in close cooperation with the members of the Division of Cereal and Forage Insect Investigations, are making studies of the development of the beetles so that information may be available in each of the infested areas as to the time when beetle emergence may be expected. The time when control measures are to be started in each area is based largely on such information. The pupal stage was found at New Orleans on April 22 and in the Florala, Ala., area on April 26, 10 days earlier than the first pupae were found at

Florida in any previous year. These findings indicate an early emergence, which may be accounted for by unusually dry weather throughout the infested area.

Control work on white-fringed beetle has begun.--Direct control measures against the white-fringed beetle were begun at Mobile, Ala., on April 30 and were going forward in the early part of May in all isolated areas, where the most drastic type of suppressive measures are to be continued throughout the entire period of emergence to determine the possibility of eradication. Materials and supplies needed to carry on the work throughout the season have been ordered to the extent that available funds will permit.

Beetle control at Army Center.--A recreational center to be used by the Army personnel on holidays and week ends has been established within the white-fringed beetle infested area at Gulfport, Miss. The site was selected by the Army officer in command, in cooperation with the project employees, and the Army has cooperated in the establishment and maintenance of adequate sanitation measures to prevent the beetles from being carried to points outside the area.

White-fringed beetle administrative instructions modified.--Under a revision of circular B. E. P. Q. 485 which became effective May 1, the certification requirements of the white-fringed beetle quarantine were waived for the current year as to certain articles shipped from designated parts of the regulated area. Such modification is justified, it is believed, because of the decrease in intensity of infestation in certain parts of the area. No modification has been made in the restrictions requiring certification of soil, whether moved independently of or attached to nursery stock or other things.

New white-fringed beetle infestation found by use of power sifter.--During test runs made by the new power sifter recently developed by the technical unit of the white-fringed beetle control project, a new infestation was discovered on a railroad right-of-way at Crichton, Ala., a suburb of Mobile. The sifting machine has proved practicable in detecting the presence of larvae, pupae, and adults in any soil except the very heavy types of clay or gumbo and even in these soils there are indications of a fair degree of efficiency.

W. P. A. project on sweetpotato weevil control in Mississippi.--Labor has been assigned by the State W. P. A. Administrator's Office in Mississippi and clean-up operations are now under way in sweetpotato fields, seedbeds, and storage banks in the areas immediately south of the counties from which it is believed that the weevils have been eradicated as a result of cooperative Federal-State operations conducted since 1937.

The sweetpotato weevil and wild host plants.--In Thomasville, Thomas County, Ga., additional infestations of the sweetpotato weevil have been found in native host plants. While it is not known whether the weevil can perpetuate itself throughout the year on these wild plants, field work is now being conducted, with the assistance of labor furnished

by the Works Progress Administration, to eliminate all such host plants in the city and its environs. Further careful inspections are being made in Georgia and in other affected States to determine the status of wild host plants with respect to such infestations. This inspection is carried on jointly with members of the research unit and the State cooperators.

Clean-up work on infected citrus hedges in Navasota, Tex., completed.--On the discovery of citrus canker on Citrus trifoliata hedges at Navasota, Grimes County, Tex., last January, a staff of trained inspectors was assigned to make a thorough inspection of the 75 hedges in the town, and W. P. A. laborers were obtained for tree-removal work in the area. The town of Navasota was completely inspected, as well as all of Grimes County. Citrus canker was found on 355 trees on 6 properties in Navasota. All the infected trees were promptly destroyed, as well as over 12,000 noninfected citrus trees on the infected properties. It seems likely that with the exception of possibly 1 or 2 hedges all citrus trees will be removed with the force of 135 relief laborers. Inspection has also been made of two contiguous counties without finding canker. A survey has been completed of major towns of central and northeastern Texas covering the route between Houston and Dallas. Numerous citrus hedges in this non-commercial area were located, inspected, and recorded.

Transit-inspection station changes.--In April the transit-inspection stations at Philadelphia and Cincinnati were closed and the inspectors at these cities were assigned to Dallas, Houston, and Pittsburgh. Transit inspection at Birmingham has also been suspended.

Transit inspection in the Northeast.--The movement of nursery stock in the Northeastern States reaches its highest point in April. This year the peak occurred early in the second week and maintained its level throughout the month. Some 75,000 shipments were inspected and over 6,000 way-bills were examined during the 30-day period. Inspectors in this area reported 225 shipments that were moving in violation of 1 or more of 4 different Federal plant quarantines. These were consigned to 36 States and Canada. Sixty-two irregularities of various State regulations were also reported to the proper officials. Every inspector in this region has commented on the tremendous number of Ribes shipments observed this season. Buffalo, N. Y., is proving to be one of the most important points for enforcing the white-pine blister rust quarantine, affording protection to the white-pine growing States of the Northeast, and to the Lake States. A carload of rose stock, consisting of 40,000 bushes, consigned to Canada was reported at New York because of the lack of Japanese beetle certification. Canadian authorities were promptly advised of this movement and they made an inspection of the stock at its destination. This is the third carload of uncertified quarantined material that has been intercepted at New York City during the present fiscal year.

CONTROL INVESTIGATIONS

Methyl bromide fumigation accelerates egg hatching.--Gypsy moth eggs fumigated with sublethal dosages of methyl bromide in November hatched from 18 to 33 days in advance of control eggs kept under like conditions in

an unheated laboratory room, in tests reported by Randall Latta, of this Division, and C. H. Gaddis, of the Division of Japanese Beetle Control. However, in eggs kept in outdoor storage there was no apparent difference in the time of hatching. J. W. Bulger reports the same acceleration in the hatching of eggs of the tent caterpillar at Hoboken, N. J. In these tests made in February, some dosages were sublethal and hatching occurred several days in advance of the controls when both were kept in a laboratory room.

INSECTICIDE INVESTIGATIONS

Insecticidal use of aminoacetanilides patented.--On April 29, 1941, Lloyd E. Smith was granted U. S. patent 2,239,832, which covers the insecticidal use of ortho-, meta-, and para-aminoacetanilides. The para derivative has given promising results when tested against the following insects: Southern army worm, melon worm, bean leaf roller, cabbage looper, cross-striped cabbage worm, and imported cabbage worm. The p-aminoacetanilide, at a concentration of 8 pounds per 100 gallons of water, was tested against potato, eggplant, tomato, pepper, and bean foliage, with no injury noted 10 days after the application of the spray. This patent is assigned to the Secretary of Agriculture.

Anabesine.--About 10 years ago the Amtorg Trading Corporation of New York City, American representatives of the Soviet Union, marketed in this country an aqueous solution of anabesine sulfate containing 40 percent anabesine. This came into considerable use, especially in Connecticut, for combating aphids. As a contact spray against the bean aphid, anabesine was shown to be four or five times as toxic as nicotine. Since 1936 anabesine has not been available on the American market, probably because the entire production was consumed in Russia. Formerly obtained only from the Asiatic weed Anabasis aphylla, anabesine is now known to occur in the tree tobacco Nicotiana glauca, which grows in the Southwestern States. Russian investigators have produced hybrids of Nicotiana glauca x N. rustica which contain as much as 7 percent of anabesine. The commercial cultivation of the tree tobacco and its hybrids seems possible in the United States. The latest information concerning anabesine is reviewed in the mimeographed publication E-537.

Physical behavior of some mixed organic insecticides.--In the control of the screwworm, it was observed that a number of organic insecticides were effective when applied as dust, but when such dusts were mixed (in order to enhance their effectiveness), they were found to liquefy. A number of binary systems of such organic insecticides have been investigated by O. A. Nelson. The systems examined were: Diphenylamine and phenoxathiin, diphenylamine and paranitrophenetole, diphenylamine and nitronaphthalene, and diphenylamine and dibenzofuran. It was observed that at the optimum concentration paranitrophenetole and nitronaphthalene each lowered the melting point from 52.8° to about 24° C., phenoxathiin to 26.4° C., and dibenzofuran to 34.5° C. Other systems will be examined and the results of the previous investigations will be published.

The red-color test for rotenone.--J. W. Wood and L. D. Goodhue have been making a study of the factors involved in the "red-color" test for rotenone and deguelin. In this test an alcoholic alkali nitrite solution is added to an acetic solution of a substance containing rotenone or deguelin, followed by the addition of a dilute solution of sulfuric acid. The heat of reaction is removed in a cooling bath. Since the test is becoming popular and has been used without due regard for interfering substances which might be present, it was deemed advisable to investigate some of these and to vary the conditions of the test. Approximately 70 organic compounds were tested for their effect, using the standard testing procedure. The compounds mesityl oxide, diacetone alcohol, methyl cellosolve, butyl cellosolve, paraldehyde, methylal, and isatin gave appreciable increases of color, while certain concentrations of ethyl acetoacetate, ethyl butyl acetoacetate, ethyl-alpha-acetoxy propionate, ethyl lactate, ethyl malonate, acetyl acetone, and chloroform prevented the formation of any red color. The effect of the other substances tested was less pronounced. Doubling the concentration of the alkali used with the sodium nitrite gave a color value almost double in terms of rotenone. Doubling the amount of nitrite, however, decreased the color value approximately one-third, whereas decreasing the amount of nitrite to a certain point increased the color. Slight variations in the temperature of the cooling bath had little effect on the test. A detailed account of this investigation is being prepared for publication.

BEE CULTURE

Pollen from alfalfa in Arizona.--While Geo. H. Vansell, Davis, Calif., has reported of his field studies in locations with miscellaneous pollen sources that the number of honeybees observed collecting alfalfa pollen was almost negligible, he also reported in the Journal of Economic Entomology for February 1941 that honeybees worked alfalfa blossoms freely in the Imperial Valley, where other pollen sources were relatively scarce. In reporting later similar evidence from Arizona, he states: "A pollen trap during the summer of 1940 at Chandler, Ariz., yielded a fairly large amount (25 lbs.) of pollen. Beginning late in April and continuing to August the predominating pollen was of a pale graying yellow color. Recent microscopical examination indicates that this supply was from alfalfa. The size and shape of the grains are indistinguishable from those taken from the bees visiting alfalfa in Imperial Valley. It is noteworthy that Arizona consistently produces a large quantity of alfalfa seed. A correlation may exist between intense pollen activity and seed set."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Two interesting records of Bruchidae.--A species of bruchid has been taken recently in seeds of Piscidia from the Island of St. Thomas. It agrees well with the description of Bruchus podagricus F. and probably is that species, which is now listed in the genus Pseudopachymerus (a synonym of Caryedes). Apparently no definite recovery of P. podagricus has been recorded since the species was described in 1801. The type was stated to have come from "America meridionalis;" in all likelihood it had been sent to Fabricius from St. Thomas. A new and very distinct species of Bruchus has

been recovered from seeds of a species of Cicer, related to the chickpea. This is the first record of Bruchus from any plant of that genus. It is now known that all five genera of the leguminous tribe Viciae found in the Mediterranean region are infested by one or more species of the genus Bruchus.

Another European weevil in North America.—An example of how a non-economic exotic species which, though common and widely distributed in North America, may long escape detection, came to light recently when W. J. Brown, of the Canadian Department of Agriculture, sent in two specimens of the European weevil Rhinoncus castor (F.) which had been collected in New Brunswick. Examination of the United States National Museum collection of Rhinoncus shows that castor has been present (confused with pyrrhopus Boh.) in the nearctic fauna at least since 1895, and apparently is now firmly established, its general range in the United States being from Maine to Virginia and west to Wisconsin; in addition, a few specimens are at hand from Washington and Oregon, and from Vancouver, British Columbia, and Ontario, Canada. Mr. Brown states, in litt., that this species is perhaps the most abundant ceutorhynchid in southeastern Canada, where it is known from numerous points in Nova Scotia, New Brunswick, Quebec, and Ontario. In Europe castor is widely distributed and is reported as feeding or breeding on Rumex, Polygonum, Oenanthe, and Phellandrium; and there are doubtless other host records in the literature. Rhinoncus castor, which was first described from Germany, has an American "counterpart" or "homologue" in the abundant and widespread native species, R. pyrrhopus Boh. A similar correspondence exists between the other two native American species of Rhinoncus and their European relatives,—namely, longulus Lec. (N. America) and perpendicularis (Reich.) (Europe) forming one pair, and occidentalis Dietz (N. America) with pericarpus (L.) (Europe) another pair. In American literature occidentalis Dietz is usually placed as a synonym of pericarpus (L.), but incorrectly so, the relationship between them being of the same homologous sort (though apparently closer) as that between pyrrhopus and castor. Although pyrrhopus and castor now occur together over a wide area in North America, no evidence of merging, which might be expected in two forms obviously so closely related, has been noted. The most useful distinguishing characters for castor are its blackish ground color, large elytral tubercles or asperities, and feebler pronotal sulcus; in the usually reddish pyrrhopus the elytral asperities are considerably smaller and the pronotal sulcus deeper.

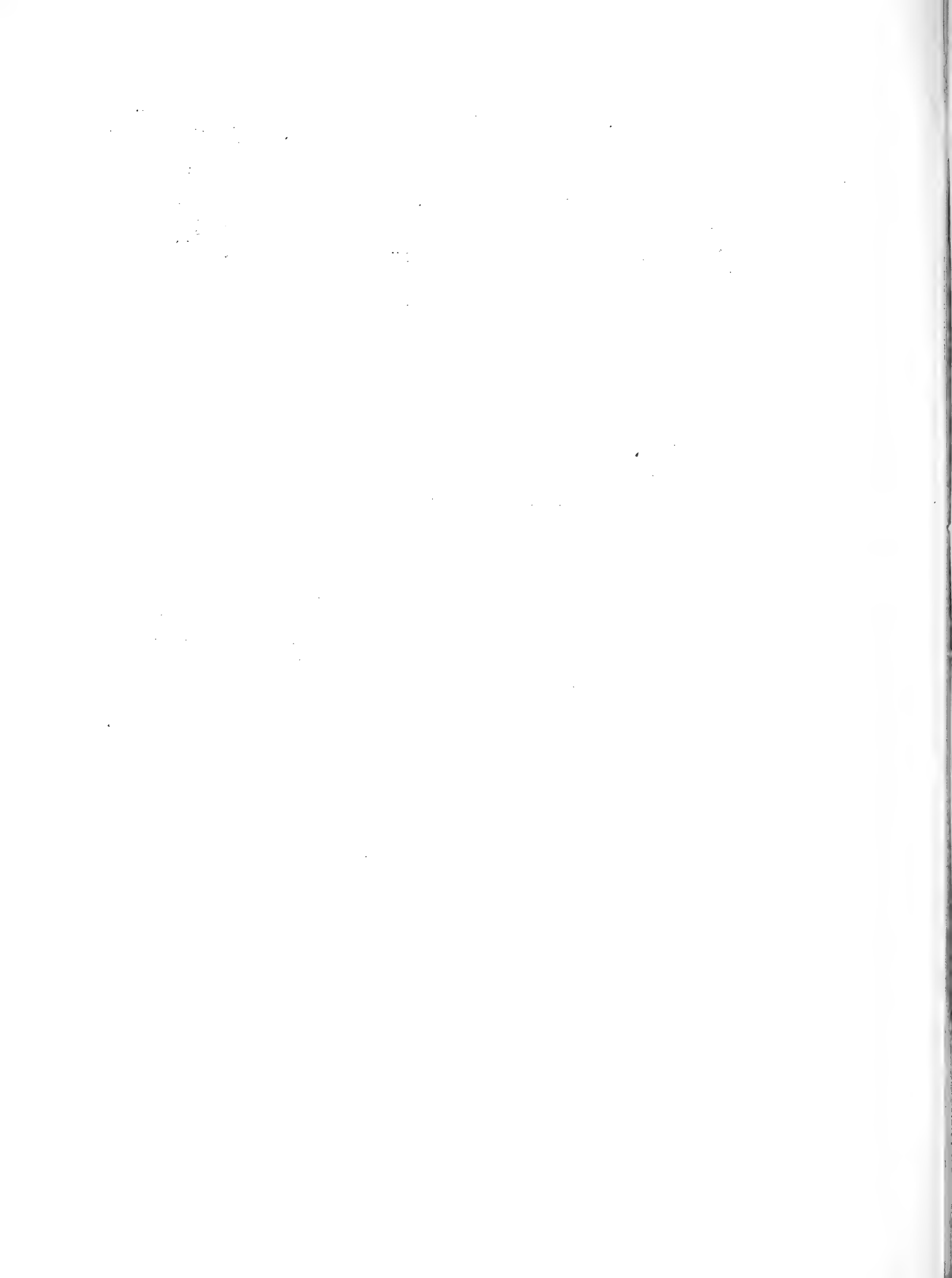
Cophes longiusculus (Boh.) in the United States.—Six specimens of this Mexican weevil, labeled "Brownsville, Tex., Dec. 17, 1911," have been received from H. H. Ross, of the Illinois Natural History Survey. So far as known, this is the first report of the occurrence of C. longiusculus in the United States. Another Mexican species of Cophes (C. gibbus Champ.) was recorded from near Tucson and in the Santa Rita Mountains, Ariz., by E. C. Van Dyke in 1930.

Additions to the collection of Orthoptera.—In the course of trips primarily intended for the study and collection of leafhoppers, P. W. Oman has collected many small lots of Orthoptera. A small collection made in 1937 in the Baboquivari Mountains and in the vicinity of Hereford, near the Mexican border in Arizona, has recently been incorporated in the main

collection of the Museum, and has been found to include several grasshoppers that represent valuable additions. One species, Perixerus gloriosus Heb., was not in the collection before, and the following are deserving of mention because of the small number of specimens previously available for study: Acantherus piperatus Scudd., Morsiella flaviventris (Bruner), Conozoa carinata Rehn, Phrynotettix tschivavensis (Hald.), Leorus robustus Heb., Schistocerca albolineata (Thos.), Melanoplus thomasi Scudd., and M. desultorius Rehn. Melanoplus thomasi is not unusual in favorable habitats, but so few specimens have been received that good series of the species are desirable. Melanoplus desultorius is a short-winged species related to M. aridus (Scudd.) and a member of a section of the genus Melanoplus that has been somewhat confused in the past.

Adult ticks abundant in Maryland in April.--Although adults of the American dog tick (Dermacenter variabilis (Say)) occasionally appear in Maryland in April, usually they are not abundant until late in May or in June. On April 27 several active adult ticks were removed from clothing after about an hour's collecting in Mattowoman Swamp, in southern Maryland. The almost continuous warm or hot weather in the latter part of April undoubtedly had caused the ticks to appear, in numbers, earlier than usual.

The squirrel flea as a pest of man.--Several years ago, at Ames, Iowa, a forestry student asked for the identification of a flea he had found feeding on his arm. It was identified by Irving Fox as Orchopeas wickhami (Baker), a common eastern flea whose normal hosts are various squirrels, and which was not known to attack man. Recently another instance has indicated this species as a possible pest. Several specimens were submitted for identification after causing annoyance in a house in Lexington, Ky. From these records it appears that this flea is capable of attacking man, and in this capacity is a potential vector of plague.



UNITED STATES
DEPARTMENT OF AGRICULTURE

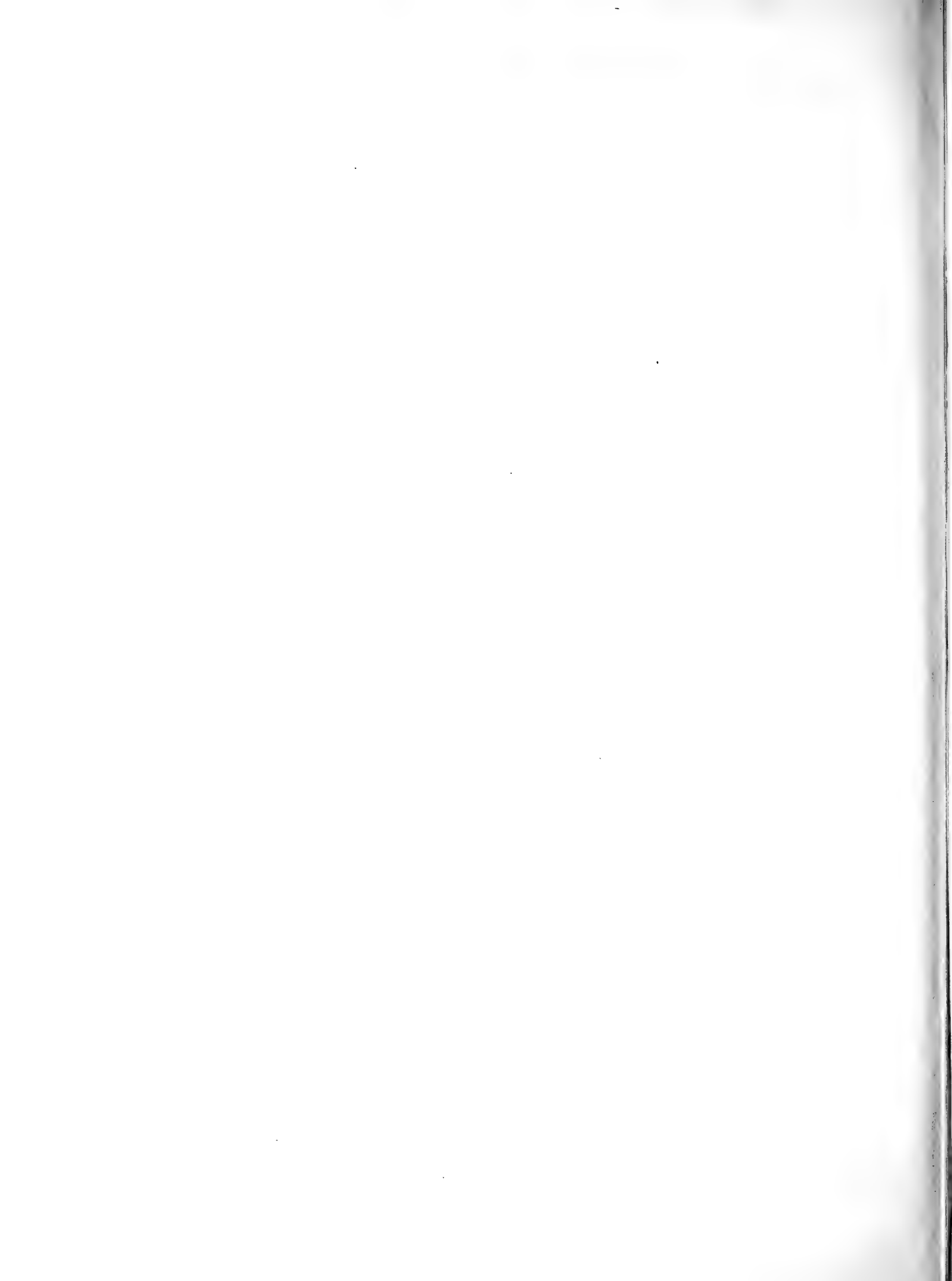


BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VIII

DR. STRONG DIES IN ARIZONA

In announcing the death of the Chief, which occurred on June 2, Secretary Wickard said: "In the death of Lee Strong the Department has lost one of its best Bureau chiefs. He was a natural leader, a good administrator, and a fine servant of the people of the United States."



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MAY 1941

Vol. VIII, No. 7

(Not for publication)

July 1, 1941

ADMINISTRATION

Uniform Style for Correspondence

The Department proposes to issue a style manual establishing uniform style and procedure for all Departmental correspondence. It is anticipated that the style prescribed in the new manual will be effective on August 15. Prior to that and as soon as copies are available appropriate instructions will be issued by the Bureau. Limited copies of the style manual are available and pertinent features are being given advance distribution to divisional offices.

The new style is being used in some of the correspondence issuing from the administrative offices. You may be interested in observing changes in procedure which will be used when the new style becomes effective. Those who may desire may now begin preparing their correspondence in accordance with the new style.

Bureau Appropriations

The report of the Conference Committee on the bill providing appropriations to the Department for the fiscal year 1942, released under date of June 17, included the following on items providing appropriations to the Bureau, in disagreement between the House and the Senate:

	Senate Bill compared with House Bill	Conference Re- port compared with House Bill
Mexican fruitfly control-----	\$ 7,500	--
Citrus canker eradication-----	13,485	\$ 13,485
Dutch elm disease eradication----	50,000	50,000
European corn borer control-----	17,939	--
Barberry eradication-----	62,500	20,000
Bee culture-----	33,000	33,000
Insecticide and fungicide in- vestigations-----	5,000	5,000
Foreign plant quarantines-----	20,000	10,000

No other items relating to Bureau appropriation were in disagreement between the House and Senate. The amounts provided for items not in disagreement are the same as those appropriated in the act for the current fiscal year. This also applies to the following items which were in disagreement: Mexican fruitfly control, citrus canker eradication, and bee culture. The amount available for Dutch elm disease eradication is \$50,000 less than the current fiscal year, that for European corn borer control, \$17,939 less. The amounts available for the item barberry eradication for 1942 is increased by \$20,000, that for insecticide and fungicide investigations by \$5,000, that for foreign plant quarantines by \$10,000.

The conference report will provide an increase of \$83,332 over the amount available for the current fiscal year to the Bureau of Entomology and Plant Quarantine for work on white pine blister rust control. The amount provided to Forest Service for white pine blister rust control is increased by \$41,668. The amount of \$115,000 provided for the Department of the Interior is an increase in the funds available to that Department for work on this disease.

BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO SPECIAL NATIONAL DEFENSE ASSIGNMENTS

The current issue of the "News Letter" includes a new section which it is proposed to continue in subsequent numbers as material is available. This section will contain the names of employees of the Bureau who have enlisted in or been called to perform military service or assigned by transfer or loan to other units of the Government to carry out special activities associated with National Defense. It is desired to give the designation and unit of the Bureau to which the employee was assigned at the time of the change and where practicable a brief statement of the new assignment. Indication of accompanying personnel adjustment within the Bureau may be added.

The material included in this issue was prepared on short notice and without giving field Division leaders opportunity to contribute. It is hoped that the list included under this heading in the various issues of the "News Letter" will make a complete record of all full-time employees, including collaborators continuously engaged in work of the Bureau, such as those concerned with the enforcement of Federal plant quarantines. It is also hoped that it can be made complete for seasonal employees working under appointment. All are requested to aid in accomplishing this by calling attention to omissions through regular channels.

The Selective Training and Service Act and procedures established under it provides for the restoration of employees to positions of equal responsibility and salary when training and service is completed. Insofar as is practicable this policy is administratively extended by the Bureau to reserve officers called for active duty. In the opinion of the Comptroller General, as indicated in Administrative Memorandum EQ-305 (2d Supplement), it is not possible to definitely extend this policy to employees who may voluntarily enter military service. Insofar as is practicable, however, the Bureau desires to extend to those who resign and enlist in the military service the same consideration when their military service is concluded.

Adams, John H., Jr., Asst. Pl. Quar. Insp. (PBW), Capt., O.R.C., 25th Inf., Ft. Huachuca, Ariz., called to active duty Dec. 26, 1940.

Allison, Glenn R., Agt., Pl. Dis. Cont. (BRC), First Lt., O.R.C., Camp Livingston, La., called to active duty May 12, 1941.

Babers, Frank H., Assoc. Biochemist, Cont. Inv., First Lt., 260th C.A. (AA), D. C. Natl. G., called to active duty Jan. 6, 1941.

Barnett, Frank L., Agt., Dom. Pl. Quar. (WFB), 155th Inf., Natl. G., Camp Blanding, Fla., called to active duty Nov. 25, 1940.

Biederman, Fred R., Agt., Dom. Pl. Quar. (GRASSHOPPER CONT.), entered military service Aug. 18, 1940.

Bofill, Miguel A., Collab., For. Pl. Quar., Master Sgt., Inf., Natl. G., called to active duty Oct. 16, 1940.

Bridges, Lester, Jr. Pl. Quar. Insp., Dom. Pl. Quar. (SPW), 2nd Lt., 24th Inf., U.S.A., Ft. Benning, Ga., called to active duty May 16, 1940.

Bunn, Ralph W., Asst. Ent., Dom. Pl. Quar. (WFB), Capt., Sanit. C. Resv., Camp Polk, La., called to active duty May 20, 1941.

Burgess, Emory D., Asst. Ent., Frt. Ins., First Lt., Sanit. C. Resv., Camp Claiborne, La., called to active duty Apr. 10, 1941.

Caperton, Edward F., Jr., Agt., Cotton Ins., on furlough, enlisted in military service.

Chang, Dai You, Asst. Clk., Frt. fly Inv., Sgt., Natl. G., called to active duty Oct. 16, 1940.

Dorst, Howard E., Asst. Ent., Truck Cr. Ins., Capt., Sanit. C., U.S.A., Camp Croft, S. C., called to active duty Apr. 7, 1941.

Douglass, W. J., Asst. Pl. Quar. Insp., For. Pl. Quar., Maj., O.R.C., called to active duty.

Eagan, Francis T., Jr. Pl. Quar. Insp., Dom. Pl. Quar. (WFB), O.R.C., U. S. Marine Corps, Parris Island, S. C., called to active duty Aug. 1, 1940.

Ernest, Paul S., Agt., Dom. Pl. Quar. (GRASSHOPPER CONT.), inducted, Select. Serv., Apr. 10, 1941.

Fate, Leston R., Asst. Pl. Path., Jap. Beetle Cont., (DED), O.R.C., Natl. G., called to active duty Jan. 6, 1941.

Furr, G. L., Jr. Pl. Quar. Insp., For. Pl. Quar., Capt., O.R.C., called to active duty.

- Graham, John G., Agt., Cotton Ins., on furlough, inducted, Selec. Serv.
- Greenberg, Louis, Asst. Clk., For. Pl. Quar., inducted, Select. Serv.,
March 13, 1941.
- Hill, Samuel O., Asst. Ent., Frt. Ins., First Lt., Sanit. C. Resv.,
U. S. A., Camp Livingston, La., called to active duty Apr. 25, 1941.
- Kagan, Abbott, Jr. Fld. Aide, Cotton Ins., on furlough, enlisted in mili-
tary service.
- Lamansky, K. W., Under Fld. Aide, Frt. Ins., inducted, Select. Serv.
- Landers, Horace J., Airplane Obsvr., Jap. Beetle Cont. (DED), inducted,
Selec. Serv., Feb. 3, 1941.
- Lieux, Davidson B., Field Aide, Truck C. Ins., inducted, Select. Serv.,
Ft. Benning, Ga., May 13, 1941.
- Mason, Horatio C., Assoc. Ent., Truck C. Ins., Capt., O.R.C., Infantry,
Ft. Benning, Ga., called to active duty Apr. 1, 1941.
- Matheny, Gallais E., Assoc. Path., Pl. Dis. Cont. (BE); Capt. U. S.
Marine Corps, Washington, D. C., called to active duty Oct. 15, 1940.
- McAlister, Harold J., Sr. Field Asst., Frt. Ins., First Lt., O.R.C.,
U. S. A., called to active duty May 5, 1941.
- Menzies, Perry P., Agt., Cotton Ins., on furlough, enlisted in military
service.
- Nerney, Norbert J., Agt., C. & For. Ins., entered military service Feb. 18,
1941.
- Noble, W. B., Assoc. Ent., C. & F. Ins., First Lt., U. S. A., Presidio,
Tex., San Francisco, Calif., called to active duty June 25, 1941.
- Parnell, C. L., Jr. Pl. Quar. Insp., For. Pl. Quar., First Lt., O.R.C.,
U. S. A., called to active duty.
- Post, Claude E., Jr. Pl. Quar. Insp., For. Pl. Quar., First Lt., O.R.C.,
U. S. A., called to active duty Nov. 7, 1940.
- Randolph, Tom B., Jr. Fld. Aide, Cotton Ins., on furlough, inducted,
Selec. Serv.
- Sigsbee, Harold J., Agt., Jap. Beetle Cont. (DED), inducted, Selec. Serv.,
Apr. 29, 1941.
- Smith, J. D., Jr. Pl. Quar. Insp., For. Pl. Quar., Capt., O.R.C., U. S. A.,
called to active duty.

Spencer, Herbert, Ent., Frt. Ins., Major, Sanit. C. Resv., Camp Shelby, Miss., called to active duty March 20, 1941.

Tolosa, Pedro, Collab., For. Pl. Quar., First Lt., Natl. G., called to active duty Oct. 16, 1940.

Wall, Harry M., Jr. Clk. Stenog., Frt. Ins., inducted, Selec. Serv., March 18, 1941.

FRUIT INSECT INVESTIGATIONS

Driving hibernating curculios out of trash.--In connection with hibernation studies of the plum curculio, such as a determination of the percentage of mortality during the winter, it becomes necessary to recover all live adults from hibernating materials. At the Fort Valley, Ga., laboratory a simple and inexpensive apparatus has been constructed which has proved to be very effective for recovering all live plum curculio adults from leaves, woods mold, pine needles, grasses, debris, and other hibernating materials, and which could no doubt be used for recovering other insects from materials in which they pass the winter. This apparatus consists of a sheet of tin 9 feet long and 2 feet wide, with a 1-inch flange along each long side. The tin is placed on four tile pipes 2 feet long and 6 inches in diameter. The hibernating material is placed in a thin layer on top of the tin and slow fires maintained underneath. When the material gradually warms up, all live beetles crawl out and are easily collected as the material is moved around with a stick.

Poisoning small darkling beetles.--A heavy infestation of Blapsstinus rufipes Casey on a fruit ranch in March and April offered an opportunity for a controlled poisoning experiment, which was carried out by Dwight F. Barnes and Charles K. Fisher, of the Fresno, Calif., laboratory. The infested field was covered with a heavy growth of filaree, chickweed, shepherd's purse, bur-clover, and other species. Four plots, each 10 feet square, were fenced in by vertical barriers of galvanized sheet iron. On April 7 three plots were treated with poison at the rate of 25 pounds per acre. Samples of the population were taken by means of a circular cutter which was forced through the plant cover and into the soil, thereby confining all the beetles in an area of 1 square foot. Rain delayed sampling, which was done on April 14. The results follow.

Plot No.	Treatment	Samples	Beetles	
			Total	Dead
		Number	Number	Percent
1-----	Control	2	13	0
2-----	Sodium fluosilicate,			
	middlings-----	5	46	83
3-----	Sodium arsenite, bran---	5	20	75
4-----	Sodium fluosilicate,			
	middlings, ground figs:	4	42	81

The sodium fluosilicate was used at the rate of $5\frac{1}{2}$ pounds, and the liquid sodium arsenite at the rate of $\frac{1}{2}$ gallon, per 100 pounds of carrier. Equal parts by weight of middlings and ground figs were used in the formula applied to plot 4. Water was added to moisten the mixtures. Applications were repeated in new locations, but the population in the area declined so rapidly that the results were indefinite.

Research on *Parlatoria chinensis* scale.--This introduced scale, found infesting certain plants in part of the city of St. Louis, Mo., in 1940, is not known to occur elsewhere in the United States, and the information available in the literature from other countries in which it is known to occur is very meager. The Bureau has undertaken, therefore, to cooperate with State agencies in an investigation of the host-plant relationships of the scale, its development, the factors that promote natural spread, its actual status as a pest, and measures for control. To provide funds for this work at the St. Joseph, Mo., Laboratory has been suspended and Howard Baker, formerly in charge of the laboratory, has been assigned to this investigation, in cooperation with the Missouri Department of Agriculture and the Department of Entomology of the University of Missouri. The post office address for the work on *P. chinensis* (Marl.) is 5201 Oakland Avenue, St. Louis, Mo., Howard Baker, in charge.

Control of Hall's scale.--Hall's scale (*Lepidosaphes halli* Green) made its reappearance in 1940 in an almond orchard at Chico, Calif. It is thought that the original infestation in the Plant introduction Gardens at Chico was cleaned up and that later the infestation in the nearby almond ranch built up to the point of spread and reinfested the gardens. The Bureau has received an allotment from appropriations provided under the general authorization for the control of incipient and emergency outbreaks of insect pests and plant diseases to attempt the eradication of the present infestation. This effort on the part of the Bureau is in cooperation with the California State Department of Agriculture, the Bureau of Plant Industry of the U. S. Department of Agriculture, and the owners of infested properties. The work is under the joint supervision of B. L. Boyden, representing the Bureau, and David B. Mackie, representing the California State Department of Agriculture, Sacramento, Calif. Mr. Boyden remains in charge of the Bureau laboratory at Whittier, Calif. The headquarters for the control work on Hall's scale is Chico, Calif., the address being 336 Broadway, E. H. Fosen, in charge.

MEXICAN FRUITFLY CONTROL

Conditions in lower Rio Grande Valley.--The citrus-fruit-harvesting season in the area regulated under Quarantine 64 closed on May 31. On that date very little fruit remained to be harvested. On a few properties where excessive rains had caused the groves to be under water for several weeks there remained a small amount of grapefruit, but this fruit was disposed of without undue difficulty. Larvae of Anastrepha ludens Loew were found on 23 properties in May. At the close of the season larval infestations had been found on 552 properties. During the same period last year 578 infestations were found. The fly population throughout this season has been relatively low. Only 943 flies had been trapped throughout the month of May, whereas on May 31, 1940, 5,031 flies had been taken.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Ecology of *Hypera brunneipennis* on sourclover and alfalfa.--W. C. McDuffie, Yuma, Ariz., reports that detailed ecological studies of *H. brunneipennis* (Boh.) in Yuma Valley were conducted last winter and spring in alfalfa and volunteer sourclover (*Melilotus indica*) in order to determine the comparative suitability of these hosts. Initial samplings early in January showed adult oviposition was well under way, but that activity was so recent that the accumulation of eggs was small. Eggs were considerably more numerous in sourclover than in alfalfa, owing to a much greater adult concentration and to shorter growth. Under these conditions hatching in sourclover was also more advanced, but larvae were still scarce and all in the first stage. Throughout January oviposition steadily increased, and the peak of egg abundance in fields occurred late in January and early in February. Oviposition gradually declined to insignificance by the early part of April. Larvae steadily increased in abundance during January, but the peak occurred late in February, indicating the incubation period in the field during these months to be approximately 1 month. This was substantiated by incubation studies in the insectary, where temperatures closely approximated those in the field. Development was relatively slow throughout January, very few larvae attaining the third and fourth stages. But with gradually increasing temperatures during February, development became accelerated and by the end of the month, third- and fourth-stage larvae were as abundant as the smaller stages and a few had matured and spun cocoons. The duration of the larval stage during this period was approximately 5 weeks. The proportion of the larval population that attained the third and fourth stages, as well as the cocoon stage, was much greater on sourclover than on alfalfa, where, for unknown reasons, survival was very poor for the second season in succession. The peak of cocoon abundance in sourclover occurred late in March, approximately 1 month after the peak larval abundance. This indicated the duration of the larval stage to be about 1 month during the latter part of February and March. New adults began emerging early in March, but the period of greatest emergence was from late in March to late in April. The peak of new adult population, viz.,

90 per square foot, in sourclover, occurred during mid-April. This, however, was not the maximum population produced, as, beginning early in April, adults were constantly leaving fields in search of aestivating places and sufficient cocoons and larvae were still present to produce a nearly constant number of adults. Taking these factors and known mortality of immature stages into account, it is believed that the total adult production per square foot in sourclover this season was at least 80 percent of the potential that had been indicated by a peak larval population of 200 per square foot. This population arose from a parent adult population of only about 1 per square foot. On the other hand, larval mortality in alfalfa was so nearly complete that the production of adults no more than replaced the parent population of about 0.25 per square foot. The fact that this has occurred in both 1940 and 1941, indicates sourclover to be a far more favorable host than alfalfa.

Proportions of June beetle species collected in Wisconsin.--T. R. Chamberlin and Lee Seaton report that night collection of beetles from host plants was hindered during May by frequent heavy thundershowers and strong winds, many of which occurred just before or just after collections were begun. Some of the data recorded therefore were obtained in shorter periods than the customary 2 to 3 hours. The collections were interesting in showing the differences in the predominance of certain species in various areas. The following table shows the percentage of total beetles represented by the commoner species in the different areas.

Locality	Date (May)	Percentage of beetles						Total
		P. rugosa	P. hirticula	P. fusca	P. ilicis	P. prunina	P. nitida	
Dane-----	5	44.0	27.7	22.8	--	--	--	94.5
Lamont---	6	0	20.4	71.2	--	--	--	91.6
Do-----	20	0	78.1	8.2	--	--	--	86.3
Do-----	27	0	83.3	11.5	--	--	--	94.8
Leeds-----	13	6.9	2.1	88.2	--	--	2.1	98.3
Poybette--	19	42.7	5.9	38.4	--	8.1	--	95.2
Linden----	21	.4	81.6	11.1	2.7	--	--	95.8
Do-----	27	.9	86.1	8.1	3.3	--	--	98.4

JAPANESE BEETLE CONTROL

Airplane distribution of milky-disease spores abandoned.--In cooperation with the Division of Fruit Insect Investigations and the Maryland Department of Horticulture, preliminary discussions had been held concerning the feasibility of dropping in pellet form from the Division's auto-giro the chalk-talc mixture containing the milky disease of Japanese beetle grubs. Legal difficulties were encountered that forced the abandonment of this procedure. As reported in the Baltimore Evening Sun, "the Attorney General has held that the State entomologist cannot use an airplane to attack the beetles by scattering dust against them. The official ruling was made by Attorney General William C. Walsh and Robert E. Clapp, Jr., one of his aides, in answer to an inquiry from Ernest N. Cory, State entomologist. Mr. Cory revealed that the United States Department of

Agriculture had made available an autogiro for use in spreading certain dusts that would tend to destroy the ubiquitous Japanese beetle grubs. Whether property owners could raise any objection, and whether permission had to be obtained from each person on whose property dust might settle from the air, were among the questions posed by Mr. Cory. Despite the fact that the State may require destruction of diseased plants and trees to prevent spread of plant diseases and even destroy them by their own agencies if owners refuse, the legal advisers of Maryland still held that use of an airplane to scatter dust was improper. Even that power, the ruling pointed out, would hardly authorize the indiscriminate scattering of some preventative in such places where it could spread to where no such insects are present. Trespass complaints might result, the legal opinion said. Moreover, it declared, another section of Maryland law 'Prohibits any aeronaut or passenger while in flight from dropping any object except loose water or ballast.'

Preparations for refrigerator-car fumigation.--At a meeting of several staff members of the Division with Pennsylvania Railroad Company officials at Wilmington, Del., on May 5, procedures to be followed in handling Japanese beetle certification of fruits and vegetables moving from the heavily infested area this summer were discussed. The only changes this year are the establishment of a new fumigation point at Pitcairn, near Pittsburgh, Pa., and the fumigation of empties at Clayton, Del. Methyl bromide will be used from 1-pound cans at every point except Edge Moor yards, near Wilmington, Del. At this point the company has a supply of 38 tanks of the fumigant still to be used. When the tank supply is exhausted cans will be used there too. Preparations were made by the treating section in May for starting fumigation activities. Gas masks to be assigned to the various fumigation points were checked and assembled ready for distribution. The Edge Moor yards were visited on May 22 and their fumigation equipment checked. A locking device has been developed by a commercial concern to prevent the clamp on the can applicator from springing back and releasing the methyl bromide on the operator. This was brought to the attention of the railroad officials as a possible improvement in their equipment. The manufacture of ventilator screens by the company had been started at the time of the visit. A meeting was also held during the month with banana company officials in the New York City area to discuss the certification procedure for refrigerator cars brought over from New Jersey.

Bermuda continues beetle-control efforts.--Advices have been received by the Bureau from J. M. Waterston, plant pathologist of the Bermuda Department of Agriculture, to the effect that his department intends to continue its efforts to keep Bermuda free from the Japanese beetle as long as possible. The same bylaws as were in effect in 1940 will govern the importation of plant material into the Colony during the period June 1 to September 30. All plants, fresh unfrozen vegetables, and commercial shipments of cut flowers imported from the United States during this period must meet the requirements of the Federal and State Japanese beetle quarantine regulations and must be accompanied by certificates to this effect issued by an authorized official of the U. S. Department of Agriculture. Importations are prohibited of sweetpotatoes, raw carrots, Indian corn or maize, and banana fruit unless unaccompanied by wrapping,

cover, or packing of any kind. Masters of steamships and aircraft have been requested by the Bermuda officials to give advance notification by radio if live beetles are discovered on board en route to Bermuda.

Japanese beetle activities in Canada.--From the April issue of the Canadian Division of Entomology News Letter it is learned that "On April 23-24, Mr. McLaine visited the Toronto office, and Niagara Falls, where spraying operations for the control of the Japanese beetle were under way. This work started on April 23 and was completed on April 29. During this time over 5,000 pounds of arsenate of lead were applied to 10½ acres in Queen Victoria Park and adjacent to the Falls. The United States Bureau of Entomology and Plant Quarantine kindly detailed one of their experienced field men, Mr. Cassel, to supervise the control work, and the Niagara Falls Park Commission, through the courtesy of the general manager, provided nine men and their power sprayer. The Ontario Department of Agriculture also shared the expense of the control work. * * * F. J. Hudson (of the London, Ontario, station) * * * on April 24 went to Niagara Falls and made photographic slides and colour movies of the Japanese beetle control work that was being done there."

Substitute for Holland bulbs.--Large quantities of small potted azalea rooted cuttings were certified during the month in northern New Jersey. One nursery shipped 180,000 of this size. Shortages of some types of azaleas are reported, as this plant in many instances appears to have taken the place of Holland bulbs that cannot be imported because of the war. The large types of azaleas are being treated for Japanese beetle and shipped extensively. A number of establishments in the North Jersey area are complying with the requirements for maintaining certified greenhouses this summer so that a greater number of azaleas can be produced for next fall and spring. There are approximately 78 certified greenhouses to scout in this section. A classified nursery in southern New Jersey is experimenting with Florida-grown azaleas.

North Carolina beetle-control activities.--During the month the Division's representative at Asheville, N. C., working in cooperation with the Division of Fruit Insect Investigations and the North Carolina Department of Agriculture, re-treated 70 acres of farm land with the chalk-talc mixture containing spores of the milky disease of Japanese beetle grubs. The dust was spotted in the field in rows 5 feet apart and at 5-foot intervals in the row. When this land was first treated, the spore dust was distributed at 10-foot by 10-foot intervals. The re-treated plot is near the railroad stockyard. After re-treating was completed, several grub surveys were made, a few prepupae and many larvae being collected. Twenty traps were set on the infested estate and on the nearby railroad property to determine the first adult emergence. At the Asheville post office, 900 traps were assembled. Seven hundred of these were in readiness for placement in the fields and residential sections of Asheville and vicinity.

Japanese beetle fumigation activities.--A nursery at Narberth, Pa., requested several varieties of plants tested with methyl bromide. These were fumigated at the White Horse, N. J., district office and returned to Narberth for observation. The main varieties in which this nurseryman is

interested are vinca, pachysandra, and ivy. All of these were in the soft-growing stage and none showed any ill effects from the treatment. One Long Island establishment treated a plot of 4,700 square feet with carbon disulfide and constructed a metal screened frame over it. This plot will be used for growing certified azaleas. The estimated cost of this screened frame is \$1,000. About 15,000 certified azaleas in 3-inch pots were set in the frame. The grower figures that it will cost approximately 8 cents per pot for certification; however, he claims that certified plants bring about 25 cents more each in the West than those which can be obtained locally.

New York City inspectors busy with clearance sales.--Most of the inspection calls in New York City during the latter half of the month were necessary because several large department stores were running clearance sales of plant material. Orders received from all parts of the country resulted in requests for daily inspection at one of the larger stores. Japanese beetle inspection work continued heavy during the first part of the month but tapered off considerably in the latter half, owing to the regular seasonal lull, together with the continued dry spell which made the digging of balled nursery stock impractical. One nursery on Long Island was forced to cancel a carload shipment because it was impossible to ball the stock owing to dry soil.

Early beetle emergence.--Earliest official reports of adult Japanese beetle emergence were received from the Norfolk, Va., Philadelphia, Pa., and Salisbury, Md., areas late in the month. The first beetle found in the Norfolk area this year was trapped on May 27 in traps set on the Army Base Golf Course. These traps, 12 in number, are being tended by men from the Norfolk office for I. M. Hawley, of the Japanese beetle research staff. On May 28, 5 beetles were found on sorghum on a farm near Hatboro, Pa. The following day, 2 beetles were found in Cape Charles, Va. A large nursery in the Norfolk area has set 12 privately owned traps in the section in which beetles were found by scouts of this Division last summer.

Japanese beetle trapping.--In addition to the number of traps placed in cities in the various States in April, traps were placed in 46 cities in 20 States in May. These included 2 cities in Arizona, 2 in California, 9 in Florida, 3 in Georgia, 4 in Idaho, 1 in Maine, 1 in Michigan, 2 in Minnesota, 1 in Mississippi, 2 in Missouri, 1 in New Hampshire, 2 in North Carolina, 2 in Oregon, 2 in South Carolina, 3 in Texas, 3 in Washington, 1 in West Virginia, 2 in Wisconsin, and 1 in Wyoming. Of the foregoing all traps placed in Florida were in the regular trapping schedule, as were 2 in Georgia, 1 in Missouri, 1 in North Carolina, and 2 in South Carolina. The remainder comprised traps distributed by Bureau field stations.

Lead arsenate treatment introduced on Eastern Shore of Maryland.--A large nursery at Pittsville, Md., has indicated their intention to treat approximately 4,500 nursery plants with arsenate of lead. This will be the first attempt in the Salisbury, Md., area to treat any large number of plants with this material. Owing to a decrease in the nursery and greenhouse inspection work on the Eastern Shore, 5 temporary inspectors were terminated in May. Practically all nurserymen in this area reported an increase in business over that of previous years. One nursery near Salisbury reported that it did one-third more business this season than ever before.

Gypsy moth certification.--Shipments in which gypsy moth infestations were found during the month were limited to 3 lots of nursery stock, in each of which solitary egg clusters were found, and 1 carload of logs and 4 carloads of lumber, from which 16 egg clusters were taken. Fifteen temporary inspectors were employed on nursery inspection during the month--2 stationed at a forest nursery in western Maine, 3 at nurseries in Massachusetts, 1 at nurseries in Newport, R. I., and 9 at Connecticut establishments. Two of the men in Connecticut were employed on Japanese beetle fumigation and inspection of soil-free plants. All others were assigned to gypsy moth inspection.

First-record Dutch elm disease infections.--Four first-record confirmations of Dutch elm disease were reported in May. One was from the town of Ghent, Columbia County, N. Y., near the southern boundary of the town and approximately 9 miles from any other known confirmed trees. A first-record case was found in Kiefer (Election District No. 33), Allegany County, Md. This was a devitalized tree which evidence indicated had been washed out during the high water of 1936 and was dying because of exposed roots. The other two first-record finds were in Luzerne County (Wilkes-Barre, Pa., area)--one in Pittston Township and one in Plains Township.

Elms in magnesia-waste reservoir present removal problem.--Removal of four elm trees from a property owned by a plant manufacturing magnesia and related products presented unusual difficulty. The residue from the plant is pumped into a large reservoir covering about 100 acres. Numerous trees have been killed by this accumulation of waste material, which in some places reaches a depth of 30 feet. The material is liquid when fresh but after exposure to the sun attains the consistency of soft putty and is adhesive. The trees were located about 100 feet from the shore. After several unsuccessful attempts at wading, a series of corduroy roads were built. This operation required considerable time and 2 entire days were spent in removal of the four trees.

Heavy bark beetle infestation.--An unusually heavy infestation of *Scolytus multistriatus* Marsh. was reported during the week ended May 17 in an elm removed from the Perkiomen Creek section of Salford Township, Montgomery County, Pa. Examination disclosed that this tree averaged 45 galleries per square foot of wood surface. The tree was infested from the base to the small upper branches. Although no emergence was noted, the insects were all in an advanced larval or pupal stage. A sample was sent to the laboratory for culturing.

Agencies cooperate in disposal of cut elm wood.--The Connecticut Light and Power Company has joined the Connecticut State Highway Department's Division of Engineering and Construction and Division of Roadside Development in agreeing to cooperate with the Dutch elm disease eradication project to the extent of having all elm wood cut in their clearing of rights-of-way disposed of by burning.

Dutch elm disease scouting hazards.--An elm-mapping crew working in Sullivan County, N. Y., had an eventful day when they killed two rattlesnakes and encountered five bears all on the same day. Almost every day some field crew in New York encountered rattlesnakes or copperheads. No cases of snake bite reported to date.

Elm leaf beetle infestation heavy in Orange County, N. Y.--Elm leaf beetle damage in Orange County was expected to be heavy this year. Numerous adults have been observed at work and damage to foliage is already apparent. Many trees through the center of the county have been observed to be loaded with egg clusters, and other sections are probably as bad off. Defoliation will soon start in earnest, as many of the eggs have already hatched, with others about ready to hatch. The expected defoliation will complicate the early Dutch elm disease and bark beetle infestation symptoms and will also result in much more dead wood later.

FOREST INSECT INVESTIGATIONS

Promising European tryphonine parasite of European spruce sawfly recovered.--P. B. Dowden, New Haven, Conn., reports that 2 males and 1 female Exenterus claripennis Thomson emerged in May from sawfly cocoons collected at Jacksonville, Vt., last fall and hibernated at this laboratory. This parasite was released in this area last summer, and this recovery gives considerable promise that the parasite has established itself. The sawfly infestation in this area is light, and it required about an hour for 2 men to collect 120 healthy cocoons. W. F. Sellers reported in the News Letter of July 1940 on the introduction of 2 promising European tryphonine parasites from Canada. He states that more recent information indicates that in Europe E. claripennis is a parasite of the European spruce sawfly (Gilpinia polytona Htg.) and Exenterus marginatorius F. is a parasite of the European pine sawfly (Neodiprion sertifer (Geoff.)).

Recently established tachinid parasite of gypsy moth available for distribution.--W. F. Sellers, New Haven, states that a small liberation consisting of 100 males and 99 mated females of Parasetigena silvestris R.-D., an introduced European dipterous parasite of the gypsy moth, was made on May 26 in the vicinity of Lake Mashepaug, Union, Conn. It was reported in the News Letter for July 1940 that this parasite had been recovered in encouraging numbers at several places in Massachusetts. From 360 puparia hibernated at this laboratory, 143 males emerged between May 6 and 13, and 123 females emerged between May 8 and 20. This is the first time material has been available from New England sources for distribution in areas where the parasite has not been previously liberated.

Termite protection in National Defense program.--C. W. Collins and R. J. Kowal, of the Morristown, N. J., laboratory, are covering the States of New Jersey, Pennsylvania, Maryland, and Delaware in an advisory capacity regarding termite protection in National Defense Building Projects which the Division recently initiated throughout the country. During the last 4 months they have engaged in consultations with architects, construction engineers, and army officials and have made inspections in connection with about 35 defense building projects financed by the U.S.H.A., P.B.A., and F.W.A., of the Federal Works Agency and the United States Army. These have consisted of housing projects composed of from 20 to 530 dwelling units, and army posts of less than 10 to over 800 new buildings. Old buildings have also been given attention in the case of army posts. Those in charge of projects have welcomed the assistance offered by the laboratory. Consultations with architects during the planning stage of projects have been sought particularly, because of the ease of providing for termite protection at that time. Nevertheless, in numerous instances where it was

impossible to advise before construction began, important measures were recommended which, if properly applied, would reduce the possibility of termite infestation. A large number of additional projects have been authorized and approved for construction in the States mentioned above.

A stage of Dutch elm disease found in brood chambers of ambrosia beetle.--W. D. Buchanan, of the Morristown, N. J., laboratory, has found corenia of Ceratostomella ulmi in a number of brood chambers of Xylosandrus gernalus Blandf. The chambers were inhabited by hibernating adults in sections of elm stored in metal cylinders at the Morristown laboratory from September 1940 until they were examined in May. The sections came from small elm trees which, after being infected artificially with C. ulmi, were injected with dichlorophenol in 50-percent alcohol and then exposed to beetle attack. Mr. Buchanan has previously shown that the Dutch elm disease may develop in trees that are attacked by beetles contaminated with this fungus.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Freezing nights cause gypsy moth larval mortality.--On several nights in May the temperatures dropped well below freezing, and considerable injury was caused to foliage. The freezing nights also resulted in a high mortality of young gypsy moth larvae, which had emerged unusually early because of the record-breaking mild weather during the entire month of April. Many egg clusters were found that had partially hatched when a sudden drop in temperature stopped the further development of the eggs. This condition was quite marked throughout the barrier zone, and it is expected that an appreciable reduction in infestation will follow in many sections. The prolonged dry spell has now lasted about 2 months, and the tinder-dry condition of the forest floor has provided an extremely serious fire hazard, although the vegetation has developed much faster than usual. The dearth of moisture has caused a rapid drop in the volume of water in many streams where it is proposed to set sprayers, and it is doubtful whether there will be a sufficient flow to supply the needs of the gypsy moth spraying program throughout the month of June, unless considerable precipitation should occur within a short time.

Three small gypsy moth infestations in Vermont apparently exterminated.--Results of a recently completed close examination of all growth surrounding a single-egg-cluster infestation in Lowell Township, Orleans County, Vt., were negative. This colony was located last December after a heavy fall of snow, which prevented a satisfactory examination of low growth, deadwood, and other debris at that time.

New gypsy moth crews start work in Vermont.--Early in May a sufficient number of W. P. A. employees was assigned to gypsy moth work in Vermont to organize six crews, but some difficulty was encountered in obtaining men whose experience and other qualifications were suitable for positions as crew foreman, as many of the men who had previously been engaged in gypsy moth work had obtained employment in private industry. One of the new crews was immediately detailed to build a temporary four-strand barbwire fence around a woodland infestation in Brandon, Rutland County, where spraying work is planned this season. Scouting was continued in

Fair Haven, also in Rutland County, and lines of hose ranging up to 6,500 or more feet in length were laid in southern Vermont areas where spraying work will be done.

Preparations for spraying in Massachusetts.--There was a slight increase, early in May, in the Massachusetts gypsy moth force, as the number of new W. P. A. workers assigned to the project more than offset the number of terminations. Several small crews were engaged in assembling material for temporary fences to be erected around areas in the barrier zone where spraying is planned. Quantities of fence posts were cut from worthless trees, with the consent of the property owners, and were set in position, preparatory to stringing the 4 strands of barbwire which constitute the fences. Barways and gates were constructed wherever necessary in order to permit access to sprayed woodlots without damage to the fences. Several wood roads were repaired sufficiently to permit driving high-pressure spraying machines to set-ups near streams or ponds; and hose lines, some of which are 5,000 feet or more in length, were laid from the proposed sprayer sites to the most distant points to be sprayed. Most of the infestations where spraying will be carried on are situated in rugged and mountainous country, which makes necessary the use of powerful spraying equipment. By the middle of the month all essential spraying equipment and supplies, except the sprayers, had been delivered to central points in the field for later redistribution to individual sprayer set-ups. Some of the W. P. A. men selected to operate spray units were given preliminary instructions in the work later in the month, using machines that had already been distributed in the field. Prospective nozzlemen were also instructed in the proper methods of applying the spray solution to different types of growth. A larger number of sprayers will be operated in Massachusetts this year than in either Vermont or Connecticut. Owing to the loss of many W. P. A. mechanics from the Greenfield repair shop to private industry, only a minimum amount of field service to the sprayers by traveling mechanics will be possible this year. The traveling mechanics render important service by rectifying minor mechanical difficulties, giving helpful instructions to sprayer operators, and preventing serious interruptions in the work due to mechanical failures.

Gypsy moth larvae emerge earlier than usual.--Most of the gypsy moth egg clusters found during the week ended May 3 by Massachusetts scouting crews had hatched; although, in most instances, the larvae were still massed on the egg clusters and were easily killed by creosote. The larvae were slightly more advanced at several small infestations located on scattered trees in the Connecticut section of the barrier zone. Many of the larvae had already crawled away from the egg clusters in search of food, and the proximity of stone walls or rock heaps at a few locations increased the difficulty of promptly exterminating the insects. There appeared to be no particular problem connected with the extermination of most of the infestations.

Spraying begun in Connecticut; additional man-power supplied.--Connecticut W. P. A. officials made a sincere effort, early in May, to obtain more workers for assignment to the gypsy moth project, in order that an ample number of men would be available to assist in spraying and other seasonal work during the next 6 or 7 weeks. Later in the month two local projects were temporarily suspended and the men were transferred to gypsy

moth work to operate the spraying units during the last week in May and the entire month of June. This work is of primary importance if the degree of infestation in the Connecticut section of the barrier zone is to be reduced to a point where the extermination of the insect may be readily accomplished. Large quantities of spraying supplies and equipment were distributed to several central points in Connecticut early in the month. Redistribution will be made as needed throughout the spraying season by small trucks which service the sprayers. The early distribution of this material was made necessary by the rapid development of the foliage, which is further advanced than it has been for several years at this season. It is important that actual spraying operations be delayed until the oak foliage, which is a preferred food of gypsy moth larvae, is from one-half to two-thirds grown so that it will retain a sufficient amount of the arsenical solution for effective killing. The foliage had developed sufficiently so that actual spraying work could be started on May 16 in Morris Township, in the southern part of Litchfield County, and it was proposed to begin spraying in other sections of Connecticut a few days thereafter.

Brush-disposal machine suspends work during spraying season.--Approximately one-half of the piled brush and other waste wood in the State forest in Cornwall, Litchfield County, Conn., had been reduced to sawdust by the brush-disposal machine by the middle of May. The operation of this machine will be temporarily discontinued until the gypsy moth spraying season has passed.

Spraying residential areas in Pennsylvania.--More than 3,600 permits were obtained for gypsy moth spraying work in the Pennsylvania area this season, but the completion of all the work planned is problematical because of the acute labor situation in that section. Although the gypsy moth project was approved and ample funds were available for the work, the W. P. A. authorities were unable to fill the requisitions for the 800-odd workers needed to conduct the spraying as planned. A lesser number of workers was supplied later in the month, and the men were immediately detailed to the thorough treatment of the most important infestations. Men were selected from the group of new employees to drive trucks and operate spray units, and received instructions concerning their assignments. Early in the month hose, lead arsenate, fish oil, and other supplies were distributed to central points in the field, and hose lines were laid from the sprayer set-ups to the areas to be sprayed. A sufficient number of N. Y. A. enrollees was available to man a small number of sprayers and washers in the residential areas of Luzerne and Lackawanna Counties, and work was started in those sections on May 19. In residential spraying it is essential that each sprayer be followed closely by another machine loaded with clear water, so that spray residue may be thoroughly washed from buildings, walls, garden furniture, and other objects before the solution has had an opportunity to dry. The residential area represents a small proportion of the total area in Pennsylvania where spraying was planned for this season, and the spraying of that section will be completed by the time the woodland trees have reached full foliage. The sprayers will then be transferred to points where extensive woodland spraying will be conducted during the remainder of the season.

Quarantine inspection work reduced by warm weather.--The volume of gypsy moth quarantine inspection work in the Pennsylvania area was considerably reduced by the approach of warm weather. Anthracite-coal mining was

drastically curtailed, resulting in a sharp decline in the demand for mine timbers of all sorts. Many of the timbers used in the mines are cut in the quarantined area, and they must be examined by inspectors before transportation is permitted.

C. C. C. gypsy moth work materially less than estimate for May.--

A total of 599 6-hour man-days was used by the C. C. C. on gypsy moth work east of the barrier zone under the supervision of this Bureau during the 5-week period reported for May. The weekly totals gradually rose from a low of 46 man-days used during the week ended May 3 to a high of 241 man-days for the week ended May 31. This was considerably less than the 300 man-days per week that had been planned. The estimated figures were based on proposed 15-man crews, while the crews actually averaged only 7 men during the first half of the month, owing to low enrollments at the camp. Later in the month it became imperative that the crews be increased to 15 men in order that they could handle the spraying equipment. Other factors contributing to the loss of proposed working time were the closing of the woods in Connecticut for a considerable period, the necessity of confining some of the crews to the vicinity of the camps where they would be immediately available if needed for fire fighting, an appreciable amount of time spent in actual fire fighting, the loss of gypsy moth work by one crew for a week while the trained foreman was on annual leave, and a small amount of time lost because of stormy weather. The work done during the month was accomplished by one crew in Massachusetts and three crews in Connecticut--one crew from each of three camps. No C. C. C. men are available for gypsy moth work in Vermont at present.

C. C. C. gypsy moth work during May.--

During the first part of May C. C. C. gypsy moth work east of the barrier-zone consisted principally of thinning, scouting, and creosoting, with the addition of some burlapping work. It will be necessary to temporarily suspend the last type of work during the period when actual spraying is in progress because of the lack of man power available. Sprayers and equipment were transported from the Greenfield Storehouse to the camps, hose lines were laid, roads were repaired, dams were built, and other preparations were made for the start of the spraying season. During the last week in May the entire force available was used on spraying work, which was started on May 22 in Connecticut and on May 29 in Massachusetts. While it had been hoped that the sprayers could be operated on a double-shift basis at some of the camps, the low enrollment at the camps compelled a change to single shifts by 15-man crews. Spraying is being done at the most dangerous infestations, but a shortage of water may force a shift to infestations of lesser intensity but with a more plentiful water supply later in the season. If this becomes necessary there will be time lost to actual spraying work while the sprayers are moved and new lines of hose laid. Up to May 31, 10 acres had been sprayed with 368 pounds of lead arsenate and 11 gallons of fish oil in Massachusetts, and 99 acres had been sprayed in Connecticut with 3,602 pounds of lead arsenate and 112 gallons of fish oil.

Several agencies cooperate in C. C. C. gypsy moth spraying program.--C. C. C. spraying operations at serious gypsy moth infestations east of the barrier zone were made possible by the cooperation of Federal and State agencies. The Bureau of Entomology and Plant Quarantine loaned one sprayer and 4,000 feet of hose for use in Massachusetts, and 2 sprayers and

9,000 feet of hose for the work in Connecticut. The Bureau also supplied a mechanic who will visit the machines in the field and make minor repairs and adjustments. The Connecticut State Gypsy Moth Organization loaned one sprayer and 4,000 feet of hose for use in that State, together with experienced men to operate the sprayer. The C. C. C. is furnishing labor, foreman supervision, lead arsenate, and fish oil, and also the gasoline and oil necessary to run the sprayers. Ten tons of lead arsenate and 12 barrels of fish oil are available in Connecticut, and $4\frac{1}{2}$ tons of lead arsenate and 6 barrels of fish oil in Massachusetts. This constitutes a sufficient supply of materials to continue the spraying well into July if the development of the caterpillars warrants the extension of the work after the end of June.

C. C. C. work within the barrier zone.--Two C. C. C. gypsy moth foremen were transferred from the camp at Chester, Mass., to two camps within the barrier zone in Massachusetts, when the Chester camp was moved to Fort Edwards. Plans of work calling for 20-man crews were approved, the time to be used chiefly on scouting work under the supervision of this Bureau, with some thinning and burlapping work also included. The low enrollment at the camps has made it impossible to obtain the 20-man crews, although it is hoped that smaller permanent crews can soon be furnished, and no men were available during most of May, owing to fire-fighting activities. The men were employed in scouting on days when they could be used on gypsy moth work. Late in May one of the two foremen was transferred to the camp in Florida, Mass., to assist in the spraying work from that camp for the duration of the season.

Results of previous defoliations observed.--A trip was made by S. S. Crossman to four of the State gypsy moth districts in the eastern part of Massachusetts to observe the results of repeated severe gypsy moth defoliations. Each district was visited in company with the State gypsy moth superintendent of the area. In one area in the North Shore section, where severe defoliation has not occurred until a short time ago, trees are now dying after 1 year of heavy feeding and 1 year of extensive defoliation. Similar conditions were also observed in another area in the same section where recent severe defoliation followed a period of heavy defoliation 10 years ago. A visit was also made to another location in eastern Massachusetts consisting chiefly of white oaks and white pines, where recent defoliation has killed or weakened many of the oaks and some of the pines. The owner of this property is now engaged in removing all oak trees in an attempt to salvage something from the oaks and to try to save the remainder of the pines. In another section, white pines which had been growing in a mixture of hardwoods favorable to gypsy moth development were dead and fallen. These trees have been down for several years, and the owner is convinced that they were killed by gypsy moth defoliation. Each of the districts visited had been defoliated from once to several times during the last 15 or 20 years. Many trees were seen which died several years ago, and numerous others were weakened and deformed and are gradually dying. Most of the dead trees were oaks, although dead white pines, spruces, and hemlocks were also observed. The dying of the oaks was more apparent where they were growing in poor soil, especially on ridges, where the ground dried out as the trees were defoliated. In some areas the hardwoods had nearly disappeared, and much pitch pine was coming in. Apparently this condition will eventually prevail over large areas in the Cape Cod district.

PLANT DISEASE CONTROL

A rapid method for retracing survey lines in sugar pine region.---Field work in blister rust control makes wide use of the rectangular system of public-land surveys, to which the boundaries of control units and subdivisions of the units are related. For instance, reconnaissance and checking work are based on the sectional system of the land survey. Unfortunately the original surveys in many places are obscurely marked on the ground, and the size and shape of the sections are extremely irregular, owing in large part to having been laid out many years ago under the contract system with crude instruments and under poor conditions. Many lines and corners, too, have been obliterated by time. The need, therefore, has arisen for a rapid and reasonably reliable method of retracing section lines in order to reestablish points upon the ground. Such a method of running boundary lines and marking them for future reference has been evolved through considerable field experience, and has proved well adapted to the need. It is based upon chaining, and involves a technique which has been demonstrated to have a probable error of about 10 feet per mile. The method has been standardized and is now being written into manual form for convenient reference in the field. The manual also will contain relevant information about the public-land survey, how to search for obliterated corners, the use of the topographic Abney hand level and chain, and many useful facts and tables. It is hoped that the new method will result in more accurate maps and in greater general efficiency in administering the blister rust control program. Any Bureau office interested in work of this nature and desiring to have a copy of the manual may obtain one by writing to the Bureau of Entomology and Plant Quarantine, 610 Syndicate Building, Oakland, Calif.

"Fruiting" cankers found in sugar pine region.---On May 17 D. R. Miller, who is scouting for blister rust in Siskiyou County, Calif., reported the examination of 357 cankers in 1 area, and of this number 96 were producing aecia. There were more fruiting cankers in this area than in all the others examined to date. Three new spots of rust have been located, one in sec. 35, T. 47 N, R. 11 W, (Mt. Diablo B & M), consisting of a single canker, another in the NW $\frac{1}{2}$ of sec. 24, T 17 N, R 7 E, (Humboldt B & M), and the third, with at least 19 infected trees and 17 of 56 cankers producing aecia, was located in the SW $\frac{1}{2}$ of sec. 12, T 17 N, R 7 E. There seem to have been two waves of infection on some of these areas, one in 1935 or 1936 and another in either 1937 or 1938. Mr. Miller stated that at the center they found all fruiting cankers were on 1934 or 1935 wood, while there were a number of younger cankers on 1937 and 1938 wood.

Vermont leader advises against planting white pine on heavy Ribes sites.---An owner of a forest tract in Greensboro, Lamoille County, Vt., recently asked S. D. Conner, State leader of blister rust control in Vermont, to examine his pine lot, as a large number of dying trees had been observed. It was found that the tract consisted of a 20-acre plantation, planted to red and white pine intermixed. The plantation had not previously come to the attention of the blister rust control organization and no protective work had been carried out. About 50 percent of the 15-year-

old white pines were found infected with blister rust and many of the trees had already died. Since the plantation was surrounded on three sides by swamp areas on which Ribes grew abundantly it was decided that the cost of protection would be far greater than the value of the pine involved and the owner was advised against further planting on the site. The owner's wife had personally destroyed a considerable number of Ribes, having made her own identification of the disease from Miscellaneous Publication 22, but such a small percentage of the total number of Ribes on the area had been destroyed that the work had been ineffective in control. In general, the Division recommends against planting white pine on sites where Ribes are so numerous that control operations would be expensive and, under arrangements with the Forest Service and Soil Conservation Service, members of the blister rust control organization are usually given the opportunity of checking in advance on such proposed white pine planting sites as are under Federal control, in order to avoid either the loss of Federally planted pine or an excessive cost for control measures.

Barberry bushes destroyed in Indiana, January 1 to April 30.--The following table summarizes the results of barberry-control operations in Indiana since January 1, in which 591 bushes were destroyed on 65 properties.

County	: Area covered	: Sq. mi.	: Number inspected	: Bushes destroyed		: Bushes destroyed	
				: on new properties	: Number	: on old properties	: Number
Resurvey:							
Allen-----	95	3	3	222	13	106	
Clinton-----	0	0	0	26	0	0	
Franklin-----	19	0	0	16	3	7	
Hamilton-----	0	1	2	46	3	0	
Howard-----	17	0	0	32	0	0	
Lake-----	0	1	3	0	0	0	
Lagrange-----	0	1	1	0	0	0	
La Porte-----	88	0	0	109	23	296	
Marion-----	5	1	2	93	1	1	
Montgomery-----	0	1	1	0	0	0	
Porter-----	11	0	0	12	0	0	
Putnam-----	0	1	1	0	0	0	
St. Joseph-----	53	6	10	138	6	153	
Tippecanoe-----	0	2	2	0	0	0	
Tipton-----	0	0	0	12	0	0	
Whitley-----	8	0	0	26	2	3	
Total-----	296	17	25	732	51	566	
Intensive original survey:							
Gibson-----	142	0	0	0	0	0	
Sullivan-----	253	0	0	0	0	0	
Total-----	395	0	0	0	0	0	

In the "Resurvey" section of the table, the counties in which work was done are listed alphabetically. For some of the counties the figures do not show the complete picture, because additional work was done outside the period January 1 to April 30, covered by the table. The data in the table show that the problem of resurvey is a serious one. Of course, in some Indiana counties, only the rechecking of a few old planted barberry locations is required. Such was the case in Tipton County, where it was necessary only to recheck 12 old locations of planted barberry bushes. As no new sprouts or bushes were found there in 1941, perhaps with 1 more recheck the county may be regarded as permanently free of barberry bushes. However, the situation is entirely different in counties such as Allen, where, during the period under study, it was necessary to survey 95 square miles of area where barberry bushes had formerly been found growing wild, in order to find and kill new bushes growing from seeds left in the ground by bushes destroyed in previous surveys. In the course of resurvey in that county, barberry bushes were found on 3 new properties. These discoveries will extend the area which must be resurveyed in the future. Therefore, in counties such as Allen, the task of the next resurvey will be more difficult than it was in 1941. It is encouraging to note that in rechecking 222 old locations of barberry bushes in Allen County, only 13 had sprouts or new bushes. That is, less than 6 percent of the old locations had new bushes in 1941. For the period January 1 to April 30, resurvey was completed on 296 square miles of area, and 25 barberry bushes were found on 17 new properties. A total of 732 old properties were inspected and on 48 of these 566 new bushes were found and destroyed. Intensive original survey work was completed in Gibson and Sullivan Counties with the inspection of 395 square miles of area.

Preliminary results of stem rust survey in Mexico and southern Texas.--

Preliminary results of the rust survey made in Mexico this spring indicate that physiologic races of stem rust 38 and 59 are the most common this year. Marquis and other hard red spring wheats are resistant to these races in southern Mexico. In fact, Marquis continues to be rust resistant as far north as San Luis Potosi. Last year there were some indications that race 56 had become established in southern Mexico but, if so, it either did not persist or persisted in extremely small amounts as it has not appeared in any of the 97 isolates identified from southern Mexico this year. In northern Mexico, on the other hand, the situation is quite different. There is further evidence that there may be an intimate relationship between the rust there and that which subsequently develops in the United States. For this reason, preliminary steps have been taken to cooperate with the Mexican Department of Agriculture in introducing or developing varieties of grain that are more resistant to stem rust than those now commonly grown. Thus far a total of 52 isolates have been identified from 38 collections made in northern Mexico, comprising 6 different races, of which race 17 is the most prevalent. Last year, it may be recalled, there was a decided increase in race 17 over previous years, both in northern Mexico and in the United States; and collections of rust obtained from northern Mexico again this year indicate a further increase in the prevalence of this race. The first few collections identified from southern Texas indicate that races 17 and 56 are likely to be the most prevalent there, also, but it is too

early to make a definite statement to that effect. More than 150 collections from the southern part of the United States are now in culture and identifications will be completed within the next few weeks. More than 200 aacial collections from barberry bushes have been received for identification. All of the material has been used as inoculum, but no identifications have been made.

COTTON INSECT INVESTIGATIONS

Boll weevil control with calcium arsenate applied at different times.--
The usual recommendation for boll weevil control is to begin dusting with calcium arsenate when 10 percent of the squares become infested and to continue at 4- or 5- day intervals until the weevils are brought under control or a crop of bolls is made; also that dusting be done at night or early in the morning when the plants are wet with dew and the air is calm. Some growers and research workers experienced in cotton dusting have questioned the advisability of beginning dusting at the 10-percent-infestation level and there has been a tendency in recent years to wait until 20 to 50 percent of the squares are infested before beginning to dust. This is especially true on the rich Delta soils where there is sufficient fertility to keep the plants fruiting until late in the season. Dusting at night or in the early morning when the plants are wet with dew has obvious disadvantages. A series of experiments was conducted by M. T. Young, G. L. Garrison, and R. C. Gaines, at Tallulah, La., in 1940 to obtain information on these questions. The plots were 1/10-acre in size and arranged in randomized blocks. The plots were surrounded by buffer areas to reduce interplot movement of insects and calcium arsenate drift, making the combined areas of plots and buffers receiving similar treatment approximately 1/4 acre. In one series of experiments 6 applications of calcium arsenate dust beginning at 10-percent infestation, 3 of which were made before and 3 after boll weevil migration had started, gave an average increase over the checks of 424 pounds of seed cotton per acre; 3 applications beginning at 10-percent infestation, made before migration had started and none after migration, 140 pounds; and 3 applications beginning when migration had started and 39 percent of the squares were infested, 332 pounds. Under the conditions prevailing in these experiments 3 late applications beginning when 39 percent of the squares were infested gave the greatest increase in yield per application. In another series of experiments, applications beginning at 8- and 25-percent infestation of squares were followed by significantly better yields than were applications beginning at 70-percent infestations, but differences between the yields following applications beginning at 8 and 25 percent were not significant. Each of the 3 treatments gave a highly significant increase over the checks. Eight applications beginning at 8-percent infestation gave an average increase of 522 pounds of seed cotton per acre; 5 applications beginning with a 25-percent infestation, an increase of 580 pounds; and 4 applications beginning with a 70-percent infestation, an increase of 350 pounds. In the third series where applications were not begun until migration had started and 19 percent of the squares were infested, 1 application gave a nonsignificant average increase in yield over the checks of 70 pounds of seed cotton per acre; 2 applications, a highly significant increase of 212 pounds; and 3 applications, 260 pounds. A large number of tests conducted at Tallulah

since 1934 on the time-of-day and the interval between applications for the best weevil control have recently been summarized. The plots from 1934 to 1938 were arranged in series and were parallel to each other. The treated areas were 3/4 acre or more in size and treatments were not assigned at random. In 1939 and 1940 the plots contained 1/4 acre or more and were arranged in randomized blocks. In 1 series of experiments plots were dusted at 4- or 5-day intervals between daybreak and 7 a. m. (early morning), between 1 and 3 p. m. (midday), and between 6 and 7 p. m. (late afternoon). In the second series the plots were dusted in the early morning at 4-, 6-, and 8-day intervals. In both series applications were begun when 10 percent of the squares were infested. The first, or "time-of-day" series covered a 5-year period and included 19 replications. The average infestations after treatments were started were 38.9 percent in the checks; 12.5 percent for the early morning applications; 19.4 percent for the midday applications; and 20.7 percent for the late afternoon applications. The average increase in yields over the checks from the early morning applications was 287 pounds of seed cotton per acre; from the midday applications, 282 pounds; and from the late-afternoon applications, 232 pounds. The second, or "time-interval" series covered a 7-year period and included 29 replications. The average increase in yields over the checks was 178 pounds of seed cotton per acre for the 4-day applications; 101 pounds for the 6-day applications; and 76 pounds for the 8-day applications. The square infestations were light during the greater part of the fruiting seasons of 1934 to 1937, inclusive, and the gains were small. Infestations were somewhat higher in 1938 and much heavier in 1939 and 1940, with correspondingly larger gains.

Beet armyworm on cotton.--A general infestation of Laphygna exigua (Hbn.) on cotton in Arizona during May was reported by T. P. Cassidy and T. C. Barber. The cotton growers call this insect the "web worm," because of the loosely spun webs on the lower surfaces of the leaves, where the small larvae feed. Small larvae of the yellow-striped armyworm (Prodenia ornithogalli Guen.) were also present, and in collections from five sections of the State submitted to Carl Heinrich, averaged about 5 percent of the total number of larvae. The first serious damage by beet armyworms on cotton this season was reported from Litchfield on May 10 and their occurrence a few days later generally distributed over the Santa Cruz and Salt River Valleys and the Case Grande, Coolidge, and Eloy areas caused great concern to the growers. The small larvae feed primarily on the seedling leaves, while the larger larvae (after second instar) often-times girdle the plants and destroy the terminal buds, thus killing the plants. After the cotton is 6 to 8 inches tall it is beyond damage. The larger larvae crawl into cracks in the soil and under debris during the heat of the day and this habit has been used as a basis of control by "flash" irrigation. Many of the older larvae, as well as the smaller larvae washed off the plants, are sealed in the soil and killed by the irrigation or washed out of the field by the "tail" water. The killing of the larvae and stimulation of plant growth by irrigation gave very satisfactory control; however, in many cases the large acreages infested could not be quickly irrigated and large quantities of calcium arsenate dust were used. One company dusted 1,200 acres by airplane. They started dusting at the rate of 10 pounds per acre but, as calcium

arsenate kills rather slowly, it was thought that not enough dust was getting on the small seedlings to give a quick kill and the rate was increased to 15 pounds per acre. Airplanes were also used in other areas. On some of the cotton at the Mesa Experiment Station where calcium arsenate was applied with hand guns, Mr. Barber estimated that 50 percent of the worms were dead 24 hours later. In general, the results from the calcium arsenate dust were fairly satisfactory but a quicker acting poison would be more effective. It is difficult to estimate the actual damage caused by this outbreak. Much of the cotton was small and had not been chopped. Growers were advised to delay thinning until the worms were controlled and, with the prompt applications of irrigations and calcium arsenate dust, the outbreak was brought under control in most fields before the stand was seriously damaged. Some replanting was necessary, especially in Pinal and Maricopa Counties. No damage was observed or reported to other crops and it is not known on which host plants the population built up before the moths migrated to cottonfields. Unusually heavy rains last winter and this spring caused a great deal of vegetation to develop, and this may have been a factor in causing the outbreak. Mr. Cassidy reports that it was the heaviest and most general infestation he has observed in Arizona in the last 15 years and the State and Federal entomologists were kept busy day and night for about a week.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

New work Projects:--Two new work projects initiated on April 30, 1941, are being undertaken in cooperation with the Washington Agricultural Experiment Station--one relating to flea beetles affecting potatoes and the other to insects affecting brambles. Headquarters for the work with flea beetles has been established at Union Gap, Wash., while that with insect pests of brambles is at Puyallup. At present the potato flea beetle (Epitrix cucumeris (Harr.)) and the Western potato flea beetle (E. subcrinita (Lec.)) are particularly destructive to potatoes produced in Washington, Oregon, Colorado, and Nebraska. The damage which they cause is twofold: (1) The adults feed on the foliage, resulting in a stunting of the plants and subsequent reduction of yield; (2) the larvae feed in the developing tubers, cutting shallow tunnels just below the surface. The presence of scarified tissue reduces the quality of the potatoes, often rendering them unsalable, and the presence of injured tissue provides a medium for the entrance of soil-borne organisms which may cause decay of the tuber. Of the more important pests affecting raspberries and loganberries, studies will be conducted with the raspberry root borer (Benbecia marginata (Harr.)), the raspberry cane maggot (Pegomya rubivora (Coq.)), leaf rollers, and possibly other pests. The raspberry root borer feeds within the crown of the plant just below the surface of the soil, devitalizing the plant and curtailing its productivity, which under extreme conditions may kill the plant outright. The raspberry cane maggot feeds within the young fruiting canes and causes them to droop and die. Leaf rollers feed upon the foliage. The initiation of these work projects was made possible by the completion of the work on the raspberry fruitworm (Byturus sp.), the redberry mite (Eriophyes essigi (Hassan)), and that on parasites of the European earwig (Forficula auricularia L.), which was being conducted at Puyallup, Wash. B. J. Landis and C. W. Getzendaner are conducting the investigations on

potato flea beetles and W. W. Baker is assigned to those on insects affecting brambles. An investigation of aphids affecting potatoes is being undertaken in cooperation with the Maine Agricultural Experiment Station, with headquarters for the summer at Houlton, Maine. Begun during the summer of 1940, the phases of study on this problem are being materially expanded this year with Theo E. Bronson, of the Madison, Wis., laboratory, again serving as leader, in close cooperation with entomologists of the Maine station. The problem concerned is the transmission to the potatoes of a virus disease known as "leaf roll" by three species of aphids, namely, the green peach aphid (Myzus persicae (Sulz.)), the buckthorn aphid (Aphis abbreviata Patch), and the potato aphid (Macrosiphum solanifolii (Ashm.)). In addition to affecting the foliage of the growing plant, the disease causes a condition in the tubers known as "net necrosis," a darkening of the tissues which lowers the quality of the tubers making them unfit for use as food or as seed stock. It has been found further that the yield of potatoes in 1940 was reduced 42 percent by feeding of the aphids alone.

Changes in leadership.--The change in the leadership of the Logan, Utah, laboratory, necessitated by the military furlough of H. E. Dorst, has resulted in the assignment of Walter E. Peay, formerly of the Moscow, Idaho, laboratory, to serve in this capacity. Captain Dorst is serving in the Sanitary Corps of the Army as camp sanitary officer and assistant medical inspector at Camp Croft, Spartanburg, S. C. The work of the Logan, Utah, laboratory includes investigations on the beet leafhopper (Eutettix tenellus (Bak.)) and the tomato fruitworm (Heliothis armigera (Hbn.)). The work of the Columbus, Ohio, laboratory also has recently been affected by the call to active duty at Fort Benning, Ga., of Captain H. C. Mason.

Hydrocyanic acid gas in control of aphids on lettuce.--C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, conducted further tests during the first quarter of 1941 with hydrocyanic acid gas to obtain additional data on the value of using this fumigant as a substitute for the nicotine-smudge method commonly employed to control aphids and whiteflies on lettuce growing in the greenhouse. They report that the series of 6 weekly fumigations, at a dosage of 1/8 ounce per 1,000 cubic feet, reduced the population of the green peach aphid to a low level, whereas on nonfumigated plants the insects continued to multiply in numbers. No injury to the foliage of the lettuce was observed from the fumigations. The treatment consisted of a series of 6 weekly fumigations of lettuce (variety, Grand Rapids) at a dosage rate of 1/8-ounce of calcium cyanide per 1,000 cubic feet of space in a greenhouse of about 21,160 cubic-foot capacity. In the seventh or final exposure the rate was increased to 3/16-ounce per 1,000 cubic feet to determine whether injury would occur at this concentration. Mortality counts of the aphids made after the first and last exposures at the 1/8-ounce rate showed that a much lower kill resulted from the latter exposure. This was in agreement with the results of previous tests which showed that as the size of the plants increased the kill of aphids was less, no doubt being due to poorer dissemination of the fumigant among the larger plants. It was also found that mortality of the aphids following the fumigation at the 1/8-ounce rate was higher in this experiment than for the 1940 winter-crop experiment at the same dosage rate. The reasons for this difference are not definitely known. Population

counts as tabulated below showed that the series of 6 exposures at the 1/8-ounce rate reduced the average aphid population from 65.9 to 3.2 aphids per leaf. In the case of the nonfumigated plants in the bed of lettuce, which were protected by gastight covers during each of the fumigation exposures, there was an increase in the average population to 116.8 aphids per leaf.

Sweetpotato weevil overwinters in wild host plants.--From examinations of the roots and crowns of many wild host plants during March 1941, K. L. Cockerhan and O. T. Deen, of the Sunset, La., laboratory, report that the results obtained confirm the former belief that Cylas fornicarius (L.) successfully overwinters in some of the perennial wild hosts, but there is no evidence that overwintering occurs in the annuals. Living larvae were found in the roots and crowns of Ipomoea littoralis, I. dissecta, and I. trichocarpa, but none were found in I. jalapa, I. pandurata, or I. lacunosa. The location and number of plants examined and the numbers of specimens of the sweetpotato weevil recovered were as follows:

Host species	Location	Plants examined	Living sweet-potato weevils recovered
		Number	Number
<u>Ipomoea trichocarpa</u> ----	Sunset, La.	16	1 larva
<u>I. jalapa</u> -----	do.	4	0
<u>I. pandurata</u> -----	do.	8	0
<u>I. littoralis</u> -----	Pass Christian, Miss.	28	19 larvae, 1 pupa
<u>I. dissecta</u> -----	do.	105	2 larvae
:	:	:	:

The examinations were made during the period March 5 to 27 and all but one of the larvae recovered were in the third instar.

Tolerance of depotted delphinium plants to treatments for cyclamen mite.--The results of treatments from replicated field-plot tests conducted during 1940 at Thurmont, Md., by Floyd F. Smith, of the Beltsville, Md., laboratory, indicated that delphinium grown in pots successfully withstood the hot-water and methyl-bromide treatments, which have previously been found effective against Tarsonemus pallidus Banks. Following treatment of the depotted plants during May, they were grown in the field and the records showed that at no time during the growing season were there noticeable differences in the growth or vigor between untreated plants and those that had been submerged in hot water or fumigated with methyl bromide. The more important results from this experiment are given in the following table.

Treatment	Delphinium variety	Plants in test		Flowers pro-
		Planted	Survived to	duced per plot
		Number	Number	(average)
	Blackmore & Lang-			
Check-----	don hybrid	504	459	101.71
Hot water-----	do.	504	470	104.86
Methyl bromide---	do.	504	464	107.14
Check-----	Wrexham hybrid	360	352	113.40
Hot water-----	do.	360	347	114.60
Methyl bromide---	do.	360	352	116.20
Check-----	Gold Medal hybrid	360	278	68.80
Hot water-----	do.	360	320	80.20
Methyl bromide---	do.	360	345	82.00

^{1/} Date when the first flowers were produced.

These data show that there was no appreciable difference in the stand or yield of the untreated and treated plants of the 3 varieties of delphinium included in this test. The hot-water treatment consisted of immersing the depotted plants for 15 minutes in water at 110° F., while for the methyl-bromide treatment the plants were fumigated with 2 pounds of methyl bromide per 1,000 cubic feet for 3 hours at a temperature of 70°. The plants were set in the field on the day following treatment in 51 randomized plots of 72 plants each, with 5 to 7 replications of each treatment. Besides the stand and yield of plants, the effectiveness of the treatments was also compared by determining the number and length of flower spikes produced.

INSECTS AFFECTING MAN AND ANIMALS

Screwworm control in Arizona.--An allotment of \$6,500 from the special appropriation provided to enable the Department to cooperate with States and local agencies in the control of incipient and emergency outbreaks of insects and plant diseases has been approved to aid in the control of a severe and unexpected outbreak of screwworms in southern Arizona. In this cooperative effort the Bureau will furnish chemicals used to make up a newly developed screwworm remedy. This remedy is known as smear No. 62, and was developed at the Bureau's laboratory in Menard, Tex., by Roy Melvin, C. L. Smith, H. E. Parish, and W. L. Barrett, Jr. The formula is given and the use of it described in a recently released circular, E-540. The field work connected with this cooperative program is under the direction of E. C. Cushing.

Mosquito surveys and National Defense.--G. H. Bradley, of the New Smyrna, Fla., laboratory, in company with personnel of the Public Health Service, inspected salt-marsh-mosquito-breeding conditions in the vicinity of 13 Defense posts during May. The survey was primarily along the Atlantic seaboard, but included 2 camps on the west coast of Florida, in the vicinity of Tampa and Dunedin.

Collection of Philippine Anopheles presented to Museum.--A collection

of 280 specimens representing 26 species of Philippine Anopheles was presented to the National Museum by W. V. King, of the Orlando, Fla., laboratory. The collection included the types and paratypes of 6 species, as well as topotypes of several others. Slide mounts of the associated larval skins were available for most of the material.

Dipping of dogs as a control for American dog tick.--C. N. Smith, of the Vineyard Haven, Mass., laboratory, reports that ". . . in the Edgartown area, where dogs have been dipped since 1938, adults of the American dog tick were less abundant than ever before."

Sulfur dust as a tick repellent.--Mr. Smith also reports that sulfur dust was entirely ineffective in preventing ticks from catching on a dog, attaching to a dog, or crawling on a person's clothing.

Control measures for Clear Lake gnat.--C. C. Deonier and A. W. Lindquist report a promising adjunct to the attack against the Chaoborus adults in the regular evening shore-wise flight in the development of a screen of fire across the path of the flight. This is accomplished by running gasoline through a pipe under water and allowing the gasoline to come to the surface, where it is ignited.

Trapping horn flies.--There is a rapidly growing interest in the use of cattle-fly traps for the control of horn flies in Texas, reports W. G. Bruce, of the Dallas laboratory. The Extension Service of the Texas A. & M. College appealed for assistance to discuss methods of horn fly control at meetings of county agents and cattlemen, with special reference to the cattle-fly trap. Attendance at these meetings ranged from 50 to 300.

Rearing Aedes lateralis in captivity.--E. F. Knipling and C. M. Gjullin, of the Portland, Oreg., laboratory, report the successful rearing of this floodwater mosquito in captivity. Approximately 500 A. lateralis eggs were obtained from a reared colony of 30 females and 30 males when they were fed beef blood to which 12 percent cane sugar had been added. Ninety percent of these eggs were fertile. The adults were fed by placing pieces of cellucotton dipped in the blood on top of the cage.

FOREIGN PLANT QUARANTINES

Fruitfly smuggling prevented again.--A young lady in a car from Mexico told the inspector at Laredo that she had no fruit, but two papayas were hidden under a cloak on the seat beside her. Immediate examination of the fruits revealed two exit holes in one and when it was cut open three larvae were found apparently feeding upon the jellylike covering of the seed. The fruit was said to have been purchased at Victoria, Tamaulipas, Mexico. The larvae were determined by C. T. Greene as those of the papaya fruitfly (Toxotrypana curvicauda Gerst.).

Entomological interceptions of interest.--A living larva of the trypetid Anastrepha nonbinpraeoptans Sein was taken at San Juan, P. R., on May 19 in a mango in baggage from St. Thomas, V. I. The coccids Chionaspis elongata Green, Kuwanaspis verniformis (Takah.), and Lepidosaphes

verniformis (Takah.) were found at the Inspection House, Washington, D. C., on Arundinaria sp. leaves in express from China. Two living larvae of the trypetid Ceratitis sp. was found at Philadelphia on May 17 in grapefruit in stores from the Union of South Africa. A living adult of the chrysomelid Cacoscelis scriptionis Jac. was taken at Laredo on May 6 on an orchid plant in baggage from Mexico. Specimens of the coccid Coccus viridis (Green) were taken at New Orleans on March 10 on a gardenia leaf in baggage from Honduras. This is our second interception of this coccid from Honduras. A living pupa and a pupal case of the pink bollworm (Pectinophora gossypiella (Saund.)) was intercepted at San Pedro on May 11 in a cotton boll in quarters from Hawaii. A living larva of the Asiatic rice borer (Chilo simplex (Btlr.)) was found at Baltimore on April 5 in rice straw used as packing for personal effects from China. Specimens of the coccid Asterolecanium aureum (Bdv.) were found at Hoboken on April 30 on leaves of Cattleya sp. in cargo from Brazil. Two living larvae of the trypetid Anastrepha sp., probably fraterculus (Wied.), were taken at New York on April 15 in an orange in stores from Brazil. Living larvae of the olethreutid Gymnandrosoma auratium Da Costa Lima (?) were intercepted at Boston on March 24 in an orange in stores from Trinidad. Living specimens of the coccid Conchaspis angraeci O'kll. were intercepted at San Juan on April 10 on an orchid plant in baggage from the Dominican Republic. Living adults of the bostrichid Sinoxylon anale Lesne were found at New York on March 28 in dorris root in cargo from British Malay and the Philippines.

Pathological interceptions of interest.--Aphelenchoides coffeae (Zimmerman) Steiner was intercepted for the first time on April 19 at New York on Cattleya sp. roots in baggage from Colombia. Citrus canker (Bacterium citri (Hasse) Doidge) was intercepted on oranges from Japan in baggage and in stores on April 18 and again in baggage on April 21 at Seattle and on May 23 at Philadelphia on sour limes in stores from the Dutch East Indies. Ceratostonella ulmi (Schwarz) Buis. was found on two more lots of the crating from England inspected during April and May at New York. Oranges in stores from Argentina were found to be badly infected with Elsinoe australis Bitancourt & Jenkins, when examined on May 22 at Boston. Determinations have just been received for two root-knot specimens (Heterodera marioni (Cornu) Goodey) sent in for verification, one Echeveria sp. root on March 17 at Laredo in cargo from Mexico, the other in beet roots on May 23 at Philadelphia in stores from Dutch East Indies. Plantains arriving from Cuba by sea train during May were found to be infected by Stachylidium theobromae Turc. when inspected at New York. Vernicularia donatum (Pers.) Fr. was intercepted on April 23 at Galveston on peppers from Cuba.

DOMESTIC PLANT QUARANTINES

The grasshopper situation.--At the close of May the aggregate hatch of all species of grasshoppers was 90-percent complete in Texas and ranged to 75-percent complete in North Dakota. Active control was begun in 2 areas by the early part of June--1 in south and east-central Texas and the other in northwestern Minnesota. The species concerned in the Texas area is the differential grasshopper (Melanoplus differentialis Thos.).

The populations are restricted to bottom-land areas along creeks and rivers and the damage ranges from complete destruction of isolated cotton and corn-fields to slight marginal injury. Sixty-five tons of bran have been shipped for bait purposes to the above area. The State leader reports that economically important infestations are expected to develop in at least 12 additional counties in that area. In northern Minnesota heavy populations of M. bivittatus Say have developed to the extent that over 1,000 tons of bait materials are being supplied to Polk, Kittson, and Marshall Counties.

The Mormon cricket situation.--The hatch of Mormon crickets is complete at low altitudes throughout the entire western area and adults are present in Washington, Oregon, and Idaho. At higher altitudes eggs were still hatching in the early part of June. In Oregon control work has been retarded because of cool and unsettled weather. Rank vegetation on the range and in marginal areas is holding the crickets out of cropland. Extensive strip baiting is in progress in Baker County and baiting is continued in the Warm Springs area by use of airplane and ground spreaders. Throughout the infested portion of Nevada, although frequent showers and cool weather have slowed up control activities, there has been a general increase in the use of bait and good results are being obtained. All the working units are well organized and ready to meet any heavy migration that may occur.

Control of armyworms and army cutworms.--Control operations against the army cutworm (Chorizagrotis auxiliaris (Grote)) have been carried out during the current season in Kansas, Colorado, Nebraska, and Utah with good results and with a minimum of damage to crops. The outbreak was not extremely serious, except in certain localized areas, and only small quantities of grasshopper bait were needed to cope with the infestations. A new and far more serious outbreak of the armyworm (Cirphis unipuncta (Haw.)) has occurred in southwestern Oklahoma and adjacent area in Texas. The most heavily infested Oklahoma counties were Harmon, Jackson, Tillman, and Cotton, with more moderate infestations extending across the State north to Major County and east to Kingfisher and Grady Counties. Damage in the most heavily infested areas had practically ceased, however, by the early part of June and approximately 98 percent of the worms had pupated. Damage was still occurring in the more northern area, where pupation was only 50- to 70-percent complete. Sufficient bait materials are on hand in all Oklahoma counties to meet control needs; however, owing to unfavorable weather conditions and the fact that the armyworms are scattered throughout the fields of rank-growing wheat and barley, only a small percentage of the farmers in the infested areas have spread bait. Excellent results, some as high as a 100-percent kill, have been obtained where bait was used. Carabid larvae, averaging as high as 10 per square yard in some fields, are taking a heavy toll of the armyworms. In Texas heavy infestations were found in Hardeman, Wilbarger, Foard, and Childress Counties. More recently the outbreak seems to be spreading west as far as Swisher and Hale Counties and south as far as Runnels County. In Wilbarger, Hardeman, and Foard Counties populations have diminished considerably with the pupation of the larvae. By the close of May, mixing stations were in operation in 24 Texas counties. Six commercial airplanes have been employed by local interests, spreading bait in wheatfields in Floyd, Swisher, and Briscoe Counties. Parasites and predators of the armyworm have become numerous in many fields, especially those of

earliest infestation.

Chinch bug survey in Oklahoma.--Spotted infestations of chinch bug were found as the result of a survey made in northeastern Oklahoma on May 26 to 30 by the State leader. Localized areas were found to be heavily infested and, unless rain or other weather conditions unfavorable to the chinch bug occur, control measures will be necessary. Arrangements have been completed for the shipping of creosote oil to the infested counties in that State if needed. One hundred chinch bugs per linear foot of drill row were found in Rogers, Osage, Craig, Ottawa, Mayes, and Muskogee Counties. The chinch bug infestations in other infested States cannot be definitely determined at this time, but it appears that little, if any, damage will occur in South Dakota or Ohio.

White-fringed beetle control methods tried on different types of area.--Several applications of dusting, spraying, clean-cultivation, and the use of herbicides have been made on each of 5 areas of isolated infestations of the white-fringed beetle on which an attempt is being made to determine the effectiveness of different methods with eradication as the objective. Each area is chosen because it represents a different type and a different problem of control. The 5 areas are described as follows: (1) An area where there is complete control of all land that is capable of cultivation and on which no crops whatever are grown. (2) An area that is under full crop operation on the part of the farmers. (3) An area of waste and abandoned lands, including many railroad tracks and industrial sites. (4) Area that is a wholly waste and abandoned expanse, with no cultivation and no inhabitants. (5) A closely built-up section in a town. W. P. A. laborers assisted with the work in the Alabama areas. The extremely dry weather prevailing throughout the infested areas practically all of May enabled the crews to put in full time and provided favorable conditions for control operations. All of the treated areas were placed in excellent condition to meet beetle emergence. The first adult Pantomorus leucoloma Boh. of the season was reported from New Orleans on May 13; the first from the Florida, Ala., area on May 22; and 47 adult beetles were collected at Carriere, Miss., on May 28-29. Establishments dealing in restricted articles in the various areas were contacted in May by regulatory inspectors relative to the seasonal quarantine restrictions, which again became effective on June 1.

Louisiana Horticultural Association favors white-fringed beetle control.--At a meeting of the Louisiana State Horticultural Association held at Baton Rouge on May 20 a resolution was passed that all State agencies give full cooperation in the suppression of the white-fringed beetle to the end that damage by the beetle and the restrictions of regulatory measures as imposed by the Federal Government may be limited to the infested areas.

Sweetpotato weevil found on wild host plant of significance.--Larvae identified as Cylas fornicarius F., were recently found on Iponoea pandurata L., in Pearl River County, Miss. It has been the opinion that in the areas off the coast such as the above county this upland species of wild morning-glory would die in the winter and therefore fail to carry the

weevils over the winter. More information is needed on the possibility of weevils overwintering on native host plants in areas away from the coast, and the control unit is working with the research unit at Sunset, La., in an attempt to obtain further data relative to the problem.

Infested sweetpotatoes intercepted.--Inspectors of the Mississippi State Plant Board have made several interceptions of sweetpotatoes, trucked in violation of the Mississippi State quarantine from points in another State where sweetpotato weevil infestations exist. In one instance the driver of the truck was arrested, tried, and fined.

Peach nursery and orchard inspections.--The most active phase of phony peach and peach mosaic work was directed toward the inspection of nurseries in the mosaic area. This work was completed by May 15, with the exception of a very few small nurseries whose sales are generally local. Excellent cooperation was obtained in the removal of diseased trees in the nursery environs throughout the area. Following the nursery-inspection work, efforts were directed, to the limit of available personnel and funds, to the inspection of orchards in the mosaic-infected area and to the removal of diseased trees with the assistance of W. P. A. laborers.

The peach mosaic situation in California and Colorado.--In California a substantial reduction in the incidence of new cases of peach mosaic is reported in some counties. To the close of May no mosaic was found in Orange County, while in Riverside and San Diego Counties this year's inspection shows a marked reduction in the number of diseased trees. The cooperation of growers has been good. In Mesa County, Colo., extremely careful inspection has resulted in the finding of a slightly increased percentage of mosaic infection over last year, with 6,203 infected trees reported up to May 31. The cooperation of growers has been uniformly satisfactory, with the exception of 1 or 2, and it is anticipated that the trees on these properties will be removed shortly. The removal of diseased trees has been prosecuted as rapidly as availability of labor permitted.

Transit inspection.--Because of the seasonal decline of nursery-stock shipments, transit inspection activities were suspended at Kansas City on May 17, at Omaha and Council Bluffs on May 29, and Houston, Dallas, Memphis, and Atlanta on June 1. Work at the Detroit station, which has been manned several months by a Michigan inspector collaborating with the Bureau, was discontinued on May 14. Approximately 257 violations of Federal domestic plant quarantines were intercepted in May. A shipment of five-needle pines infested with pine needle scale (Chionaspis pinifoliae Fitch), caught at St. Paul, was returned to the consignor by a Minnesota State inspector under State authority. A shipment containing currant bushes labeled "silver lace vine" was intercepted at Pittsburgh. The shipment was moving into the State of Pennsylvania without the required control-area permit. The inspector at Boston recovered a specimen of a coleopterous adult, which was identified as belonging to the genus Paria, on a strawberry plant.

INSECTICIDE INVESTIGATIONS

Preparation of pure phenothiazine.--Purification of phenothiazine and the accurate determination of the freezing point of this compound has recently been done by L. E. Smith and O. A. Nelson. The melting point of 180° - 181° C., as recorded in the literature and in chemical handbooks, was shown to be too low. Purification by repeated crystallizations followed by sublimation under carefully controlled conditions yielded a product of highest purity. This compound had a freezing point of $185.11 \pm .02^{\circ}$ C. This freezing point (or melting point) is suggested as one criterion for the purity of phenothiazine. This degree of purity could not be attained by repeated crystallizations only.

Improved method for determining molecular weights.--In connection with chemical work on new compounds, including natural products having promise as insecticides, it is essential to determine molecular weights accurately. While there are numerous methods for doing this, it happened that for various reasons in the case of one series of substances all available methods failed. In order to meet this contingency a little-known procedure outlined by Signer about 11 years ago was critically studied by E. P. Clark, of this Division, in the hope that it could be employed. The information thus gained led to a procedure of general application that is far more accurate and reliable than any other procedure available. By its use the difficulties in the insecticidal problem at hand were overcome and the method, which is to be published soon, will undoubtedly be extensively used in other lines of organic chemical research. The procedure, involving the principle of isothermal distillation and using micro quantities, is capable of distinguishing with certainty a C₃₀ from a C₃₁ compound.

Some "paris greens" are not paris green.--In the last 2 years R. H. Carter and C. M. Smith have come across five samples of insecticidal materials sold as paris green which were definitely not copper acetoarsenite $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{Cu}(\text{AsO}_2)_2$. Two of them were probably simple copper meta-arsenite $\text{Cu}(\text{AsO}_2)_2 \cdot \text{H}_2\text{O}$, the others indefinite mixtures of copper arsenite and copper arsenate such as are formed when paris green is treated with alkaline media. These products may be satisfactory or even superior insecticides, but entomologists should be careful not to ascribe results obtained with them to paris green.

BEE CULTURE

Honeybees collecting nectar and pollen from grapevines.--Geo. H. Vansell, Davis, Calif., reports: "Large loads of yellow- to orange-colored pollen are taken from the grape. In some cases several bees at one time were observed on individual vines. Many of the bees had partial loads of nectar with a sugar concentration of 65 to 75 percent. The plants are visited throughout the day, but most heavily during the morning hours. There is a ring-like, orange-colored area about the base of each tiny grape berry which is presumably nectary tissue. The grape, as these observations reveal, must be pollinated considerably by the honeybee, as both nectar and pollen are collected. It is estimated that 65,600 bees were work-

ing on a 40-acre field at 7:30 a. m., on May 22, 1941. This is on a basis of 6 bees observed on a trellised vine covering 100 square feet. Some flies and other insects were also seeking nectar."

Honeybees select older blossoms on orange.--In connection with the fact that bees do not gather nectar the sugar concentration of which is too low to suit their taste, Mr. Vansell has found that in the case of orange blossoms the sugar concentration is not sufficient to draw the honeybee until the flowers have aged somewhat. He states: "Orange-blossom buds begin to secrete nectar before the petals open and continue after their unfolding for at least 48 hours. The life of an individual blossom is about 1 week, after which time the petals and anthers shatter away. The bud nectar has an average sugar concentration of about 14-15 percent, but at this concentration the nectar is not attractive to bees, especially in the presence of the more concentrated nectar secreted by mustard and oxalis blossoms. By exposure to dry air or wind, the water from orange nectar is evaporated. This results in the older blossoms having nectar of higher sugar concentration. When the concentration approaches 30 percent the bees begin to collect it for storage. This season, on April 9 at 9:30 a. m., at Santa Ana, Calif., the sugar concentration of nectar from buds, freshly opened and old blossoms, and from bees were ascertained by refractometer method. The average concentration values are as follows: Closed buds, 13.8 percent; buds with 1-2 petals open, 15.7 percent; recently opened blossoms, 20.3 percent; old, shattering blossoms, 30.8 percent; honeybee stomachs, 31.9 percent.

Infection of queen bees with *Nosema* spores may be important cause of premature supersedure.--C. L. Farrar, Madison, Wis., reports: "Southern queens used in stock-testing studies have been superseded in larger numbers in 1940 and 1941. Difference in the quality of lines of stock has been recognized as a major factor in queen supersedure, yet in the last two seasons, a number of queens from lines showing good performance have superseded in a peculiar manner. Two queens which recently stopped laying were examined and found heavily infested with spores of the protozoan *Nosema apis*. In checking back through the colony records for the last two seasons the behavior of the queens, the breaking in the brood cycle, and subsequent supersedure show a close similarity with the record for the two queens found infected. *Nosema* was found in better than 15 percent of the laboratory's overwintered colonies, and the percentage with a light infection was probably considerably greater. Feeding experiments conducted under greenhouse conditions have shown that, where the worker population is infected, brood rearing is not normal, regardless of food conditions. Packages this spring have reared less brood and of poorer quality than packages studied in previous years, yet the season has been exceptionally favorable for pollen and the colony populations have been normal. Circumstantial evidence suggests that *Nosema* may have been a limiting factor. Overwintered colonies have reared exceptionally good brood and are strong. Queen infection appears to be a matter of chance since some colonies heavily infected last winter maintained healthy queens, while other queens became infected."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Busck returns from Hawaii.--August Busck returned in April from Honolulu. He had spent the previous 6 months at the Bernice P. Bishop Museum studying the Microlepidoptera of Hawaii. The trip was made under a Yale University-Bishop Museum Fellowship, with the object of undertaking a classification of the Hawaiian Microlepidoptera. Mr. Busck brought back with him some 300 wing and genitalia slides, made during his studies in Honolulu, as well as numerous undissected specimens for further study here, and in addition the entire Microlepidoptera collections of O. H. Swezey and E. C. Zimmerman, made in Samoa last year. These collections contain numerous good series of reared species. They will be worked up when the report on the Hawaiian species is completed. Mr. Busck has the privilege of retaining, for the National Collection, a proper share of the Samoan material, including paratypes of any new species he may describe.

Response of flies to certain vibrations.--Vibrations or sounds of certain pitch apparently attract Coelopa frigida (F.). This is a common acalypterate muscid fly which is supposed to breed in seaweed along the Atlantic coast. Heretofore the species has been considered innocuous. A long series of specimens of both sexes, collected by Harry F. Dietz, of the Grassolli Chemical Department, E. I. duPont de Nemours & Company, Wilmington, Del., was forwarded to this Division with the information given below. The following observations are of considerable zoological interest and may have an economic bearing under certain circumstances. "One of the important features in these two infestations (in Massachusetts) is that the flies were attracted to these (dry) cleaning establishments in large numbers only when certain types of vibrating machinery were in operation. When this machinery was not in operation those flies that had collected would disperse. Consequently, it appears that they had been attracted to these plants, not by the odor of the cleaner fluids used, but by a certain type of vibration or sound of certain pitch. The cleaning fluid was a very generally employed chlorinated ethylene compound. The flies were not attracted to the exhaust from which fumes were emanating. In the drying chambers such flies as came in contact with the concentrated fumes were knocked down immediately and killed. From the point of view of the cleaners, this collection of flies in their places of business, irrespective of the reason, is a serious menace, because of its psychological effect on customers." (Quoted from Mr. Dietz's letter.)

Myrmica aldrichi Wheeler recovered.--In a collection of ants determined recently for the Department of Entomology, Oregon State College, there were specimens of M. aldrichi from Mount Hood. So far as known, these represent the only individuals of the species, other than the cotypes.

Valuable additions to collection of bees.--During the last 6 months T. D. A. Cockerell, of the University of Colorado, has sent in several very valuable lots of bees. The material consists of types of approximately 300 species, described by Prof. Cockerell, and 600 additional species determined by him. Most of them are from Australia and Siberia, the remainder from Africa, Asia, and the Americas. This material constitutes an invaluable contribution to the collection at the National Museum, as

more than half the species were heretofore not represented in the identified bee collection.

Rearing of pine sawflies attempted.--In 1817 Leach described four species of the pine-feeding sawfly genus Neodiprion from specimens collected near Savannah, Ga., by John Abbot. The identity of these species has remained uncertain and at least one of the names has been misapplied to the white pine sawfly. In the hope of obtaining material which would aid in making more satisfactory identifications of these species, R. A. Cushman and H. W. Capps visited Savannah and other points with similar flora along the Atlantic coast. Many colonies of larvae were collected from various species of pine. The material is being reared at West Point, Va., by L. A. Hetrick, a collaborator of the Bureau, stationed at the Virginia Agricultural Experiment Station. The result of the attempted association of names and species will not be known until the adults have been reared and the species studied.

Type material of the genus Cryptus added to the collection.--Harry D. Pratt, a graduate student at the University of Minnesota, has recently returned to the National Museum material of the ichneumonid genus Cryptus. He borrowed the material for a study in connection with the preparation of a revision of the North American species of the genus. In addition to the several hundred specimens of the old species, the material includes type specimens of 20 of the 31 new species to be described, 19 represented by the holotypes.

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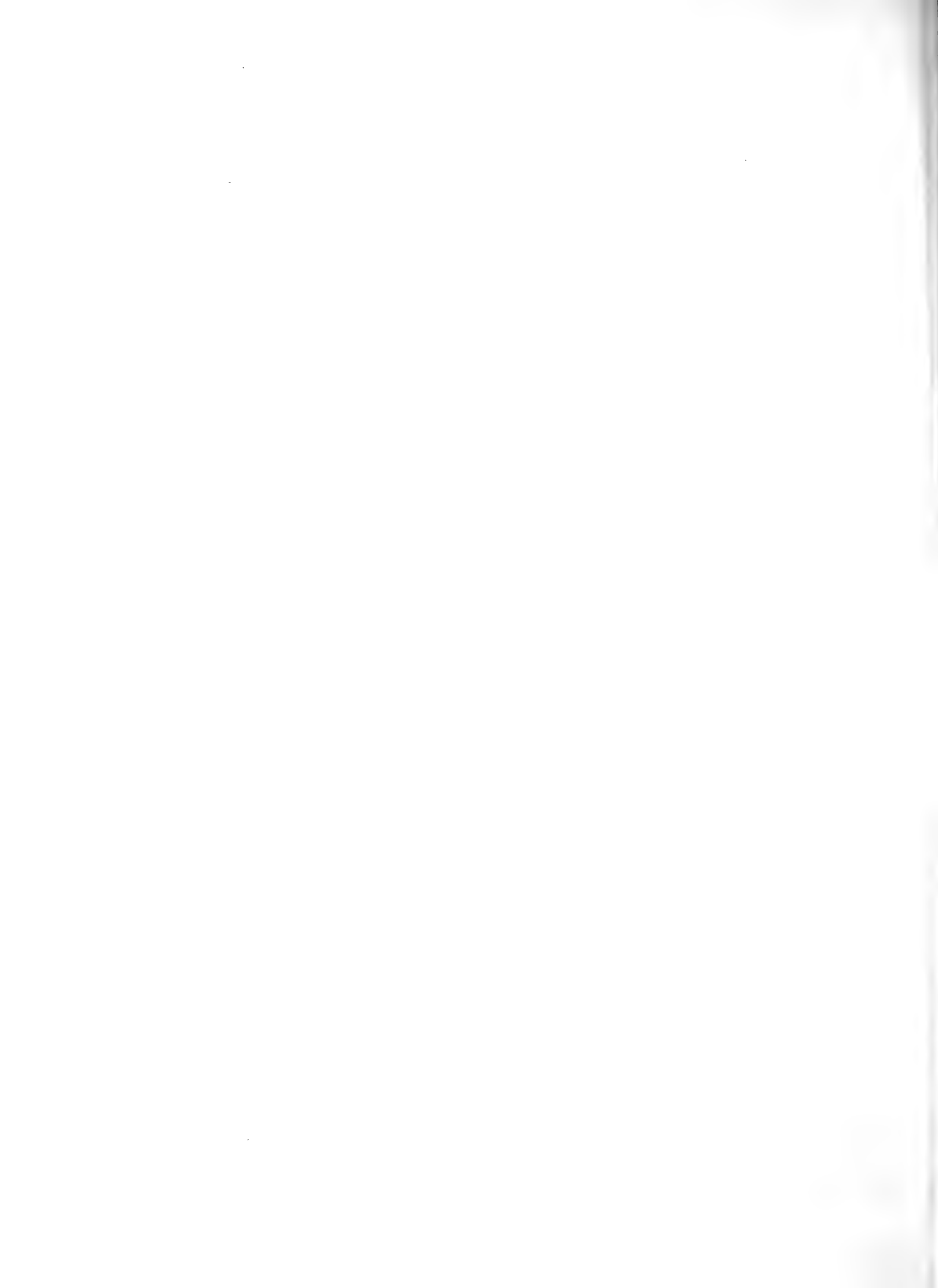
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BUREAU OF
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ADMINISTRATION

The following statement in reference to the Bureau, its activities, and functions, prepared on July 21, 1941, is believed to be of general interest.

The Bureau of Entomology and Plant Quarantine was created by organizational mergers brought about by administrative orders of the Secretary of Agriculture issued in 1933 and 1934 and given general legislative approval in the "Agricultural Appropriation Act of 1935," approved March 26, 1934, and the "Agricultural Appropriation Act, 1936," approved May 17, 1935. These mergers brought together activities of the Department concerned with investigations on insect pests, conducted by the Bureau of Entomology; activities concerned with the enforcement of plant quarantine regulations and operations to control and prevent the spread of insect pests which had gained limited foothold in the United States, conducted by the Bureau of Plant Quarantine; operations aimed to control or eradicate plant diseases, conducted by the Bureau of Plant Industry; and chemical investigations on insecticides and fungicides, carried on by the Bureau of Chemistry and Soils.

The functions of the Bureau cover a wide field of interrelated activities concerned with (1) ways of protecting man, his crops, livestock, and possessions from insect pests; (2) preventing the introduction and spread of plant pests through the importation and interstate movement of plants and plant products; and (3) action programs to eradicate, suppress, or control insect pests and plant diseases. Its functions include research, service, regulatory, and control activities and involve contacts and cooperation with most of the Bureaus of the Department and many units of other Departments; with agricultural agencies throughout the United States and in other countries; and with industry, transportation concerns, farmers, and others concerned with agriculture in its broadest sense.

Research activities.--There are more than 700,000 known kinds of insects of which more than 250,000 are known to occur within the United States. Many of these are injurious, a goodly number are beneficial, and others are of little or no economic importance as far as known. The investigations on insects and their economic relations involve studies of their characters, classification, anatomy, physiology, responses, habits, life history, and distribution with the view of developing practical and economical methods for destroying harmful ones and promoting and increasing the usefulness and

distribution of those which are beneficial. Such studies are concerned with species injurious to agriculture and forestry, those which attack and annoy man and animals affecting their health, those which infest human habitations, and those which are injurious to industries or destroy possessions and products. They also deal with the culture and use of honeybees and with beekeeping practices to develop fuller utilization and returns from this important beneficial insect. The development of control measures includes consideration of the use of natural enemies, cultural practices, mechanical means and devices, and the use of chemicals to attract, repel, and kill noxious species. Chemical investigations are conducted on problems relating to the composition, action, and application of insecticides and materials that may be used with them and to develop methods by which such materials may be manufactured.

Service activities.--Insects affect man, agriculture, and forestry in many ways. One of the important functions of the Bureau is the service it gives by disseminating information on how pests can be controlled and useful species utilized. This is done through correspondence, publications, and by other devices, including supplying information to extension agencies. Research is the basis of such service. The service activities are not restricted to giving advice but under appropriate conditions include surveys to determine the status of pests and technical planning and supervision of control operations carried on by other Federal agencies, States, local communities, and individuals. Service also includes aid in matters relating to plant quarantines and inspections and certifications of regulated products so they may move freely and in full compliance with plant quarantine regulations.

Regulatory activities.--An important part of the work of the Bureau is concerned with the enforcement of plant quarantines and regulatory orders designed to prevent the introduction and spread of plant pests, the introduction of a disease of the adult honeybees, and the inspection and certification of plants and plant products to meet the sanitary requirements of foreign countries. There are 40 Federal plant quarantines and regulatory orders now in effect--22 of which relate to the entry of products from foreign countries, 10 relate to the movement of products within the mainland of the United States, and 8 relate to movement of products from Hawaii and Puerto Rico to the mainland.

These activities are carried out in close cooperation with State and territorial officials. The Bureau advises the Secretary on matters relating to plant quarantines and is responsible to him for the enforcement of the following acts dealing with plant quarantines and related matters:

- (1) The Insect Pest Act of 1905.
- (2) The Plant Quarantine Act of 1912, as amended.
- (3) The act of 1922 governing the importation of adult honeybees.
- (4) The Terminal Inspection Act of 1915, as amended, which is enforced in cooperation with the Post Office Department.

(5) The so-called Mexican Border Act which is reenacted annually and regulates the movement of railway cars and other vehicles into United States from Mexico.

(6) The so-called Export Certification Act which is reenacted annually and authorizes the inspection and certification of plants and plant products to meet the sanitary requirements of foreign countries.

Operations to control insect pests and plant diseases.--In cooperation with State and local agencies the Bureau carries on operations to eradicate, suppress, or control insect pests and plant diseases which occur as incipient or emergency outbreaks or have been introduced and gained limited establishment within the United States. These activities are carried on under authority included in the act making appropriations to the Department or under the special legislation approved April 6, 1937, and amended May 9, 1938, which authorized the Department to cooperate with State, local agencies, and individuals to control incipient and emergency outbreaks of insect pests and plant diseases.

Organization.--To carry out the activities and functions assigned to the Bureau it is now organized into 23 divisions. Twelve of these deal with research, 6 with control and prevention of spread, 4 are concerned with service to the Bureau, and 1 has regulatory functions only. Five of the divisions are headquartered in the field. The others have headquarters in Washington.

Regular projects.--The activities of the Bureau carried out under regular appropriations are provided for under 25 subappropriation items and classified in the project system of the Department under financial work and research line projects. Classified under the main functions referred to above these projects are divided as follows:

<u>Function</u>	<u>Financial Projects</u>	<u>Work Projects</u>	<u>Line Projects</u>
Research	27	81	839
Service	4	10	-
Regulatory	4	12	-
Control	<u>9</u>	<u>36</u>	<u>-</u>
Total	44	139	839

Laboratories and offices.--The Bureau carries on the work assigned to it within every State in the United States, in Hawaii, in Puerto Rico, and in the Canal Zone and has field laboratories in Mexico, Japan, and Uruguay. One hundred and twenty-six laboratories are maintained at various places in the United States for carrying on investigations, and 295 offices and suboffices to aid in conducting regulatory and control operations. Where practicable headquarters for these various functions are housed in the same buildings and in many cases the quarters are supplied by cooperating State or local agencies.

Personnel.--With the regular funds appropriated for the use of the Bureau it employs under departmental appointment on the average of 3,200 people. In addition to this a goodly number of individuals are employed by field agents under letter of authorization--the numbers varying with the season and needs for the work. These figures do not include those employed on projects conducted under allotments from funds provided for emergency relief which in June 1941 totaled 6,825.

For June 1941 the appointed employees paid from regular funds totaled 3,358--316 of these are headquartered in Washington and 3,042 at various locations in the field.

Funds appropriated or allotted to the Bureau for 1942.--The funds provided for carrying on the work of the Bureau for the current fiscal year come from a number of sources as indicated in the following tabulation:

Salaries and expenses from regular appropriation act.....	\$ 5,329,978
Allotment for research from funds provided through appropriations authorized by the Bankhead-Jones Act.....	15,700
Allotment for research from Commodity Credit Corporation Capital Fund.....	16,000
Allotment for service from appropriation to Civilian Conservation Corps.....	5,000
Appropriation for the control of incipient and emergency outbreaks of insect pests and plant diseases--season 1941.....	2,225,000
Allotment from WPA appropriation for relief for 6 months, ending December 31, 1941.....	<u>2,432,075</u>
Total.....	\$10,023,753

The regular appropriation "Salaries and Expenses" may be divided into groups as follows:

Administration.....	\$ 165,980
Research.....	2,187,532
Control and prevention of spread, including enforcement of certain domestic plant quarantines.....	2,210,545
Regulatory only.....	<u>765,921</u>
Total.....	\$ 5,329,928

Activities carried on to combat incipient and emergency outbreaks of plant pests.--Operations conducted in cooperation with State and local agencies to eradicate, suppress, or control plant pests with funds provided under special authorizing legislation vary from season to season. The following tabulation lists the projects now underway, gives the amount of funds now allotted to each, and the name of the division of the Bureau responsible for the administration of the work:

<u>Project</u>	<u>Allotment</u>	<u>Division</u>
Grasshopper and Mormon Cricket Control	\$ 553,000	Domestic Plant Quarantine
Chinch Bug Control	300,000	" " "
White-Fringed Beetle Control	300,000	" " "
Pear Psyllid Control	365,000	Fruit Insects
Hall Scale Eradication	30,000	" "
Screwworm Control	6,500	Insects Affecting Man and Animals
Sugarcane Mite Eradication	800	Cereal and Forage Insects
Administrative Expenses	45,000	Administration
Unallotted	<u>624,700</u>	--
Total appropriation	\$2,225,000	

Projects carried on with allotments from WPA.--The \$2,432,075 provided from emergency relief appropriation for the first 6 months of the current fiscal year is allotted for carrying on 8 projects. The following lists these, gives the amount allotted to each activity and indicates the division of the Bureau responsible for the administration of the work:

<u>Project</u>	<u>Allotment</u>	<u>Division</u>
Blister Rust Control	\$ 637,000	Plant Disease Control
Barberry Eradication	391,500	" " "
Phony Peach Disease Control	84,500	Domestic Plant Quarantine
Peach Mosaic Control	62,500	" " "
Citrus Canker Eradication	24,500	" " "
Gypsy Moth Control	341,000	Gypsy Moth Control
Dutch Elm Disease Eradication	864,000	Japanese Beetle Control
Wild Cotton Eradication	23,000	Pink Bollworm Control
D. C. Administration	<u>4,075</u>	Administration
Total	\$2,432,075	

F. S. PUCKETT
Senior Administrative Officer
Division of Pink Bollworm and Thurberia Weevil Control

Word has just been received that Felix S. Puckett died suddenly at San Antonio, Tex., on July 23, 1941. He was born on March 7, 1885, in Buda, Tex. He attended the Texas A. & M. College, graduating in 1907 with the Bachelor of Science degree. He pursued graduate work at that institution the following year and became associate director of the North Carolina Experiment Station in 1910, serving for 5 years. He then became associated with an industrial concern dealing with potash, and served as the publicity agent for this firm until he became associated with the U. S. Department of Agriculture.

Since October 8, 1917, Mr. Puckett has been in continuous employment

with the Department and, with the exception of a short period beginning in 1928, has been connected with work on pink bollworm eradication and control. He was in general charge of field operations carried on in cooperation with the State of Texas to eradicate the early discovered infestations of pink bollworm and was responsible for organizing and directing clean-up work. His long association with the work of pink bollworm control made him unusually well qualified to be in charge of the business operations of this project. For many years he has been the business manager of the work associated with pink bollworm control and quarantine enforcement. In 1928 he was transferred to a similar position in connection with the work on European corn borer. This assignment was terminated in 1930, when he returned to the pink bollworm project.

Mr. Puckett was a conscientious and indefatigable worker and a valuable employee.

BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO SPECIAL
NATIONAL DEFENSE ASSIGNMENTS

Buck, Fred H., Agt., Pl. Dis. Cont. (BRC), on furlough, inducted, Selec. Serv., June 25, 1941.

Crumb, Samuel E., Jr., Asst. Fld. Aide, Truck C. Ins., inducted, Selec. Serv., June 23, 1941.

Nalewaik, William J., Agt., Jap. Beetle Cont. (DED), O.R.C., Natl. G., called to active duty July 1, 1941.

Scharlach, Arthur B., Agt., PLW Cont., First Lt., O.R.C., U.S.A., Fort Huachuca, Ariz., called to active duty July 1, 1941.

Walsh, Harry S., Chief Operating Engin., For. Pl. Quar., U. S. Naval Resv., resigned July 14, 1941, to answer immediate call for active service.

FRUIT INSECT INVESTIGATIONS

Propylene dichloride for peach borer control.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that preliminary experiments have indicated that propylene dichloride is more effective than ethylene dichloride against the peach borer. Ten-percent propylene dichloride emulsion gave a higher mortality of borers than the recommended 15-percent ethylene dichloride emulsion around 3-year-old peach trees, and 15-percent propylene dichloride emulsion gave a higher borer mortality than the recommended 20-percent ethylene dichloride emulsion around 12-year-old trees. No injury to the trees has yet been observed.

Colonization of imported parasite of Japanese beetle.--J. L. King and L. B. Parker, of the Japanese beetle laboratory, Moorestown, N. J., have reported on colonization of the hymenopterous parasite Tiphia vernalis Roh. during the spring of 1941. A total of 14,000 field-collected

females were distributed in 139 colonies in New York, Pennsylvania, New Jersey, Connecticut, Rhode Island, Virginia, West Virginia, and Ohio. The colonies consisted of 100 females each, except 1 which had 200. To date a total of 1,561 colonies have been distributed in 12 States and the District of Columbia by the Bureau, in cooperation with State agencies. In addition, 1,500 females were supplied to the University of Maryland this spring for rearing purposes.

Use of carbon dioxide for anesthetizing Japanese beetle larvae.--

In connection with the production of milky-disease spore material at the Japanese beetle laboratory at Moorestown, many thousands of Japanese beetle larvae are inoculated by injection of the inoculum into the body cavity. In this work extreme care is necessary to avoid puncturing the intestine, and the activity of the grub is an important factor in the procedure. S. R. Dutky has devised a method for anesthetizing the grubs, which consists of the use of dry ice to furnish carbon dioxide gas, which is used as an anesthetic to inactivate the larvae prior to injection of the inoculum. This prior inactivation has reduced the danger of losses of the inoculum during the injection process and has greatly facilitated the handling of the larvae. He has found that larvae may be anesthetized for a period of 8 hours with little or no ill effect.

Colonization of type-A milky-disease organism.--R. T. White, of the Japanese beetle laboratory, has reported the completion of the program of colonization of the milky disease, caused by Bacillus popilliae Dutsky, in New Jersey. This work was started in the fall of 1939 and has been carried out in cooperation with the New Jersey Department of Agriculture. A total of 450 plots, averaging about 3/4 acre each, were treated, the plots being located at about 3-1/2-mile intervals throughout the infested portions of the State. Milky-disease colonization is also being carried on in Maryland, Delaware, Pennsylvania, New York, and Connecticut, in cooperation with the appropriate agencies of those States. Colonization treatments have also been made during the fall of 1940 and the current spring at Government reservations throughout the generally infested beetle area. About 5,500 acres in all have been treated--approximately 1,500 acres in and adjacent to the District of Columbia, and the balance on 43 Government reservations in Maryland, Delaware, Pennsylvania, New Jersey, and New York.

MEXICAN FRUIT FLY CONTROL

Inspection completed in June.--The annual tree-to-tree inspection on citrus fruits in the regulated area under Quarantine 64 was completed before June 30. This inspection was the most difficult on record because the excessive rains had caused weeds to grow in great abundance and prevented cultivation of a large percentage of the groves. High water, weeds, and mosquitoes harassed the workers throughout the period of the inspection. Larval infestations for the season totaled 552. They were found during the following months: November, 1; February, 17; March, 168; April, 343; and May, 23. Trap recoveries for the year amounted to only 979 adult A. ludens. Total fruit shipments for the season declined 2,257 equivalent carlots from last season's production. The total production for this year was 44,198.3 equivalent cars. Of this amount of fruit 16,595.5 cars of grapefruit and 45.4 cars of oranges were processed.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Hessian fly-resistant wheats commercially available in California.---

L. G. Jones, Sacramento, Calif., reports that a breeding program for the production of wheat varieties possessing resistance to the hessian fly and to fungous diseases was begun in 1931 by W. B. Cartwright, of this Bureau, and G. A. Wiebe, of the Bureau of Plant Industry. This program was conducted by them for several years and has since been continued by W. B. Noble of this Bureau and C. A. Suneson of the Bureau of Plant Industry. By 1938, the first fly-resistant wheat suited to California conditions, Big Club 38, was ready for release. This was developed from a cross between the fly-resistant winter variety Dawson which is not commercially suitable to California and the fly susceptible spring wheat, Big Club, a good commercial variety there. In 1938 a 3-acre plot of Big Club 38 was sown for 1939 harvest, and a 30-acre field of it was sown the following year. In 1941 a 75-acre field of the new variety showed a plant infestation of 2 percent, as compared with an average plant infestation of 79 percent, with visible fly damage, in neighboring fields of the regular Big Club. Another wheat, known as Poso 41, is now ready for increase. The development of this variety involved the transfer of fly resistance from the winter wheat, Dawson, to the commercially desirable spring wheat, Poso. Although Big Club 38 and Poso 41 both possess a high degree of resistance to the strain of hessian fly prevalent in California they are not resistant to the common fungous diseases. Progress is being made, however, in the development of varieties resistant to these diseases, as well as the hessian fly. Resistance to the fly and also to the fungous disease, commonly called bunt, has already been established in one promising variety developed from a cross between Dawson and Big Club. By the use of a stem-rust-resistant line in the breeding operations, it is hoped that a strain of the popular Big Club type possessing resistance to hessian fly, bunt, and stem rust will be ready for release in 1943.

Control of armyworm in wheat.---R. G. Dahms, Lawton, Okla., reports that the amount of poison-bran bait necessary per acre and the possibility of a bait containing less sodium arsenite than usually recommended for the control of the armyworm (*Cirphis unipuncta* (Haw.)) in wheat has recently been investigated by R. G. Dahms, in cooperation with F. A. Fenton, of the Oklahoma Experiment Station. In all cases sodium arsenite was the poison used and bran was the carrier. No molasses or other attractant was used. Under the conditions of these experiments, 10 pounds, dry weight, of bran per acre was not enough for effective control of the armyworm. Bait spread at the rate of 20, 30, and 40 pounds per acre gave approximately the same kill. More worms were killed in a shorter time when 2 quarts of sodium arsenite were used per 100 pounds of bran than when 1½ quarts were used; however, at the end of 72 hours there was only 7.5-percent difference in favor of the 2-quart strength.

JAPANESE BEETLE CONTROL

Refrigerator-car fumigation.---Preparations were completed early in June for the fumigation of refrigerator cars with hydrocyanic acid and methyl bromide. The first car was fumigated at the Edge Moor, Del., yards

on June 19. Owing to the great increase in the amount of freight being handled, all operations at this yard are confined to one track, whereas two tracks were available last year. Trains are constantly being drilled on either side of the track used for fumigation. This condition has greatly increased the danger to the men engaged in fumigation work. The number of cars fumigated was extremely light until June 26, when 14 were fumigated. From all indications, the peak at Edge Moor will not be reached until July. It is reported that, owing to dry weather, the crops in this area have been reduced approximately 50 percent. Fumigation of potatoes began at the Greenwich Yards, Philadelphia, on June 17. Up to June 26 more cars were fumigated there than at Edge Moor. One-pound cans of the fumigant were used at all points except Edge Moor and proved satisfactory. On cool days a little more time is consumed in emptying the cans, because of their lower pressure, but this is the only inconvenience encountered. Fumigation of empty refrigerator cars with HCN began in Baltimore on June 25. The same procedure was followed as last year, using liquid HCN and splashing 3 ounces in each end of the car.

Cut-flower and farm-products inspection.--Although the first emergence of adult Japanese beetles appeared to be earlier than usual, indications are that the peak flight of the insect will be no earlier than in other years. Accordingly, it was possible at the beginning of the summer quarantine on June 15, in most of the northern sections of the regulated area, to certify without actual inspection locally grown farm products and cut flowers. In the Elmira, N. Y., area, where cut-flower inspection has been a problem, arrangements were made to have all flowers grown by infested or unclassified establishments brought to a central location during certain hours for inspection and certification. Two carnation growers on Long Island started during the month to ship thousands of cut flowers each day to southern points. Shipments to these points will continue as long as prices hold, probably a few days into July. Inquiries at various estates in Westchester County, N. Y., indicated that 5 estates will make regular semiweekly shipments of cut flowers during July and August. On June 1 and 2, 5 temporary inspectors began work on the Eastern Shore of Virginia. Owing to the dry weather and the late potato season, cut flowers were the principal items inspected the first week in the month. Several large cut-flower establishments are now located in the vicinity of Cape Charles, Va. Because of the heavy infestation there, all cut-flower establishments making shipments to points outside the regulated area have screened packing sheds. Seventy-one adult beetles were removed from 1,117 boxes of cut flowers inspected in this area. On June 16, 21 temporary farm-products inspectors were employed on the Eastern Shores of Maryland and Virginia, and 18 in Delaware. Cabbage and lettuce were the first varieties of farm products offered for inspection in Virginia. String beans was the first crop to be certified from Maryland. During the month cabbage, cucumbers, garlic, onions, string beans, and white potatoes were offered for inspection. Sixty-nine beetles were removed from approximately 80,000 units of farm products inspected.

Reduced dosage of lead arsenate assists nurserymen.--Reduction from 1,500 pounds to 1,100 pounds per acre for lead arsenate treatment of nursery plots made it possible for one large New Jersey nursery to retain several sizable plots in a certified status that would otherwise have been discon-

tinued. Results of analyses of soil samples collected at southern New York establishments showed that no releading was necessary in that area. Original loading totaling about 3 acres was done at several establishments on Long Island, and for the first time in recent years lead arsenate treating of nursery plots was performed at an establishment in Westchester County, N. Y. At the Westchester nursery a block of 2,000 small Taxus was treated with this material, in order to eliminate the labor and expense of carbon disulphide emulsion treatment which for several years has been the basis of certification at the nursery. At a Long Island establishment a valuable topiary yew was loaded for shipment in the fall. A Long Island greenhouse was treated with naphthalene flakes and screened for certification. In this area there were also 6 yards of potting soil fumigated with carbon disulphide for a perennial frame. Two experimental lead arsenate treatments of growing stock were made at a Maryland nursery late in June. If the shipper is satisfied with the results, additional treatments will be made next year.

Vegetable inspection in New Jersey.—Inspection of vegetable plants was the outstanding feature of plant-inspection work in New Jersey. This required the services of three inspectors during the entire month. Several thousand more plants were certified this month than in June 1940. The largest vegetable-plant grower was from 2 to 3 weeks behind schedule in filling orders, owing to the dry weather this spring. This same establishment grows large quantities of celery plants, which are generally shipped in July, but the dry weather ruined the entire crop. The business of this firm has been boosted by orders received from a mail-order firm doing a Nation-wide business.

Certified cabbage for surplus commodities.—Arrangements were made with a representative of the Federal Surplus Commodities Corporation at Cape Charles, Va., to obtain cabbage from a certified source for shipment outside the Japanese beetle regulated area and thereby avoid the necessity for fumigation of the car after loading. Seven carloads of this produce from an uncertified source were fumigated, however. One-pound cans of methyl bromide were used at this point for the first time and worked very satisfactorily. The blowers used to circulate the gas were of the old type, with four-strap hangers for supporting them in the bunker door, making them difficult to handle and install satisfactorily. As most of the work at Cape Charles is carried on at night, this arrangement is hazardous. Officials of the Pennsylvania Railroad were advised to return the blowers to the Edge Moor, Del., railroad yards, from which they were obtained, and request replacement blowers with one-strap hangers. This change was accomplished.

Fumigation of farm products in motortrucks.—Information was requested during June by the manager of the Eastern Shore Shippers Traffic Association, Onley, Va., on the possibility of fumigating farm products in refrigerator trucks and van-type motortrucks. Observations were immediately made concerning the feasibility of this type of fumigation. After examining many trucks, it was generally agreed by members of the staff of this Division and by Heber C. Donohoe, of the Division of Control Investigations, that refrigerator trucks are tight enough to fumigate, and that with their air-circulation equipment, bunkers, and vents, they are ideal for fumigation. The van-type of truck, however, presents a different problem. Work on fumigation of the latter type was continued into July.

Railroad men instructed in fumigation procedure at Pittsburgh.--On June 19 a representative of the treating section of the Division visited Pitcairn Yards of the Pennsylvania Railroad, near Pittsburgh, to check over the fumigation equipment on hand there. An empty refrigerator car was spotted on a spur track and railroad men instructed in the fumigation procedure. The hanger arm used in supporting the blower was too long and suggestions were made for shortening it. The devices for applying methyl bromide from the 1-pound cans were found to be of an old type. New applicators were ordered by the railroad. Two gas masks to be used by the fumigators had canisters for protection against HCN. These were removed and replaced with methyl bromide canisters.

Weather vs. beetles.--In reporting to the meteorologist of the Weather Bureau at Baltimore, one of the Weather Bureau's observers at Belair, Md., on June 30 wrote: "While reporting weather conditions, we are forcibly reminded of the havoc being wielded by the Japanese beetle. The beetle is doing more damage to crops, fruits, and truck gardens than any weather conditions, including wind and hailstorms. Unless there be some remedy to offset the Japanese beetle, it will take everything of a food nature, and that looks like an omen of famine." The letter was referred by the Weather Bureau to the district Japanese beetle office in Baltimore.

Rhode Island leases beetle traps to residents.--The Rhode Island State Department of Agriculture has this year adopted the policy of leasing Japanese beetle traps to individuals and others in the State at fees of 50 cents to \$1.50 each, depending on whether or not the traps are tended by State men or by the individual renting the trap. Brayton Eddy, administrator, Division of Entomology and Plant Industry, anticipates a shortage of State traps for rental purposes.

Soil analyses completed.--Analyses of representative soil samples from lead arsenate treated nursery plots, heeling-in areas, and coldframes were completed at the Moorestown, N. J., laboratory during the month and the results were given to the nurseries concerned so that the necessary retreatments to bring the lead arsenate content up to the required dosage could be made before the July deadline.

Nursery and greenhouse scouting under way.--Assignment of scouts to survey class I nurseries and greenhouses for the presence of the Japanese beetle began in Maryland and Virginia on June 18. Beetles were found on a few plots that were uninfested last year. Heavy flight of the adult was expected early in July in this area. Extension of the scouting to more northern districts will proceed as soon as adult emergence warrants.

Copper scarcity forces grower to screen with netting.--In rescreening seven certified greenhouses at Red Bank, N. J., a large classified grower was able to obtain copper wire sufficient for only three houses. The hardware-supply house informed the superintendent of the greenhouses that it would take from 6 to 8 months to obtain delivery of additional wire. The remainder of the houses were screened with netting, which will require annual replacement.

Virginia beetle found during New York inspection.--On June 25 an inspector in New York City examining cut flowers for shipment to a point outside the regulated area found an adult Japanese beetle on cut gladiolus just received from Cheriton, Va.

Federal Housing project includes leaded plots.--One of the large nurseries in northern New Jersey has sold 42 acres of the establishment for a Federal Housing project. Twenty-one lead arsenate treated plots were included in this acreage.

Gypsy and brown-tail moth inspections.--Owing to the seasonal life cycle of the gypsy moth, only 1 egg cluster was found in the course of June inspection. This was observed on nursery stock offered for inspection. The item was refused certification and uninfested stock was substituted. Larval infestation was found in 2 truckloads and 1 carload of lumber, 2 carloads of excelsior, and 1 truckload of laurel. A total of 84 gypsy moth larvae were removed and destroyed. In addition, 42 larvae of brown-tail moth were found during the inspection of a carload of reels.

Training schools for W. P. A. Dutch elm disease scouts.--W. P. A. scout training started in the States of Connecticut, New Jersey, New York, and Pennsylvania during the first week in June. In Connecticut, since a constant general training had been carried on throughout the sanitation period, it was possible to put crews of experienced men in the field almost immediately. The training of all former and potential scouts was completed in New Jersey by June 7, using portions of 2 rainy days for instruction at field headquarters. In some districts in Pennsylvania, training was carried on in conjunction with scouting. The Pennsylvania schools were established at Philadelphia, Reading, and East Stroudsburg. In the Binghamton, N. Y., area there was no typical wilting of elm foliage that could be observed by the new men, so the time was devoted to training the men in climbing, use of naps, and writing of suspect cards. Training was stressed in the Athens, Ohio, area, advantage being taken of 2 days of heavy rain to keep the regular men in the garage and give them a review of the important features connected with scouting work. A thorough mental and physical adaptability test was used for the new men. In the Wilkes-Barre, Pa., area, 1 day was spent in training men in the principles of scouting for Dutch elm disease symptoms and in the proper use of ropes for climbing. Over 50 percent of the men in this area were experienced scouts, and with the new men distributed among the experienced crews, it is not believed that the quality of scouting will suffer for lack of a more extended training period.

Scout schools for men on regular funds.--Training of new scouts employed on Departmental funds was started on June 9, with 50 men. By June 15, 37 of these were sent to the various detached areas for summer scouting work. The following week, the scout school was continued for a large group of regular fund men. The training program was conducted on the property of the Elizabeth Water Company, in Union Township, Union County, N. J., at the same location used in previous years. In all a total of 243 men were enrolled for training and of these 205 completed the training and were assigned to Connecticut, New York, and Pennsylvania. Elm identification, Dutch elm disease symptoms, and climbing were allotted the major portion of the training

schedule. Most of the men were assigned to the field on the completion of their third day of scout school.

W. P. A. field operations interrupted pending allotment of funds.--

On June 27, owing to uncertainty as to availability of funds after July 1, the Security Wage workers were told not to return to work until notified. They turned in their tools and equipment and these were checked over. Field operations were considerably curtailed by the necessity for moving some of the county headquarters, closing garages, dismantling, packing, and loading equipment and transferring it to storage at the Newburgh, N. Y., warehouse. As this was the end of the fiscal year and the outlook for next year's program uncertain, little or no new work was started during the last week in the month, but a special effort was made to finish work already started, such as the final cleaning up of wood piles, beetle traps, and scattered beetle-infested elms.

Powder-company police arrest scout crew.--

While scouting in Belvidere Borough, Warren County, N. J., on a street opposite the New Jersey Powder Company, a Dutch elm disease scout crew was arrested by the powder company's police. The scouts were taken to the guard's office in custody, and after 1½ hours' questioning, and long after they had shown their identification cards, they were released. The men were arrested in the town and apparently not on the powder company's grounds. Their maps were confiscated but were returned to them when they were released. The foreman of the crew had previously performed work inside the fence and had received several passes from the chief guard.

Oxen get truck out of ditch.--

Timely assistance was rendered by a farmer to a Dutch elm disease scout crew in Connecticut. The crew's truck had become mired in a mud hole of a dirt road. A nearby farmer, observing their predicament, insisted upon offering aid. His yoke of oxen were soon hitched to the front bumper and with a few "gecs" and "haws," coupled with observations on the undependability of modern transportation, the farmer soon had the scouts on their way.

Hot weather wilts elms.--

As a result of hot weather late in the month, wilted elms appeared in greater numbers than had been the case in some previous summer periods. Elm leaf beetle defoliation was also becoming quite pronounced by the end of June.

Bethlehem field station and Easton garage moved to Allentown.--

The Dutch elm disease headquarters in Pennsylvania, formerly located in Bethlehem, was moved to 532 Hamilton Street, Allentown, at the end of June. The Easton, Pa., garage was also vacated and moved to 123 South Jordan Street, Allentown.

FOREST INSECT INVESTIGATIONS

Parasitization of hibernating oriental hag moth cocoons.--P. B. Dowden, of the New Haven, Conn., laboratory, reports as follows: "Last winter a number of collections of hibernating cocoons of Cnidocarpa flavescens Wlk. were made by the Massachusetts Department of Conservation in the vicinity of Boston, Mass., and sent to the New Haven forest insect laboratory for dissection. The purpose of the work was to evaluate the role being played by the imported tachinid fly Chaetexorista javana B. & B., which overwinters as a larva within this host. A total of 3,918 living cocoons were dissected. Fifty-eight percent of them contained Chaetexorista larvae, but unfortunately many of the parasite larvae were dead. Only 23 percent of the hag moth cocoons contained living Chaetexorista. These figures are of interest, when compared with similar work done the previous year. About the same number of cocoons were dissected. Forty-seven percent contained Chaetexorista larvae, and 38 percent contained living larvae of this parasite. Most of the collections were made from towns north of Boston, particularly Medford, Revere, Winthrop, Beverly, and Salem. South of Boston the host population was at such a low level that only a few small collections of cocoons could be made."

Parasite of sawfly cocoons possibly established prior to recent importations.--J. V. Schaffner, Jr., of New Haven, Conn., reports that Microplectron fuscipennis Zett. is very abundant in an infestation of the sawfly Gilpinia frutetorum (F.) in a plantation of red pine at Southington, Conn. This sawfly infestation was called to our attention early in May by members of the staff of the Connecticut Agricultural Experiment Station. The infestation is in a block of about 5 acres of red pine trees, 25 feet in height. The trees had been fed upon rather heavily in 1940, the defoliation ranging from about 25 to 60 percent. The sawfly hibernates as prepupal larvae in cocoons in the duff. Recent rearings have disclosed the species to be Gilpinia frutetorum (F.), which is of European origin, and that a very large proportion of the cocoons were parasitized by a small hymenopteron. The parasite was identified as Microplectron fuscipennis by P. B. Dowden, of this laboratory, and later verified by the Division of Insect Identification. Liberations of this parasite were made in European spruce sawfly infestations in Orange, Conn., in 1936 and in Westfield, Mass., in 1938, these points being respectively about 25 miles southwesterly and 35 miles northerly from the G. frutetorum infestation in Southington. It seems improbable that this small parasitic insect could have migrated 25 to 35 miles and increased to such a large population as is present in the Southington infestation in the 3 to 5 years since the liberations were made. It is believed, therefore, that the parasite may have been introduced into this area with its host.

Dinitrocyclohexyl phenol effective against gypsy moth.--S. F. Potts, of the New Haven, Conn., laboratory, reports that a concentration of 1 pound of dinitrocyclohexyl phenol per 100 gallons of water applied to small plots gave complete kill of fifth-instar gypsy moth larvae in 5 days. Five pounds of cryolite gave slightly better kill than 3 pounds of lead arsenate per 100 gallons of water.

Dry weather causes lowering of voltage gradient in trees.--T. J. Parr, of the New Haven, Conn., laboratory, reports that the voltage gradients in trees of all species tested have been affected by the spring drought in New England. Normally, bases of the trees should be positive to the top early in the spring, and as growth starts a reversal should take place and the tops become positive to the base. This reversal started in April, but with the onset of dry weather the gradients began to sink again, and only recently, following several rains, have the tops become positive. The gradient in all trees is lower by several millivolts than it was at this time in 1940, and it now seems probable that the effect of the drought will be evident in the voltage gradient readings throughout the year.

Period of activity of overwintering adults of *Hylurgopinus rufipes* (Eich.) during spring.--R. T. Webber, Morristown, N. J., observed that elm logs cut March 26, 1941, were attractive to active adults that were moving away from their hibernation quarters in the bark of standing living elms. The fresh-cut logs were racked in piles and covered with cheesecloth which was supported over them by a framework made of furring. This was incidental to another experiment, but afforded an opportunity to determine the period of time when most overwintering adults are active in search of breeding material. Adults were first attracted to the log piles late in April but appeared in large numbers from May 1 to May 25, then decreased rapidly in numbers until June 15, after which date no adults were attracted. The emergence of adults in the spring of 1941 from overwintering larvae did not occur until May 29. This first emergence occurred soon after the last date of extensive activity of overwintering adults--May 25. These observations indicate that there is a vast amount of attack of susceptible elm wood for breeding purposes during May. Such material thus serves as a reservoir of *Ceratostomella ulni*. Further data is being collected during this season on the activity of adults originating from overwintering larvae.

Fumigation and spray tests with hibernating *H. rufipes* adults.--R. R. Whitten and W. C. Baker, of the Morristown, N. J., laboratory, report on their experimental results for the control of hibernating *H. rufipes* adults in elm trees of small size, using orthodichlorobenzene sprays and methyl bromide fumigation. None of the spray mixtures tested gave effective control. In the methyl bromide fumigation treatments, dosages ranging from 2 to 5 pounds per 1,000 cubic feet and exposures of from 2 to 4 hours were tested. Only dosages of $3\frac{1}{2}$ and 5 pounds gave promising results and these need further experimentation before any definite conclusions can be drawn.

Experimental forest-insect control project.--J. C. Evenden, of the forest-insect laboratory at Coeur d'Alene, Idaho, reports that the experimental bark-beetle control project conducted through the cooperation of the Forest Service during May and June, to test the practicability of penetrating sprays as a means of controlling the mountain pine beetle in white pine, has been completed. During this period extremely bad weather prevailed, which tended to reduce the efficiency of the operation and to place the treatment under unfavorable conditions. However, if under such adverse circumstances the method is found to be effective, it can be adopted with safety. During this project over 1,000 trees were treated with a solution of orthodichlorobenzene and fuel oil. Experiments were conducted testing different strengths of orthodichlorobenzene, as well as the possibility of

using water with an emulsifier to supplement the use of oil as a carrier. The final results of this project will not be available until the latter part of July, when the last examinations as to the effectiveness of the spray will be made.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Semi-inaccessible infestations sprayed from autogiro.--Plans for the aerial treatment of a number of gypsy moth infestations in towns located within the barrier zone by flying over them with an autogiro owned by this project, and equipped with an apparatus which mixes the lead arsenate and fish oil in the proper proportions immediately after the materials are projected into the air, were completed before the end of May. This apparatus and the method of treatment were developed by the Bureau of Entomology and Plant Quarantine. The infestations selected for this type of treatment varied in size, and were situated on high elevations that would require the use of extremely long hose lines and which would be decidedly difficult to reach with ground-spraying equipment. It was planned to base the autogiro at a small airport in the vicinity of each section to be treated. It was expected, because of the extremely early hatch this spring, that the work would be started during the latter part of May. However, the foliage development at the higher elevations was somewhat retarded, and sufficient growth for satisfactory treatment was not present until the first of June. On June 2 the autogiro was flown from its temporary base at the airport in Turners Falls, Mass., to the Canaan, Conn., airport. The first area selected for treatment consisted of about 150 acres in Canaan. The terrain was extremely uneven and it was found that the movements of air currents over the area at certain times, particularly in the evening, were so violent that there was a decided tendency for the lead arsenate and fish-oil solution to be blown entirely outside of the area where treatment was desired. Treatment flights were practical on only one evening while the autogiro was treating this area. Conditions were usually best for treatment flights from daylight until 8 or 9 a.m. and from a little before sundown until dark. All of the aerial treatment work planned for Connecticut was completed on June 16. The autogiro then moved to a private airport in Sheffield, Mass., for the treatment of the Mount Washington infestation. The treatment of this area was completed on June 21. After demonstrating aerial treatment work at a meeting of foresters in Durham, N. H., the selected infestations in Vermont were treated. All treatments were made at the rate of 30 pounds of lead arsenate per acre.

Autogiro demonstrates aerial gypsy moth treatment.--A meeting of the New England section of the Society of American Foresters, in conjunction with the American Association for the Advancement of Science, was held on the campus of the University of New Hampshire, at Durham, from June 23 to 26. The meeting was largely attended and included prominent foresters and entomologists, and delegates from associated activities. Shortly before noon on June 24 an opportunity was given to examine the autogiro and apparatus used in the aerial treatment of gypsy moth infestations, developed by the Bureau of Entomology and Plant Quarantine. An area of ground near the University campus was then treated from the air in view of the assembly. The aerial treatment of gypsy moth infestations in the barrier zone area was interrupted for 1 day in order to make this demonstration possible.

Increased gypsy moth work in Vermont.--Shortly before the first of June a sufficient number of additional men had been assigned to gypsy moth work in Vermont to organize 2 more crews. One of the new crews was assigned to scouting in Lowell Township, Orleans County, where 3 other crews were already employed, and the other crew began work in Swanton, Franklin County. A total of 12 W. P. A. crews were then working in 5 western Vermont counties. Four of the crews were employed in Orleans County, 1 in Franklin County, 5 in Rutland County, and 2 in Bennington County. In addition, a small crew of regular employees was engaged on a special assignment in Addison County. Within a few days scouting work was discontinued in all Vermont towns, except in 1 town in Orleans County, and the crews began the spraying of infestations. Some burlapping work at infestations where thinning work had previously been done was also accomplished. Spraying work was started on May 27 in Woodford Township, Bennington County, southern Vermont, at the base of a mountainous ridge where the foliage had developed sufficiently to warrant this type of work. Spraying continued toward the summit of the ridge as the foliage expanded. The spraying of other sections was begun a few days later and progressed satisfactorily, despite the fact that most of the crews were necessarily directed by inexperienced foremen. It was necessary to discontinue spraying operations for 3 days about the middle of June. These days were scheduled as nonworking days, although they were available for make-up time. Because of the long period of fair weather, the men had no time to make up and a halt in the work was necessary.

Gypsy moth spray hose damaged by hedgehogs.--Hedgehogs have damaged many lengths of gypsy moth spray hose this season in the Massachusetts-Vermont area, by gnawing off the outside rubber casing and biting into the underlying fabric. Hose damaged by these animals is usually located in those portions of the line near ledgy and densely wooded hillsides where their dens are most commonly located. Gypsy moth spray hose has frequently been so seriously damaged by hedgehogs during the night that it burst as soon as pressure was applied on the following day.

Gypsy moth spraying in Massachusetts.--Four gypsy moth sprayers began operating at infested locations in Massachusetts, where the development of the foliage had been most rapid, on May 26; and the remainder of the sprayers assigned to the Massachusetts barrier zone area were put into active service soon after June 1. Although working under several handicaps, the progress of the work was satisfactory during the month.

Connecticut gypsy moth spraying accomplished with small crews.--Foliage development in Connecticut advanced so rapidly this season that spraying operations could be started much earlier than usual. The first sprayer in that State was put into operation on May 16, in a location where conditions were especially favorable. Another machine began work in Litchfield County on May 26, and a third machine started on May 28. Weather conditions were favorable throughout the month.

Gypsy moth spraying in Pennsylvania.--By the end of May practically all residential spraying in the Pennsylvania area had been completed, and preparations had been made to move the sprayers and equipment to woodland spraying sites in Spring Brook, Madison, Roaring Brook, Covington, Lehigh,

and Lackawanna Townships, in Lackawanna County; in Pittston, Kingston, Plains, Jenkins, and Bear Creek Townships, in Luzerne County; and in Coolbaugh Township, in Monroe County. By June 6, 25 sprayers were in operation on woodland spraying, while 2 sprayers were completing the spraying of several small and scattered residential infestations. These 2 machines, together with another recently transferred from the New England area, were available for woodland spraying by June 10. At mid-month 17 of the machines were working double shifts, 2 6-hour periods, whereas the remaining 11 machines were running on single 8-hour shifts. Seven of the latter sprayers were manned by N. Y. A. enrollees. The weather was generally favorable for spraying, although it was necessary to respray several small areas where heavy showers washed off the solution before it had had an opportunity to dry. Recent examinations of areas in Pennsylvania where spraying had been completed showed that effective killing had been accomplished. In view of the early date on which spraying was started and the generally fair weather that prevailed during the period, it is expected that satisfactory control of the insect will result this season in the treated areas.

Gypsy moth work done by C. C. C. during fiscal year 1941.--A total of 56,549 6-hour man-days were used by the C. C. C. on gypsy moth work during the fiscal year 1941, as compared with 70,630 man-days used during the previous fiscal year. The decrease in work was due chiefly to the low enrollments in the C. C. C., which caused the abandonment of many camps. Gypsy moth work was done on a total of 70,620 acres. Woodland scouting was performed on 52,873 of these acres, and open scouting on 11,690 acres. Silvicultural thinning work was performed on 2,070 acres, and burning work on 816 acres. Rebrushing was done on 1,517 acres that had been thinned during previous years. During these operations 264,274 gypsy moth egg clusters were destroyed. Only a small amount of burlapping work was possible this season, because of the necessity of using most of the available man power for spraying. During the fiscal year 1941, 161,866 trees were burlapped and 268,594 gypsy moth caterpillars and pupae were destroyed by the men patrolling the bands; however, most of this work was done during the previous larval season, which overlapped into the present fiscal year.

C. C. C. gypsy moth spraying.--C. C. C. gypsy moth work during June consisted mainly of spraying infested locations in Massachusetts and Connecticut with lead arsenate and fish-oil solution. The weather was unusually favorable for spraying operations. While some time was lost because of forest fires and rainstorms, the loss was offset to some extent by the replenishing of the water supply at several set-ups that would have had to be abandoned, had there been no rain. One sprayer operating in Massachusetts and two in Connecticut were loaned to the C. C. C. by the Bureau of Entomology and Plant Quarantine, while an additional machine was loaned by the Connecticut gypsy moth organization for work in that State. The latter organization also loaned several men to help in the work, as well as a considerable quantity of spray hose. Excellent cooperation was given by the camp superintendents during the spraying season by furnishing the men necessary to operate the sprayers, even though the camp quotas were very low. In order to do this, in some cases, all other camp projects were seriously reduced or temporarily suspended. Spraying work by the crews at two camps in Connecticut was discontinued toward the end of the month, as the supply

of lead arsenate and fish oil furnished by the C. C. C. was exhausted, and also because of the acute labor shortage at the end of an enrollment period. The Connecticut gypsy moth organization furnished an extra half-ton of lead arsenate for the use of one crew where labor was available after the original supply had been used. It is expected that sufficient materials will be available to carry the work from the camp in Massachusetts well into July, as enough was supplied to run the machine on the double-shift basis, while labor was sufficient for only one shift. By the end of the fiscal year 561 acres had been sprayed by the C. C. C. in Connecticut and 140 acres from the single camp in Massachusetts.

Administrative changes affecting C. C. C. gypsy moth work.--C. C. C. work in the corps. area, which includes the New England States, has been reorganized, all State offices have been discontinued, and many of the employees have been discharged. All C. C. C. work in this area is now administered and supervised by the United States Forest Service from their headquarters in Boston, Mass. The State foresters will initiate the projects and will contact the Forest Service through a liaison officer who will represent the State interests. Owing to this drastic reduction in C. C. C. administration and supervision, it was not possible for the Forest Service to continue the services of the C. C. C. official who has been assisting in the supervision of the C. C. C. gypsy moth work east of the barrier zone that is supervised by this Bureau. No C. C. C. gypsy moth work is now in progress in Vermont, although it is anticipated that crews will be returned to the work during the winter months. Three crews remain on gypsy moth work in Connecticut and one in Massachusetts. Although the plans of work designate 20-man crews, it will not be possible for the camps to furnish that number of men unless the camp enrollments increase considerably. The work of these remaining crews is important, as most of it is done in towns just east of the barrier zone where considerable infestation is present, and from which the spread of the insect to towns within the barrier zone is possible.

Preliminary observations on current gypsy moth defoliation.--No accurate records on gypsy moth defoliation are available at this time, as the effects of the feeding were only beginning to be visible at the end of June. However, S. S. Crossman has supplied several preliminary notes based on observations made on trips through the infested areas. Defoliation in the Massachusetts and Connecticut areas west of the Connecticut River does not appear to be so heavy and extensive as during some of the previous years, and no severe defoliations have yet been noted in this region. Three large oaks, approximately 50-percent defoliated, were observed in Simsbury, Conn., but these trees were later sprayed by the State gypsy moth force. There is considerable defoliation in the Rockingham-Springfield area in Vermont, although the damage appears to be less extensive than last year. Fairly large areas showing defoliation were observed in Walpole, N. H., across the Connecticut River from Bellows Falls, Vt.; and heavy feeding was reported in several towns in southeastern New Hampshire. Severe defoliations have already been noted in Groton, Westford, Boxford, North Andover, Danvers, Peabody, and in the Concord-Ayer section of Massachusetts, and heavy feeding by the gypsy moth has been reported from several other towns in northeastern Massachusetts. Complete defoliation of apple trees also

occurred in Essex, Rowley, and Newberry, Mass.

Previously defoliated areas examined.--Inspections of areas where one or more serious defoliations of woodland trees have occurred during the last 10 or 15 years were made during June in Granby and vicinity in Connecticut, on Cape Cod and the North Shore in Massachusetts, and in Maine and New Hampshire. A large number of oak trees and some white birch, hemlock, and spruce were found to be dead or dying. Some of the trees seem to have showed definite effects during the year following the defoliation and have been gradually dying since that time. In numerous instances the trees had been growing satisfactorily, although in poor soil and sometimes on ridges, and the drying out of the soil following the defoliation hastened their decline; however, many of the dead and dying trees had been growing thriftily in good soil with a plentiful supply of moisture. Some of the areas had been defoliated several times, while others had suffered heavy feeding for 1 year, followed by severe defoliation during the ensuing season.

PLANT DISEASE CONTROL

Southern States appropriate increased funds for white pine blister rust control.--The regional office of the blister rust control project at Richmond, Va., reports that the States in the southern Appalachian region have steadily increased their cash appropriations for cooperative blister rust control work. This is considered a good testimony of their appreciation of the control operations in the white-pine-growing sections of the Appalachian Mountains. The States concerned are Georgia, Maryland, North Carolina, Tennessee, Virginia, and West Virginia. The total cash appropriations for this group of States have increased as follows: 1936, \$1,200; 1937, \$1,005; 1938, \$7,071; 1939, \$7,839; 1940, \$9,224; 1941, \$8,300; and 1942, \$14,100. These appropriations are supplemented each year by other cooperative services including supplying office space, the value of cultivated Ribes destroyed, the services of State nursery inspectors, and similar features. The direct State appropriations for this purpose have increased almost every year, with the exception of the fiscal year 1941, during which a serious fire season prevented the State of West Virginia from making as large an allotment to blister rust control as it had anticipated.

New blister rust infections.--Blister rust on white pine was found for the first time in Shenandoah County, Va., on May 7 at the Woodstock Gap picnic ground by State leader J. G. Luce. Infected Ribes had been found in the county previously. Only one tree was found infected and it had a fair-sized branch canker in the aecial stage. The infection was about 5 years old. No Ribes were found nearby. Rust on white pine was found in the fruiting stage along the Moorefield River in Hardy County, W. Va., in May. This is the western-most location in which the rust has been found in Hardy County. The discovery of a new pine infection center on the Shasta National Forest about 14 miles west of Vollmers, Calif., in the Clear Creek drainage, was reported in June. A preliminary report indicates that several sugar pines have numerous cankers, some of them fruiting. The infection is of 1937 origin. Rust was found on western white pine for the first time in Glacier National Park at the head of Lake McDonald, in Montana.

Blister rust exhibit attracts attention.--The blister rust diorama exhibit, which was placed at three county fairs in California in May, namely, Angel's Camp, Chico, and Mariposa (all these districts being adjacent to blister rust areas), was viewed by more than 20,000 people. Considerable interest was shown by the people in the menace of the rust and many comments were overheard on the excellence of the exhibit.

Phenological data.--In Massachusetts, District Leader Brockway found the first uredinial stage of the blister rust reported on Ribes in Lynnfield Township, in Essex County, on June 2, one day in advance of a similar report from Ipswich, Essex County. A report was also received from District Leader Wheeler indicating the development of this stage of the rust on Ribes cynosbati in Southampton, Hampshire County, Mass., on June 2. The first evidence of the telial stage of the rust was reported by Mr. Wheeler in Southampton, Hampshire County, on Ribes hirtellum on June 30. This stage was also noted on July 1 on Ribes sativum (escaped red currant) in Middleton, Essex County. In Connecticut State Leader Riley reported the first uredinia on June 9, found by Mr. Miller. Mr. Riley also states that he found a little uredinial infection on June 12, but it was light. The first evidence of the uredinial stage of the rust in Vermont was recorded in Arlington, Bennington County, on June 3, and in Maryland on June 14, near Deep Creek Lake, in Garrett County. In the North Central region, uredinia was first noted on Ribes in Michigan in the Upper Peninsula on May 23, and in the Lower Peninsula on May 24, although it is believed this was in evidence at least a week earlier. In Ohio it was reported that the production of ascia began as early as April 14.

Results of initial and subsequent surveys in three Ohio counties.--Since 1933, 3 counties in Ohio--Fulton, Geauga, and Portage--have been given a second complete survey for barberry eradication. These are rural counties. The largest town, Ravenna, in Portage County, has a population of about 7,000. There are 9,234 farms in the 1,342 square miles comprising the 3 counties. Harry Atwood, in charge of barberry-eradication work in Ohio, pictures the barberry-eradication situation in these counties as follows: At the completion of the initial intensive survey 1,619,720 barberry bushes had been destroyed on 1,442 properties. If these bushes had been evenly distributed, the barberry concentration would have exceeded 1,311 bushes per square mile, or more than 2 bushes per acre, with an infested property on every 0.87 square mile of area. Only 163, or slightly more than 10 percent, of the properties were found in towns or villages; 11.6 percent were rural locations having planted bushes; and 77.8 percent were properties on which wild bushes were growing. Every sixth farm had bushes, and 1 or more bushes were found growing wild on every seventh farm. During the second intensive survey, which has just been completed, 98 new properties were found infested; 79 of these, or 80 percent, had wild bushes on them. Barberries were found on 30.4 percent of the old locations in Portage County, on 14.3 percent in Geauga County, and on 15 percent in Fulton County. During the second intensive survey of these counties a total of 140,506 barberry bushes were located. This is approximately 8 percent of the total that has been eradicated in this area. The 98 new properties represent 63 percent of the total number that have been found in-

fested. During the second survey 93.5 percent of the bushes found were on old properties. Owing to the wide distribution in these counties, at least 1 more intensive survey will be necessary and thereafter only limited areas will need attention. Geauga and Portage Counties are in the most heavily infested section of the State.

Stem rust causes slight damage to winter wheat.--Stem rust damage in the winter Wheat Belt may be briefly summarized as follows: Stem rust damage in Kansas is not expected to exceed 1 percent. In Nebraska grain is ripe, with very little if any damage in the southern part of the State. There is some green grain in the Panhandle but losses for the State as a whole will not exceed a trace. No damage is expected to winter wheat in Colorado. Damage to winter wheat in Iowa and Missouri will not exceed 1 or 2 percent, and stem rust will cause less than 1-percent damage to wheat in Illinois, Wisconsin, Indiana, Ohio, Michigan, and Pennsylvania.

COTTON INSECT INVESTIGATIONS

Effect of nicotine sulfate for aphid control on pink bollworm moths.--L. W. Noble and O. T. Robertson, of the Presidio, Tex., laboratory, report that cage tests with 4-percent nicotine sulfate-lime dust were conducted to determine whether this insecticide, when used to control aphids on experimental cotton, influenced the population of the pink bollworm moths. In previous tests nicotine sulfate sprays had been found to reduce the hatching of pink bollworm eggs. In tests with 4-percent nicotine dust, the longevity of moths was reduced slightly when cages were dusted at an ordinary rate used for aphid control. In 1 experiment in which cotton in a 4' by 4' by 4-foot screen cage was dusted as for aphid control, the 34 moths lived from 1 to 8 days, or an average of 5.59 days, whereas in an untreated check cage the 24 moths lived from 3 to 10 days, or an average of 6.29 days. In another experiment the moths were confined in small screen cylinders. The dust was applied at the usual rate and the blast was directed within 18 inches of the cylinders on 2 sides so that the drift made contact with the moths. They were stupefied by the nicotine but recovered within a few hours. The 16 moths from the treated cylinders lived from 1 to 9 days, or for an average of 5.44 days, whereas the 18 moths from the untreated cylinders lived from 2 to 9 days, or an average of 5.78 days. In a third test in which the moths were confined in screen cylinders and given an extremely heavy dosage of 4 percent nicotine sulfate dust, they were killed or did not recover sufficiently to become active. As it is the habit of pink bollworm moths in the field to hide during the day under soil surface debris or in cracks in the soil, they are not so much exposed to contact insecticides as the moths used in these tests. The results of these tests indicate that 4-percent nicotine sulfate dust applied for aphid control on cotton will not affect pink bollworm moths sufficiently to significantly affect the experimental results.

The boll weevil situation in South Carolina.--For some years comparatively few cotton growers in South Carolina have used calcium arsenate dust for boll weevil control. This has been due in part to the light weevil infestations and in part to the fact that several influential agencies in the State have discouraged its use. F. F. Bondy and C. F. Rainwater report that

more dusting was done for boll weevil control in June 1941 than in any year since 1930. This was due to the higher infestations in many fields, to the prospect of serious boll weevil damage over large areas, and to the development of the mixture of calcium arsenate with sufficient rotenone to prevent serious aphid infestations. In the hibernation cages at Florence, S. C., the emergence during May and June was 9.99 percent of the 27,500 weevils installed in cages last fall. The percentage emergence was higher this year than during any previous year since the hibernation experiments were started, and the average square infestation in the cottonfields in the vicinity of Florence was higher during the last week of June than in any June during this period, as shown by the following records:

Year	Percentage of boll weevil emergence in hibernation cages during May and June	Average percentage of square infestation during last week of June
1932-----	3.95	21.90
1933-----	7.07	15.20
1934-----	1.04	2.10
1935-----	1.71	4.50
1936-----	1.01	2.22
1937-----	7.03	16.00
1938-----	1.76	5.10
1939-----	2.54	8.30
1940-----	1.08	.90
1941-----	9.99	28.8

At Florence the weevil emergence into the cottonfields was studied by collecting all the weevils in a 1/5-acre trap planting of cotton and on a flight screen trap. No weevils were collected before May 15; in the period May 16-31, 33 were collected; from June 1-14, 592 were collected; and from June 16-30, 490 were collected. Of the total weevils collected 43.9 percent were taken after June 14, or after the time for effective mop treatment of cotton. Much of the cotton was too large for effective mopping by June 10. Bondy and Rainwater summarize the situation at Florence, S. C., at the end of June as follows: "The weather in April and May was favorable for cotton, whereas in June the weather was favorable for boll weevil development and not favorable for cotton. The boll weevil emergence in the cages was the highest since hibernation cage experiments were started in 1932. More weevils were taken from the trap crop than any year since experimental trap plots were started in 1938. More weevils were caught on the flight-screen traps than in any year since 1938, when this series of flight-screen studies was begun. The mop applications delayed the square infestation. More dusting is being done for the control of the boll weevil than in any year since 1930. Many farmers mopped their cotton early but the square infestation is now from 18.0 to 58.5 percent. These farmers have turned to the dust applications to try and save their crops."

Pink bollworm hibernation tests in Big Bend of Texas.--L. W. Noble and W. L. Lowry, Presidio, Tex., report that the percentage survival of pink bollworm larvae in hibernation tests conducted at Presidio was higher

for the winter of 1940-41 than for any winter since the tests were begun. In these tests the larvae are given treatments simulating various winter cultural practices. These treatments consist of different dates of burial at 2-inch, 4-inch, and 6-inch depths, with different date of winter and spring irrigations. The percentage emergence of moths in 1941 and during the previous 5 years for identical treatments was as follows: (1) In the series in which all plots were irrigated on March 15 the percentage of moths emerging this spring in the plots buried on November 1, 1940, was 23.31 percent, as compared with an average of 3.11 percent in 1939 and 1940. In the plots buried on December 1 the survival was 19.54 percent, as compared with 14.94 percent for the 5-year period 1936-40. In the plots buried January 1, 1941, the survival was 24.31 percent, as compared with an average survival of 10.56 percent during the previous 5 years. In the plots buried February 1, 1941, the survival was 35.25 percent, as compared with 10.74 percent during the previous 5 years. In the plots buried March 1, 1941, the survival was 31.45 percent, as compared with an average survival of 7.90 percent during the previous 5 years. The average emergence of moths in all of the plots that were buried on five different dates between November 1 and March 1, all of which were irrigated on March 15, 1941, was 26.78 percent, as compared with an average emergence of moths of 10.32 percent during previous years. (2) In the series in which all of the bolls and cocoons were buried on December 1, 1940, where the irrigation took place on March 10, 1941, the survival of moths was 18.12 percent, as compared with an average of 10.04 percent during the 5-year period 1936-40. Where irrigated on April 1 the survival was 17.84 percent, as compared with 7.30 percent during the previous 5 years. Where irrigated on April 20 the survival was 13.36 percent, as compared with 6.95 percent during the previous 4 years. Where the plots were not irrigated the survival was 6.25 percent, as compared with 4.31 percent during the previous 3 years. The average survival or spring emergence of moths for the entire series where the date of burial was December 1, 1940, was 13.89 percent, as compared with an average survival of 7.50 percent during previous years. The figures given are weighted averages. The total number of pink bollworm larvae in cocoons and bolls installed in these experiments was 39,489. The total number of moths emerging was 5,157.

Winter survival of pink bollworm in the Juarez Valley, Chihuahua, Mexico.--The first record of winter survival of the pink bollworm in the Juarez Valley is reported by Messrs. Noble and Lowry. The occurrence last fall of an unusually heavy pink bollworm infestation in the Juarez Valley (on the Mexican side of the Rio Grande, opposite the lower El Paso Valley) afforded opportunity for conducting hibernation tests in that area. This division, in cooperation with the Division of Pink Bollworm and Thurberia Weevil Control, assisted officials of the Mexican Department of Agriculture in conducting these tests. Although the percentage emergence or moth recovery from the hibernation cages was low, 10 moth specimens have been identified as the pink bollworm, thus establishing a record of winter survival in this area.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild cotton eradication in Florida.--A number of years ago a program was begun to eradicate the pink bollworm from southern Florida and adjacent keys through the destruction of the wild cotton plant, which acts as a host to this dangerous cotton insect and from which it was spreading into the main Cotton Belt. The work for the 1940-41 season was brought to a close at the end of June. The program for the season was an unusually satisfactory one, and was carried out with from 90 to 100 W. P. A. employees, approximately 200 C. C. C. enrollees, and a small number of Bureau employees. At the close of the season the C. C. C. camp was dismantled and moved elsewhere, as that organization will not participate in wild cotton eradication in Florida in the future. Three clean-ups were completed during the past season in nearly all areas, and there was a total reduction of more than half a million seedling plants, over the previous season. For the month of June, 1,347 acres was covered, from which were removed 10,188 seedlings, 34 sprout plants, and 48 plants with mature bolls. During the first week in June a program was inaugurated which had for its purpose the location and removal of dooryard cotton plants from Dade and Broward Counties. In Dade County, cotton found on more than 200 locations yielded 623 mature and 1,157 seedling plants. A very light pink bollworm infestation was found in these dooryard plants. Information obtained in Cuba, as the result of a survey for wild cotton during 1940 and 1941, proved conclusively that the pink bollworm could maintain itself on only 2 or 3 dooryard plants which fruited heavily. Consequently, in the future, dooryard cotton plants in Dade and Broward Counties will be removed each year, to prevent build-up of infestation from that source.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Studies on aphids affecting potatoes in Maine.--Upon the return of D. J. Caffrey to the Washington office, after completing a survey of the investigations on the beet leafhopper, W. A. Shands, who was drafted to serve as a substitute for Mr. Caffrey, has been assigned to a special investigation dealing with the biological aspects of aphids affecting potatoes in Maine. The investigations performed by Mr. Shands will be independent of those carried on by Theo. E. Bronson, who has returned to Houlton, Maine, to resume work on the chemical control of these aphids. It is expected that the information obtained by Mr. Shands will be of value in the application of control measures. Three species of aphids are involved in this problem including the green peach aphid (Myzus persicae (Sulz.)), the buckthorn aphid (Aphis abbreviata Patch), and the potato aphid (Macrosiphum solanifolii (Ashm.)). Little is known regarding the host plants or migratory habits of these aphids. In addition to causing a direct reduction in yield as a result of their feeding, these species of aphids transmit a disease known as "leaf roll," to which the Green Mountain variety of potato is particularly susceptible. Potato tubers affected by this disease exhibit a series of dark concentric rings within their tissue after cooking which reduces their value for culinary purposes.

Thrips control on snap beans fails to increase quality and yield of crop.--Five applications of various insecticides during the period when blossoms of snap beans were heavily infested with thrips failed to increase the quality and yield of this crop, according to an experiment conducted by C. B. Wisecup at Sanford, Fla., during April and May 1941. Four randomized blocks containing 1/65-acre plots were used to compare sprays containing pyrethrum, pyrethrum-rotenone, tartar emetic-brown sugar, and nicotine sulfate, respectively, with untreated checks. In addition to large numbers of the Florida flower thrips (Frankliniella cephalica (Crawf.)), in the blooms, a heavy infestation of the greenhouse thrips (Heliothrips haemorrhoidalis (Bouche)) developed on the leaves. None of these materials prevented an increase in the numbers of thrips, but both the nicotine sulfate and the tartar emetic-brown sugar sprays resulted in thrips populations significantly lower than in the untreated plots. No significant differences in the total weight of bean pods harvested were demonstrated, nor were there any significant differences in the calculated number of bean pods from any treatment. The use of the average weight of the beans harvested as an index of quality showed that the bean pods from the nicotine sulfate treatments were significantly superior to all others. The degree of thrips control obtained did not affect the "set" of bean pods but it appears that the tartar emetic spray affected adversely the quality of the beans produced.

Lead arsenate controls vegetable weevil on shade-grown tobacco in plant bed.--Experiments conducted by F. S. Chamberlin, of the Quincy, Fla., laboratory, have substantiated the results obtained in previous experiments indicating that lead arsenate, used either as a spray or as a dust, will readily control Listroderes obliquus Klug., which has since 1937 become a rather important plant bed pest in that area and which, when carried to the tobacco fields on infested plants, has resulted in serious injury to the stand. The experiments indicated that the arsenical will exert control in either the spray or the dust form at dosage rates of 3 pounds per 100 gallons of the spray or $\frac{1}{2}$ pound of the dust per 100 square yards of plant bed space. Two or three applications during the latter part of the plant-bed growing season usually serve to give sufficient protection against the insect.

Early plowing of winter cover crops reduces wireworm infestation in irrigated lands.--M. W. Stone, of the Ventura, Calif., laboratory, in investigations conducted during 1940-41 with winter cover crops in areas infested by Limonius californicus (Mann.), found that increased wireworm populations will result after even 1 year's planting of winter cover crops, if they are allowed to remain standing during the time of adult emergence or until the last week in March or the first week in April, as was the case in the experimental plots. The following table shows the kind of cover crops tested and the average number of larvae per square foot of soil 16 inches deep in 1940 and in the early and late plowed plots in 1941.

Cover crop	1940	1941	
		Early plowed	Late plowed
	Number	Number	Number
Barley-----	1.10	0.75	2.31
Mustard-----	1.26	.54	.94
Clover-----	1.09	.42	1.15
Vetch-----	1.45	.28	.72
Fenugreek-----	1.47	.47	.69
Control-----	1.05	.40	.33
Average (cover crop)----	1.27	0.49	1.16

The above results were based on cover crops planted between November 1 to 6, 1939, in 3 fields, in a randomized-block arrangement of plots, there being 16 replicates of the cover crops, barley, mustard, clover, and fallow plots and 12 replicates of the vetch and fenugreek. Half of the replicated plots were plowed under on February 20 and the remaining half from the last week in March to the first week in April 1940. A total of 20 in 1940 and 24 in 1941 1/4-square-foot samples of soil to a depth of 16 inches were taken at random from each plot and sifted prior to the planting of lima beans in May and June 1940-41.

Green June beetle larvae in tobacco plant beds controlled by gasoline and ethylene dichloride emulsion.--In experiments conducted by L. B. Scott and Joe Milan, of the Clarksville, Tenn., laboratory, on the control of Cotinis nitida (L.) in tobacco plant beds, it was found that both gasoline and the ethylene dichloride emulsion are effective for the control of the larvae when applied by pouring into small holes spaced 18 inches apart in both directions. The emulsion was applied at the rate of 4.7 gallons per 100 square yards of bed (1.5 ounces per hole), whereas the gasoline was applied at the rate of 12.5 gallons per 100 square yards of bed (4 ounces per hole). Examination of the top 12 inches of soil 3 days after the materials were applied showed that the emulsion had killed 88.54 percent of the grubs, whereas the gasoline had killed 67.01 percent. The material caused only slight damage to the tobacco plants. Mustard oil emulsion, kerosene extract of pyrethrum, carbon disulfide emulsion, paris green-bran bait, paradichlorobenzene crystals, paradichlorobenzene in kerosene oil or cottonseed oil, and calcium cyanide failed to provide satisfactory control, the calcium cyanide causing very severe plant damage.

Effect of sugars on production of eggs by narcissus bulb fly.--In experiments conducted at the Sumner, Wash., laboratory, Paul M. Eide found that sugars fed to the narcissus bulb flies kept in cages for the purpose of producing eggs for ovicidal studies had a pronounced effect on the egg laying of these flies. Flies which had only pollen and water available deposited an average of only 8.2 eggs per female, as compared with those furnished maltose, the lowest of the sugar fed flies, which laid an average of 39.1 eggs. The average egg deposition of flies furnished sucrose, plus pollen, was 98.1. The apparent order of influence, as indicated by totals of eggs deposited in 11 series or replications, was sucrose plus pollen, levulose, sucrose alone, dextrose, honey, and maltose. This information is of considerable importance from the standpoint of bait sprays, as it is of interest to know that feeding of the flies must precede egg laying.

INSECTS AFFECTING MAN AND ANIMALS

Clear Lake gnat as a possible food for fish reared in hatchery.--According to A. W. Lindquist, of the Nice, Calif., laboratory, arrangements have been made with the California Fish and Game Commission and a private fish hatchery to carry on some tests using gnats caught in light traps as fish food in hatcheries. There is a possibility that these gnats may provide a valuable supplemental source of factor "H" and others that promote growth and reduce death losses. The gnats are kept in cold storage to prevent decomposition. If a profitable use could be found for the great numbers of gnats obtained in light traps, their control would be greatly augmented with funds so obtained.

Healing extracts of maggots popularized by the press.--During the last month, two popular articles have appeared regarding William Robinson's discoveries on the healing extracts of maggots. One, published in the Du Pont magazine for June, was entitled, "Exit--Wearing Halo, Maggots Saved Lives before Men Knew Why. Modern Science Solved the Riddle, and Now Carbanide, Synthetic Urea, Is Medically Approved in the Healing Arts." The other article was in the June 14 issue of Collier's and is called "Humble Healers."

Cooperative advisory service in control of cattle grubs.--Reports from J. Myron Maxwell to E. W. Laake, of the Dallas, Tex., laboratory, indicated that more than 15,000 cattle in 31 counties in Oklahoma were treated with the standard cube-soap wash during the past winter season. The treatment was under the supervision of the county agents and resulted directly from demonstrations made by the personnel of the Dallas station during the 1939-40 cattle grub season. Two pure-bred herds were treated systematically with the cube-soap wash in Cherokee County, Tex., throughout the last grub season, with practically 100-percent kills of grubs.

Rearing stableflies.--Craig Eagleson, of the Dallas, Tex., laboratory, reports that a very decided improvement in the larval medium has been effected by mixing an equal part of wet peat moss with the fermented chopped alfalfa used as the matrix of the medium. Dr. Eagleson states that, although a complete generation has not been reared on this medium, the large size of the first crop of pupae reared in it was very satisfactory.

Control of sand flies in diked and undiked marshes.--Isolations of larvae from soil samples obtained from diked and undiked marshes during 1939 by J. B. Hull and S. E. Shields, of the Fort Pierce, Fla., laboratory, showed that a reduction of 89.88 percent of the breeding resulted from the use of dikes and pumps. Sand flies emerging in cages placed on the diked and undiked marshes also indicated that 90.65-percent control was obtained. Of the remaining 9.35 percent of the sand fly larvae not controlled in the diked areas, breeding was found to occur in wet soil of the ditches and in low places which did not become dry. During the last quarter highly significant differences were found in diked and undiked marshes within the ditches and at distances of 10, 20, 40, and 75 feet from ditches. In no location was there a significant difference between the mangrove and pickleweed areas.

Persistence of single infestation of American dog tick.--C. N. Smith, of the Vineyard Haven, Mass., laboratory, reports that during April, May, and June no larvae, 1 nymph, and 466 adults appeared in a plot in which various factors were controlled. Hosts of adults were excluded and mice provided on which seed ticks and nymphs could feed at will. The plot was prepared and infested with eggs in 1939. The peak of adult activity was in mid-April, adults declining in numbers steadily until only 22 were found on June 13, 1941.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--A living adult of the lygaeid *Acroleucus vicinalis* Dist. was taken at Laredo on June 4 with pineapples in cargo from Mexico. Two living larvae of the Mexican fruit-fly (*Anastrepha ludens* (Loew)) were intercepted at Del Rio, Tex., on April 14 in grapefruit in baggage, and another at Houston, Tex., on June 6 in an orange in quarters, both fruits being from Mexico. A living larva of the trypetid *Anastrepha mombinpraeoptans* Sein was found at Mobile, Ala., on June 2 in mango in stores from Cuba. One living adult of the elaterid *Diasterius cribratus* Lec. was intercepted at Laredo on May 22 with pineapples in cargo from Mexico. Living larvae, pupae, and adults of the otitid *Euxesta stigmatias* Loew were found at Brownsville on June 3 in green corn in baggage from Mexico. Specimens of the coccid *Formosaspis nigra* (Takah.) were taken at the Inspection House, Washington, D. C., on January 29 on the leaf of *Schizostachyum dumetorum* in cargo from China. A living larva and pupa of the gelechiid *Gnorimoschema plaesiosema* (Turner) were found at New York on June 4 in potato in stores from Peru. The coccid *Kuwanaspis vermiformis* (Takah.) was taken at the Inspection House, Washington, D. C., on January 30 on *Phyllostachys* sp. in express from China. The coccid *Lepidosaphes okitsuensis* Kuw. was intercepted at the Inspection House, Washington, D. C., on February 21, 1940, on *Shortia uniflora grandiflora* in mail from Japan. Living larvae of the curculionid *Palaeopus costicollis* Marsh. were intercepted at New York on May 21 in yam and sweetpotato in baggage from Jamaica. Five living and one dead larvae of the pink bollworm (*Pectinophora gossypiella* (Saund.)) were found at Laredo on May 13 in seed cotton in a box car coming from Mexico. Living larvae identified as probably *Rhigopsidius tucumanus* Haller, the Argentine potato weevil, were taken at Seattle on May 27 in potatoes in stores from Peru. Living specimens of the mango weevil (*Sternochetus mangiferae* (F.)) were intercepted at San Francisco on May 27 in mango seed in baggage from Hawaii.

Pathological interceptions of interest.--Ascochyta pisi Lib. was found on May 22 at New York on *Vicia faba* pods from Portugal. *Ascochyta* sp., unlike anything reported on *Broneliaceae*, was intercepted at Hoboken on February 21 on a broneliad in mail from Costa Rica. *Ascochyta* sp. was intercepted on April 24 at Laredo on leaves of *Epidendrum* sp. and *Lycaste* sp. in baggage from Mexico. *Asterina delitescens* Ell. & Martin was intercepted on March 28 at El Paso on red bay leaves in baggage from Mexico. *Cercospora angreci* Ferrill & Roum. was intercepted on May 23 at Brownsville on *Laelia* sp. in airplane baggage from Mexico. The same fungus has been determined on a *Cymbidium* sp. leaf from India (apparently first report from India), intercepted in a mail shipment on December 23, 1937, at Washington.

Another belated report is Colletotrichum orchidearum Allesch, intercepted on Vanda sp. (apparently first report on Vanda) in mail from the Philippines on September 26, 1940, at Hoboken. An undetermined species of Phomopsis resembling a stage of Diaporthe eres Nit. was intercepted on May 8 at Seattle on a magnolia plant from England. Diplodia paraphysaria Sacc. was intercepted on special-permit orchid plants from Guatemala on May 2 and from Venezuela on May 17 at San Juan. Diplodina sp. was intercepted on May 13 at Seattle on Ephedra vulgaris from China. Hemileia oncidii Griffon & Maub. was intercepted at Hoboken on April 22 on Epidendrum sp. and on May 26 on Oncidium sp., both being special-permit mail shipments from Costa Rica. Heterodera marioni (Cornu) Goodey was intercepted on May 26 at Miami in carrots from Bahamas. Kuehneola malvicola (Speg.) Arth. was found on April 17 at Roma, Tex., on a plant of Hibiscus cardiophyllus from Mexico, intended for propagation. Leptosphaeria eustoma (Fr.) Sacc. was found on April 13 at New York on banana leaves in stores from Cuba. Macrophoma oncidii P. Henn. was intercepted on April 2 at San Francisco on Cypripedium haynaldianum in mail from the Philippines. Microthyrium sp. (no previous reports found on Orchidaceae) was intercepted on March 26 at Brownsville on Epidendrum sp. from Mexico. Mycogone sp. (no species reported on orchids) was found on August 22, 1940, at Hoboken, on Cattleya sp. from Brazil. Pestalozzia sp. (no species found reported on the host genus) was intercepted on February 24 at San Francisco on Marica coerulea grandiflora from Costa Rica. Phoma bakeriana Sacc. was intercepted at New Orleans on August 11, 1940, on Vigna sinensis pods from Dutch Guiana. Phyllosticta laeliae Keissl. was intercepted on August 12, 1940, at Seattle on Cattleya sp. from Costa Rica. Phyllosticta sp. (the same undescribed species previously intercepted on orchids from West Indies, Central America, and Japan) was intercepted at Seattle on April 12 on Dendrobium phalaenopsis from the Philippines. Pratylenchus pratensis (de Man) Fil. was intercepted on May 21 and Rotylenchus bradys (Steiner & Le Hew) Fil. on June 4 at New York in yams from Jamaica. Selenophoma sp., unlike anything found described on orchids, was intercepted on September 25, 1940, on Laelia sp. from Brazil, and a similar fungus on April 1, 1941, at Hoboken on Oncidium sp. from Guatemala. Septobasidium prunophilum Couch was found on April 30 at San Francisco on Prunus sp. twigs in stores from Japan. Uredo oncidii P. Henn. was intercepted on April 23 at Hoboken on Oncidium sp. from Guatemala. Uredo sp. was intercepted on May 15 at Hoboken on Batemannia sp. in mail from Costa Rica.

DOMESTIC PLANT QUARANTINES

The grasshopper situation.--The grasshopper infestation throughout the Great Plains States is in general much lighter than in 1940. Rains during June delayed grasshopper development and at the same time produced lush marginal vegetation, which in many instances held grasshoppers out of crops. The principal infestations occur in the following areas: (1) In Minnesota a heavy infestation of the two-striped grasshopper (Melanoplus bivittatus Say) exists in the Red River Valley. Widespread baiting operations are in progress in 3 northwestern counties, but have been delayed somewhat by unfavorable weather and extensive farm operations. Over 3,600 tons of wet bait have been spread in Kittson, Marshall, and Polk Counties. (2) In central South Dakota the same species is reported as developing increased local migrations into small-grain fields with crop

injury severe in places. Sufficient bait materials are on hand to meet immediate needs in this area but there is a lack of farmer interest in the spreading of bait. (3) In Kansas an infestation of the lesser migratory grasshopper (M. mexicanus Sauss.), estimated to cover approximately 500,000 acres, recently developed in the southwestern counties, resulting in flights in a north and northwesterly direction into Colorado, Nebraska, and possibly Wyoming, throughout the latter part of June. These flights were made, however, before damage to small grains occurred. Farmers displayed little interest in baiting in this wheat-growing section, apparently hoping that harvesting would be well under way before damage could be serious. A study to determine the direction, extent of the migrations, and the resultant changes in population at the origin and termination points of the flights is being made by control supervisors and survey inspectors, in cooperation with workers from the grasshopper-research office at Bozeman, Mont. (4) In Arizona a severe infestation of M. mexicanus developed early in June in the Sulphur Springs Valley, covering approximately 1,000,000 acres of range and desert land in Cochise and Graham Counties. Small crop areas adjoin the infestations. Populations in these fields ran as high as 50 per square yard and flights occurred on June 12 and 13, extending northeastward into the margin of Gila Valley. A careful survey will be made of these migrations and others which may occur. It was deemed inadvisable by the local ranchers and farmers to attempt control measures on a large scale against this infestation because of the wide distribution over range land. It is believed that damage to the range will not be excessive, except in very localized areas. Sufficient bait materials have been sent to meet the needs of the farmers in protecting cultivated areas, and bait spreaders and mixers have been made available to the local agencies. (5) In Texas, baiting decreased in the south and east-central areas, where the differential grasshopper (Melanoplus differentialis Thos.) reached the adult stage. This infestation, which was particularly threatening a month ago, now seems to be well under control.

Armyworm infestations subsiding.--The outbreak of armyworm (Cirphis unipuncta Haw.) in the Oklahoma and Texas Panhandles, as reported in the July 1, 1941, issue of the News Letter, had subsided by the early part of June, and most of the worms had entered the pupal stage. Farmers in the areas where armyworm infestations first developed reported that baiting was instrumental in saving a good portion of the small grain from destruction.

The Mormon cricket situation.--Mormon crickets are reaching maturity throughout the infested States and in most places oviposition is in progress. Bands of younger crickets, however, continue filtering down from high altitudes. Egg deposition of the Coulee cricket, Peranabrus scabricollis Thos., was practically complete by the end of June. The intensive control operations in Oregon where bait was being spread by aircraft has been brought to a close, with the exception of 2 heavy migrations north of the Warm Springs Indian Reservation, where baiting is still in progress. Kills of Mormon crickets with sodium fluosilicate bait by airplane strip-baiting ranged from 95 to 100 percent during periods of favorable weather, and from 50 to 75 percent on days unfavorable for cricket feeding. Owing to a lighter infestation of Coulee crickets, strip-baiting of this species resulted in kills averaging only about 80 percent. In Nevada general activity of the Mormon cricket during June was less than expected, owing to

cool weather and continued rains. During the last week in the month, however, cricket migrations increased in intensity. In Idaho cooperation in large-scale control measures by volunteer sources has continued to afford excellent crop protection. In Jefferson and Madison Counties, Idaho, an average of 50 volunteer workers donated their services each day during the week ended June 21, and also furnished trucks and teams for hauling and spreading bait to fight heavy bands of crickets along an 8-mile front. Forty-five tons of sodium fluosilicate bait (dry weight) were spread. Excellent control was obtained, dead crickets being observed to the extent of 70 to 80 per square yard. Moderate to heavy localized migrations of crickets also occurred in Yellowstone and Big Horn Counties, Mont., in Juab and Tooele Counties, Utah, and in Hot Springs, Sheridan, and Washakie Counties, Wyo. Crop damage was prevented or held to a minimum in all these areas. Mormon cricket migrations in south-central South Dakota were halted early in June, after which the crickets scattered, and little crop damage occurred.

White-fringed beetles emerge.---Adult white-fringed beetles were observed during June at various points in the infested States and by July 10 emergence was observed in all the infested areas. Except in New Orleans, where a large percentage of the insects have now reached the adult stage, peak emergence is expected between the 10th and 20th of July.

White-fringed beetle control under way.---In accordance with the provisions of the program of work which called for the application of control measures, such operations are being conducted cooperatively with the States, and will be continued through the period of peak emergence of the beetles in the areas as a whole in places where the infestations are of such a nature as to present an appreciable hazard of artificial or natural spread. Such work is also being continued in the 5 areas of isolated infestations on which an attempt is being made to determine the effectiveness of different methods as to each type of area, with eradication as an objective. At Bolton, Miss., which is one of the areas where eradication is being attempted, 28 recently emerged beetles were found, of which 26 were dead, indicating the effectiveness of control measures. Later, some 60 beetles, most of which were dead, were found in the same yard.

Chinch bug infestations light.---Because of the prospects of heavy chinch bug infestations in Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, and Oklahoma, as indicated by the survey conducted by the Bureau in the fall of 1940 and by reports from State officials during the winter, the Secretary, on June 9, allotted for chinch bug control funds from the appropriation for the control of emergency and incipient outbreaks of insect pests and plant diseases. State officials kept the Bureau informed as to developments of infestations throughout June and inspectors were assigned by the Bureau as requested to assist them in estimating needs for creosote, and in supervising its distribution. Heavy rains occurring at frequent intervals throughout the infested areas during June and the early part of July, reduced the populations of chinch bug nymphs and produced a heavy growth of vegetation, which in many instances kept the insects in small-grain fields after harvest and thereby reduced migrations into corn. Fungus disease, occasioned by the dampness, also contributed to the further destruction of these pests. Consequently,

the need of constructing creosote barriers to protect cornfields was minimized and requests for creosote came from only a few counties in the entire chinch bug area. By July 10 a total of 270,850 gallons had been purchased and delivered, as compared with nearly 2,150,000 gallons used by July 10 of last year. The situation, as reported in the early part of July by State leaders and field scouts, indicated that little, if any, more creosote would be needed. The most severe threat to corn this spring existed in Kansas, Nebraska, and Iowa, but even in these States the infestations were very spotted and generally light, in comparison with last year's infestations.

Phony peach inspection.--In the phony-diseased area nursery environs inspections were made the first order of business in June. Over 22,000 properties were inspected in 12 States and it is probable that, with a very few exceptions, all the 388 nurseries, the surrounding zones of which were inspected, will meet certification requirements.

Peach mosaic inspection.--During June, orchard inspection for the peach mosaic disease was continued in Arizona, California, Colorado, New Mexico, Texas, and Utah. In California the number of trees found infected represented a reduction of 25 percent over last year. In Colorado the finding of 7,147 mosaic trees in Mesa County represents an increase of 2,065 over the 1940 season.

Fifteen States assist in peach-tree inspection.--In the 18 States in which inspection was conducted for both the phony peach and peach mosaic diseases, State cooperation was represented by 67 field supervisory employees and 1 office worker. Of these, the State of California assigned 16, Colorado 13, Alabama 9, Texas 5, Utah 5, Tennessee 4, Mississippi 3, Arkansas 2, Georgia 2, Illinois 2, Louisiana 2, North Carolina 2, Kentucky 1, Missouri 1, and South Carolina 1.

Citrus canker eradication.--A close recheck in June of the 6 properties at Navasota and 2 properties at Corpus Christi, Tex., where citrus canker was discovered early this year, resulted in finding no indications of the disease at this time. Orange trees which had been sold from the infected nursery at Corpus Christi to local residents were also inspected, with negative results. The 6 Navasota properties were searched for seedlings developing since the hedges were eradicated, with the result that young seedlings were found on 3 of the properties--nearly 20,000 on 1 property--while the other 3 properties remained apparently free from them. Inspection was also conducted in June in the Texas counties of Milam, Colorado, Fort Bend, and Harris, and tree-removal work in Grimes, Galveston, and Brazoria Counties. The force employed in Texas was comprised of 21 Federal inspectors, 1 State man, and 128 W. P. A. laborers.

CONTROL INVESTIGATIONS

The use of fatty acids in insecticidal aerosols.--W. N. Sullivan and J. H. Fales, of this Division, with L. D. Goodhue, of the Division of Insecticide Investigations, have shown that some relatively nonvolatile compounds, when applied in smoke or fog form, show promise as fumigants

against insects. This development makes possible the use of safe and inexpensive insecticides formerly considered impractical because of difficulties in producing effective concentrations at room temperatures. In practice a solution of the insecticidal material was sprayed on a heated surface. On coming in contact with the hot surface, the solvent was evaporated with explosive violence, and any dissolved material that does not vaporize readily was reduced mechanically to colloidal dimensions. That is, the insecticide was dispersed as an aerosol consisting of a suspension of the solid or liquid particles in air. By this method of volatilizing it was possible to keep the insecticide dispersed in an enclosed space for a long time. The rate of evaporation was also greatly increased and the maximum vapor concentration was quickly obtained because of the tremendous surface of these small particles. The potency was further increased by the direct contact action of these small particles. The apparatus used in this work consisted of a small nasal type atomizer mounted 4 inches above the center of an electric hot plate held at 375° C. A small electric compressor was used to maintain the air pressure that operated the atomizer. To stabilize and increase the toxicity of these insecticidal aerosols, fatty acids (lauric or oleic) were added to the spray solution. It was shown with biological tests against the housefly that these materials increased the effectiveness of orthodichlorobenzene. The relative effectiveness against houseflies of these tests, in 30-minute exposure periods, are given in the following table. Orthodichlorobenzene was used at the rate of 0.28 cc. per cubic foot and the fatty acid at 0.071 gram per cubic foot.

Material tested	Insects tested:		Mortality after 2 days	
	Number		Percent	
Orthodichlorobenzene-----	609	:	2	
Orthodichlorobenzene plus oleic acid:-	440	:	55	
Orthodichlorobenzene plus lauric acid:	471	:	60	
Lauric acid-----	216	:	1	
Oleic acid-----	220	:	1	

Although lauric and oleic acids are substantially inert when used alone, under the conditions of these tests they act as adjuvants when combined with orthodichlorobenzene and greatly increase the effectiveness of the aerosol. Certain fatty-acid derivatives, such as salts, esters, and the like, also gave increased insecticidal action. The results were corroborated by room tests against the roach and the bedbug, where a 100-percent mortality was obtained by using 1.5 pounds of orthodichlorobenzene containing 5 percent of lauric acid per 1,000 cubic feet. This method of producing an aerocolloidal dispersion by spraying liquid toxins on a heated surface might be of use to bacteriologists, who have found bactericidal aerosols effective in decontaminating rooms. A note on this subject has been accepted for publication in Science.

INSECTICIDE INVESTIGATIONS

Use of aerosols discussed at Durham meeting.--L. D. Goodhue presented a paper on the application of the aerosol to fumigation before the meeting of the American Association of Economic Entomologists at Durham, N. H., on June 25 and 26, 1941. This was a discussion of the work carried on in cooperation with W. N. Sullivan and J. H. Fales, of the Division of Control Investigations. Since the use of aerosols for the control of insects is not generally familiar to entomologists, an explanation of their properties was given. It was shown that solid insecticides could be separated into particles small enough to stay suspended in air for as long as 24 hours, thus making possible the use as fumigants of nonvolatile compounds that could not be used in any other way. A small laboratory testing chamber was described in which insecticides in solution are sprayed on a hot surface to produce the aerosol. Approximately 200 organic compounds have been tested in aerosol form against the housefly in this apparatus. Some of the most toxic compounds were rotenone, pyrethrum, 3-chloroacacenaphthene, 3-chlorodibenzofuran, xanthone, phthalonitrile, and pentachlorophenol. Considerable interest in this new method was shown. The proceedings of the symposium are to be published in book form.

Composition of a commercial geraniol used in Japanese beetle baits.--About 25,000 pounds of commercial geraniol are used annually in baits for the Japanese beetle. The approximate percentage composition of the commercial geraniol studied by Howard A. Jones and H. L. Haller, of the Division of Insecticide Investigations (see News Ed. of Amer. Chem. Soc. Jour. v. 19, No. 12, pp. 683-685, June 25, 1941) was as follows: Terpenes, 4; aldehyde, 1; citronellol, 17; nerol, or geraniol not combining with calcium chloride, 7; citronellyl acetate, 2; geraniol, 34; geranyl acetate, 8; geranyl butyrate, 0.2; eugenol, 1; gamma-cadinene, 8; elemol, 10; gamma-cadinol and other sesquiterpene alcohols (by difference), 7; bieugenol, 0.2; zinc salt, 0.2. The material appears to be a fraction of citronella oil comprising the major portion of the distillate remaining after the removal of most of the citronellal, with a small proportion of terpenes added back.

BEE CULTURE

Self-fertilization is being accomplished in the honeybee.--Otto Mackensen, Baton Rouge, La., reports: "Queenbees have been successfully mated with their sons. The consequence of such matings is the same as self-fertilization, since a queen's sons are produced from unfertilized haploid eggs. To accomplish such matings it is necessary to force virgin queens to begin laying by preventing mating flights, and then to inseminate them with sperm from their sons as soon as these have become sexually mature. The queens are caged for 3 days before insemination to retard egg production so that the oviducts will be empty and ready to receive semen. In most cases at least a few worker progeny are produced. This technique is expected to be useful whenever severe inbreeding is desirable."

Live-bee demonstrations prove interesting to individuals inexperienced with bees.--The Division's sublaboratory maintained at the Fruit and Truck Branch Experiment Station of the University of Arkansas, at Hope, Ark., is frequently visited by agricultural groups who come to the station

to attend meetings of various kinds. S. E. McGregor, in charge of the sublaboratory, describes his method of handling such groups as follows: "Giving a live bee demonstration has proved more interesting than a monologue on bees and bee behavior to groups visiting the University of Arkansas Fruit and Truck Branch Experiment Station. A screen cage has been built to fit over the bed of a pick-up truck and when the time comes to give the demonstration a colony of bees is picked up in the apiary and set into the truck, which is then driven directly into the amphitheater in which the crowd is assembled. Before entering the cage, a short talk is given on proper preparation, during which time the veil and gloves are donned and the smoker is lighted. When giving the demonstration, frames of honey, brood, and bees are held up where they can be seen plainly by the audience. Some humor can be added such as finding a mosquito in the cage, getting too hot and having to remove gloves, veil, and finally shirt; or showing how a swarm may be brought home in your hat so that if you meet the owner you merely put your hat on and walk by unsuspected. This immediately brings a dare from someone in the audience to see this done and after telling him how crazy he is for really taking you seriously, you absent-mindedly put the hat on your own head, much to the delight of the audience. This type of talk is of special interest to those persons who have never before seen inside a modern bee hive."

INSECT IDENTIFICATION

Bruchus hamatus Miller intercepted.--Adults of B. hamatus Miller were found recently in a shipment of seeds from Leningrad. The seeds are very similar to those of Lathyrus vernus Bernhardt and probably belong to this or a closely related species. The latter plant, collected in Turkey by Westover and Wellman in 1937, was found heavily infested by Bruchus hamatus. No previous host-plant record has been found. Although the recent shipment of seeds was sent from Leningrad, it is probable that it originated from farther south in Europe, as the known distribution of the bruchid is confined to islands of the Adriatic Sea, Greece, Syria, and Turkey. Lathyrus vernus is an ornamental, erect, perennial pea with flowers $3/4$ inch long. It is but little known in America.

An interesting ant submitted from Africa.--Recently there have been submitted for determination some ants which are important coffee pests at Denbia, Africa. They were sent by R. L. Steyaert, Division de Phytopathologie, Banbesa, Belgian Congo. Concerning one of the forms, a species of Macronischoides, apparently africanum (Mayr), Mr. Steyaert writes as follows: "Two or three bites (of this species) are sufficient to induce high fevers and extreme pain and stiffness in the limbs. It is also usual to have swellings of the glands under the armpits." M. R. Smith states that it is probable that the sting rather than the bite is responsible for the pain and fever.

Calonycterus setarius Roelofs in Illinois.--First reported from North America at Yonkers, N. Y., in 1930, this Japanese weevil has since been found in Connecticut, Massachusetts, Pennsylvania, and Maryland; and in a collection sent for identification by the Illinois Natural History Survey are two specimens of C. setarius labeled "Arlington Hts., Ill., Aug. 26, 1940, V. A. Sturn."

Urania fulgens (Bdv.) collected in Texas.--A single specimen of the day-flying moth Urania fulgens (Bdv.) collected at San Antonio, Tex., April 7, 1941, was sent in recently by Dee Montgomery. Two specimens were taken on April 17, 1941, at Austin, Tex., by C. D. Orchard. These are the first records of this species' being found in the United States. Specimens were numerous at both localities during April and were frequently seen feeding on wild garlic (Allium sp.). There are numerous published records of Urania fulgens (Bdv.) migrating toward the north from southern Mexico and Central America and it is not surprising that some specimens should reach Texas.

Anuraphis apiifolia Theo. intercepted from Portugal.--Specimens of Anuraphis apiifolia Theo. were taken at New York on a shipment of celery from Portugal. This is the first time the species has been intercepted in this country and its first known record from Portugal. Previously it has been recorded from Egypt and Morocco.

Psylla spartii (Guer.) in Washington.--Specimens of a psyllid collected from Scotch broom (Cytisus scoparius Link) at Vashon Heights, Vashon Island, Wash., on May 1, 1940, by W. W. Baker, of the Division of Truck Crop and Garden Insect Investigations, have been identified as the European Psylla spartii (Guer.). Although a few specimens of the species were collected at Fort Lewis, Wash., in 1935, by R. H. Beamer and P. W. Oman, the specimens submitted by Mr. Baker constitute the first adequate sample of the species from an American source and made possible its determination. Psylla spartii has been reported as abundant on broom in central Europe and England.

New distribution records for two Scarabaeidae.--Anomala orientalis Waterhouse has been collected in the District of Columbia by E. A. Chapin, of the National Museum. This is the first record of this species in the District. So far it has not been recorded from Maryland. Beetles reared from a considerable number of larvae collected early in April at Pittsville, Md., have been identified as Hoplia equina Lec. This is the first record of the occurrence of this species south of Massachusetts. The larvae were at the roots of a hedgerow consisting of small Liquidambar shrubs growing on the banks of a drainage ditch.



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UNITED STATES
DEPARTMENT OF AGRICULTURE



BUREAU OF
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NEWS LETTER

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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JULY 1941

Vol. VIII, No. 9

(Not for publication)

September 1, 1941

G. A. Runner Dies

In the death of George A. Runner on July 11, the Bureau of Entomology and Plant Quarantine lost one of its older employees. Mr. Runner was born in Ottawa County, Ohio, November 16, 1876. He attended Ohio Northern University at Ada, Ohio, and Southwestern Presbyterian University at Clarksville, Tenn. From July 1907 to early in 1909 he was in the employ of the Louisiana State Crop Pest Commission. On May 1, 1909, he was appointed "Agent and Expert" in the Division of Southern Field Crop Insects, and carried on investigations of the insects affecting tobacco and other crops for about 8 years (with the exception of a short detail to the Federal Horticultural Board in 1914 and 1915). In May 1917 he was transferred to the Division of Deciduous Fruit Insects and assigned to studies of grape insects at Sandusky, Ohio, which remained his station until his death. Mr. Runner was shy and retiring, and rarely attended entomological meetings, but was held in high esteem by the professional workers and growers who became acquainted with him. He possessed a wealth of practical information on grape insects and their control, as well as on many other phases of grape culture, which has proved particularly valuable to the conferences held in recent years to discuss the grape-insect problems of the Great Lakes region. Mr. Runner is survived by his widow, two sons, and a daughter.

BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO
SPECIAL NATIONAL DEFENSE ASSIGNMENTS

Frederic, Edgar H., Agt., (SPWC), Dom. Pl. Quar., on furlough, inducted Select. Serv., July 21, 1941. On duty with 23th Q. M. Reg., U. S. A., Camp Stewart, Ga.

McGough, James M., Jr. Ent., Cont. Inv., Port Arthur Recreational Area, Port Arthur, Tex., called to active military duty May 20, 1941.

McLain, George F., Jr. Pl. Quar. Insp., (PBW), Maj., Infantry, O.R.C., U. S. A., 368th Infantry, Fort Huachuca, Ariz., called to active duty July 13, 1941.

Sanders, Robert W., Agt., Dom. Pl. Quar. (PHONY P.), O.R.C., U. S. A., Camp Croft, Spartanburg, S. C., called to active duty August 5, 1941.

Wagner, Robert M., Agt., Forest Ins., inducted, Select. Serv., July 21, 1941.

Wright, Lewis J., Jr. Clk., Dom. Pl. Quar. (GRASSHOPPER & M. C. CONT.) on furlough, inducted, Select. Serv., July 15, 1941.

FRUIT INSECT INVESTIGATIONS

Rearing of a parasite in field cages.--This season is the fourth in which Macrocentrus ancylivora Roh., the leading parasite of the oriental fruit moth, has been successfully bred in large field cages by the Moores-town, N. J., laboratory. In the News Letter for September 1940, the results for 1937, 1938, and 1940 were reported. In the following table the results for 1941 are compared with those for 1940.

Year	: Size of caged area	: Females used in breeding	: Total females obtained for each female used in breeding	: Parasites obtained				: Usable insects per 1,000 leaves collected
				: Total	: Females	: Per acre	: Per 1,000 leaves	
1940---	: 4,158	: 2,052	: 9	: 45,008	: 18,909	: 470,000	: 555	: 595
1941---	: 4,221	: 1,968	: 13	: 60,893	: 25,207	: 628,000	: 681	: 738

The breeding in 1941 is, by far, the best of any of the 4 years. The total number of female parasites produced for each female, and the number of usable insects per thousand emerging, was exceptionally satisfactory. At the rate of propagation obtained this year enough parasites could be produced from 1 acre of field cage to stock 1,200 acres of peach orchard in control work. Last year the half-way point in emergence of females was reached on July 18, while the peak of second-brood infestation for orchards receiving liberations was from July 1 to 20. This resulted in the issuance of a considerable number of the parasites too late to be of maximum value in field releases in this district. This year 24-hour incubation at 80° F. was provided, and this resulted in an emergence of half of the female parasites before June 29. The peak of the second-brood infestation was from June 30 to July 4. The timing of emergence was thus almost perfect for the most effective use of the parasites. Enough work has now been done to warrant the statement that M. ancylivora could be produced by this method in unlimited numbers, with a minimum prospect of failure and at a comparatively low cost.

A mite predaceous on eggs of olive scale.--Observations on the egg laying of the olive scale (Parlatoria oleae Colv.) on olive and rose, made by Oscar G. Bacon, of the Fresno, Calif., laboratory, were interfered with by the activities of a mite, determined by H. E. Ewing as Hemisarcoptes melus (Shimer). A few mites were present under scales on rose on April 10. They were feeding on the contents of the eggs of the scales, including unhatched young. White eggs of the mites were found among the larger, purplish eggs of the Parlatoria. By May 12 the mites had increased in numbers and 100 percent of the eggs under olive scales on the rose were found to have been attacked. Examinations of scale infestations on olive in 10 locations showed that the mites were well distributed in the field.

MEXICAN FRUITFLY CONTROL

Only one Mexican fruitfly found.--Although approximately 9,000 traps were operated regularly throughout the month of July, only 1 adult Anastrepha ludens Loew was taken. This fly was trapped in the Mission district. This year, as in previous seasons, the fly population decreased very rapidly after the fruit was removed from the trees. The usual summer population of A. serpentina began to make its appearance, and during the month several specimens were trapped in various districts. With the exception of 1 rather heavy rain in the eastern end of the valley, no other moisture was recorded in July, and at the close of the month many growers were preparing to irrigate their groves for the first time this season. The fruit crop is maturing normally. Very little insect activity has been recorded, with the exception of the usual amount of damage by rust mite, and in a few isolated groves a light infestation of citrus whitefly has become established.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Effect of heat on insect eggs.--J. C. Frankenfeld, Manhattan, Kans., reports that tests conducted on the effect of heat on the eggs of various flour and stored-grain insects showed marked variations in the susceptibility of eggs to heat. Treated in a thermostatically controlled, electrically heated water bath, in which the temperature can be regulated to within $\pm 0.10^{\circ}$ F., the eggs of some species were consistently killed in 5 minutes or less, whereas the eggs of other species required an exposure of 35 minutes or more to consistently obtain a 100-percent kill. Eggs of the species tested in the order of their susceptibility to 120° and the period of exposure required to consistently obtain 100-percent kill are listed below.

Species	Period of exposure to obtain 100-percent kill
	Minutes
<u>Tenebroides mauritanicus</u> L.-----:	4
<u>Gnathocerus cornutus</u> Fab.-----:	5
<u>Attagenus piceus</u> Oliv.-----:	5
<u>Oryzaeophilus surinamensis</u> L.-----:	5
<u>Synaesus angustus</u> -----:	10
<u>Ephestia kuehniella</u> Zell.-----:	10
<u>Tribolium castaneum</u> Herbst.-----:	15
<u>Tribolium confusum</u> Duv.-----:	25
<u>Palorus ratzeburgi</u> Wissm.-----:	30
<u>Latheticus oryzae</u> Waterh.-----:	35+

Marquillo hybrids outyield ordinary winter wheats in hessian fly-resistance tests.--Elmer T. Jones, Manhattan, says that results from the Springfield fly-resistance test plots clearly indicate the importance of Marquillo-winter wheat fly-resistant hybrids during fly outbreaks. With field infestations in this area the highest and most widespread in 14 years, 7 fly-resistant winter-habit selections of 3 crosses involving Marquillo as a resistant parent produced an average of 139 grams of grain each for 24 square feet of row, as against an average of only 17 grams for each of 4 standard varieties of winter wheat in the same test. Each row contained the same number of plants in the fall. The reduction of yield was directly attributable to fall fly infestation. Test weight (estimated) of grain of ordinary wheats ranged from 45 to 57 pounds; test weight of hybrid grain, 57 to 60 pounds per bushel.

European corn borer parasites in Eastern States.--C. A. Clark, Moorestown, N. J., reports that the polyembryonic braconid Macrocentrus gifuensis Ashm. was recovered in northeastern Massachusetts and at Bernardston, north-central Massachusetts, in the fall of 1940, from releases made early that summer, and was found to be well established in Atlantic Township, Monmouth County, N. J., from releases made in 1939 and 1940. This species parasitized 17.1 percent of the borers collected over a 2,000-square-mile area in southeastern Massachusetts, where it has been established since 1932. The tachinid Lydella grisescens R. D. was observed to be established at all 10 of the parasite liberation points at which host collections were made in the fall of 1940. In most localities borer parasitization by this species was less than 10 percent but at Hadley, in Hampshire County, Mass., it was 19.6 percent. The ichneumonid Inareolata punctoria Roman was very abundant at Agawam and Hadley, Mass. It had parasitized 21.4 and 8.9 percent, respectively, of the borers collected at these two dispersion release points. It continued to be the most abundant parasite in northeastern Massachusetts, where it destroyed 14.9 percent of the host population. In central Connecticut, in an area of approximately 200 square miles, this parasite killed 20.3 percent of the borers examined, and the average mortality due to I. punctoria in collections made in a

territory of over 400 square miles was 12.9 percent. This parasite was also well established at Haddam, Conn., where it had parasitized 7.9 percent of the hosts collected. It is established in Monmouth County, N. J., but was not recovered in 1940 in Burlington County, N. J., or in Accomac County, Va. The egg-larval parasite Chelonus annulipes Wesm. was present in numbers only in southeastern Massachusetts. Even at this release point the parasite is rather limited in distribution and numbers and gives no indication of increasing in importance. Four specimens were reared from hosts in two collections from central Connecticut. Of particular interest is the continued increase in borer parasitization in an area of almost 2,000 square miles in southeastern Massachusetts. In this area the percentages of parasitization of fall-collected borer larvae by all species were as follows: 3.6 in 1937, 12.4 in 1938, 18.3 in 1939, and 30.3 in 1940. Borer parasitization in collections from the central 500 square miles of this area, where the parasites have been present for several years, averaged 45.1 percent at the close of 1940.

Tests of insecticidal control of European corn borer.--D. D. Questel, Toledo, Ohio, conducted tests in commercial fields of sweet corn in the vicinity of Toledo, Ohio, of a high-clearance, power-operated, self-propelled boom sprayer which is being developed by the Bureau of Agricultural Chemistry and Engineering for European corn borer control in early market sweet corn. Approximately 5 acres of corn were treated with this machine in heavily infested fields of Early Gold, Spancross, Early Harvest, Early Market, and Early Sensation, using 4 pounds of ground derris root (4.8 % rotenone) per 100 gallons of water and a wetting agent (Areskap) at the rate of 1 to 2,500. Four applications were made, starting with first hatch of the borer and repeated thereafter at 5-day intervals, using 110 gallons of spray per acre per application. Borer reduction in the ears ranged from 85 to 91 percent and in the plants from 87 to 91 percent, the borer populations in the checks (nontreated areas) averaging from 9 to 17 borers per plant. The percent borer-free ears in the marketable yield of the treated plots ranged from 71 to 89, as compared with 11 to 25 in the checks. Marketable yields from the treated areas in some cases were double those obtained from the checks, owing to culling of badly damaged ears and increase in sterility of plants in check areas. Growers marketing corn from these treated and check areas report premiums of 50 percent in sale price of nonsorted treated corn over sales of nontreated corn.

White grubs of the A brood scarce in southwestern Wisconsin.--T. R. Chamberlin, Madison, Wis., reports that although the flight of the 1941 A-brood beetles in southwestern Wisconsin was smaller than that of 1935 and 1938, considerably fewer grubs of this brood than were expected were found in the early sampling. Samples from fields of bluegrass, barley, and alfalfa on one farm in an area near Lamont, which should have been heavily infested, produced only a single grub of this brood. On other farms most of the holes contained none, but a few yielded from several to eight grubs, which presumably were the offspring of single beetles. Possibly the extremely early emergence of beetles in large numbers and the suppression of their activity later by cold rainy periods of rather long

duration hindered proper development and deposition of their eggs. Further sampling is necessary to determine whether this condition is general in the State.

JAPANESE BEETLE CONTROL

Beetle conditions in Philadelphia.--A number of surveys were made during July in the markets and parks in the center of Philadelphia to obtain comparative data on beetle flight. Although beetles could be found feeding on weeds in most sections, few were in active flight. Adults did not appear in numbers until late in the month and then with somewhat less intensity than in 1940. Very few beetles were found in Dock Street Market. During the heavy flights of a decade ago beetles swarmed in this congested market district. In the Philadelphia suburbs plenty of beetles were observed feeding, although there was no heavy flight. In the southeastern corner of Pennsylvania, heavy defoliation was reported in sections of the West Grove area, from which thousands of roses are certified each year. Trees most heavily attacked were apple, cherry, linden, and sassafras, with the fruit trees receiving the most damage. The heaviest feeding in the Philadelphia area was near Lancaster and in lower York County. This heavily infested section, which formerly centered near Gap, has moved closer to Lancaster. In a strip about 6 to 8 miles east of the city, extensive feeding has been done on corn, cherry, apple, and other preferred host plants. Inspectors stationed at the Philadelphia produce terminals preinspected and sealed 277 empty refrigerator cars, all of which were loaded with bananas and certified for movement to nonregulated territory. An additional 77 carloads of white potatoes were fumigated with methyl bromide. These inspectors report that the method of applying the gas from 1-pound cans, newly adopted this season, has thus far proved very satisfactory. A Philadelphia seed house received a report from one of their customers in New Jersey that a 4-acre field of soybeans had been ruined by the Japanese beetle.

Infestations found in many southern New York nurseries.--Of the 33 class I, or uninfested, nurseries and greenhouses scouted in the New York City district, infestations had been found by the end of the month in or within 500 feet of 13 units. The infestation in New York City is reported as light this year, but as decidedly heavy on Long Island and in adjacent Westchester County, within a radius of 50 miles of New York. Trapping operations are being carried on at many of the large estates, where the beetles are so numerous that a careful selection of cut flowers is necessary to obtain blooms that are not damaged by beetle feeding. A certified greenhouse on Long Island has been awarded a contract to grow 5,000 potted black-mint plants. Arrangements have been made to grow the plants under certified conditions so that they will be eligible for shipment to points outside the regulated area.

Extra charge for certified plants.--At the bottom of a full-paged advertisement in one of the horticultural trade magazines, a Connecticut nurseryman adds: "'B' certificate furnished after October 1st at 10 cents per tree extra." Deliveries are by truck or carload only, no boxing. Purchasers are invited to "Save by digging your own at 15 cents less per tree."

This probably reflects the difficulties some of the nurseries are having in obtaining labor in competition with surrounding industries. The extra charge for the Japanese beetle quarantine "B" certificate is apparently due to the fact that infestation was found in this establishment in 1939 and the only trees that may be dug and immediately certified are those from plots treated with lead arsenate before July 1 of this year. Trees from these newly treated plots are not eligible for certification until October 1. This firm also has a fumigation chamber for the chemical treatment of plants with methyl bromide. They are not classified under the Japanese beetle quarantine regulations.

Transit inspector indirectly responsible for discovery of apparent theft.--When an inspector from the New York City district Japanese beetle office investigated an uncertified shipment of two boxes containing eight ferns in soil shipped under the labels of a New York City firm to Chicago, Ill., he was in turn referred to another flower dealer claimed by the party named as consignor to have been the actual shipper. The proprietor of the firm alleged to have made the shipment could find no trace of such a consignment in his shipping records. This proprietor had previously suspected that someone of his employees had been stealing some of his plants and in this instance believed that this individual had shipped the plants, using another firm's labels without their authorization.

Icing yards inspected.--On the last 3 days of the month, a tour of inspection was made of the refrigerator car icing yards in Brunswick, Hagerstown, and Cumberland, Md., to observe the intensity of Japanese beetle infestation and to check on the manner in which cars were iced and cleaned. At the Baltimore and Ohio yards in Brunswick and the Western Maryland yards in Hagerstown, infestation was found to be quite heavy. At the yards of these two railroads in Cumberland, infestation was much lighter. At the Pennsylvania Railroad yards in Hagerstown, a light but general infestation was noted. The men in charge of the operations at each yard visited stated that all precautionary measures were being taken to prevent beetles gaining access to the cars while they were being cleaned or iced.

Spraying at Army airfield --A spraying program is being carried on at the Middletown, Pa., Air Depot of the U. S. Army, near Harrisburg. Army engineers are building a dike along the Susquehanna River at this point. Their activities have routed hordes of Japanese beetles out of the dense growth along the river and these have invaded the foliage surrounding the flying field. Extensive damage has been caused to poplar, Norway maple, and garden and flowering plants. Beetles have even attacked the new growth of some evergreens. An aluminum sulphate-hydrated lime spray is being used.

Heavy flight at Baltimore banana piers.--Inspectors stationed at the banana piers in Baltimore reported the occurrence of the heaviest Japanese beetle flight ever noted in that area. Starting July 10 it was necessary to use conveyors and screens in each day's unloading operations. One banana company purchased \$100 worth of new screens and tarpaulins with which to screen their floats so that their refrigerator cars could be loaded under protection despite the swarming beetles.

Japanese beetle trapping.--At the end of July traps were in operation in five cities in Georgia, three in Illinois, seven in Indiana, two in Kentucky, two in Michigan, one in Missouri, four in New York, eight in North Carolina, nine in Ohio, six in Virginia, and three in West Virginia. Traps were removed during the month from the cities of Charlotte, Durham, Elizabeth City, Goldsboro, Lexington, Raleigh, Rocky Mount, Salisbury, Wilmington, and Wilson, in North Carolina.

Initial fumigation of produce in refrigerator trucks.--The first methyl bromide fumigation of produce in a refrigerator truck for Japanese beetle certification was made at Cedarville, N. J., on July 10. A truckload of cabbage and beets was also fumigated on July 16 at Morrisville, Pa., before leaving for Miami, Fla. Another truckload of cabbage was fumigated at Morrisville on July 20.

Ice used to precool fumigation chamber.--A greenhouseman in central New Jersey is using ice to precool his methyl bromide fumigation chamber during the summer months. Ice is left in the chamber overnight and removed the following morning prior to fumigation, thereby reducing the temperature and lessening the chance of plant injury during the fumigation period.

Springfield, Mass., beetle trapping.--Figures supplied by L. F. Prouty, of the Springfield Park Department, show that 531 quarts of beetles had been trapped in 1,750 traps up to July 31. The largest daily catch was on July 29, when 150,000 beetles were either trapped or hand-picked.

Advance elm survey work.--Advance survey work was started about the middle of July and will continue until the middle of September. A complete survey will be made in designated sections in the major work areas, as well as at each outlying point of infection. In addition, surveys will be made in the following areas: A large part of Massachusetts, including a special Boston Scolytus survey; the entire State of Rhode Island; the Ohio River Valley and the old Cleveland disease area; the Potomac River Valley and the old Norfolk-Portsmouth area; and the city of Baltimore.

Elm leaf beetle defoliation.--Damage to elm foliage remains severe in New Jersey and New York, and has reduced the efficiency of scouting in some sections, in that more climbing is necessary. In the advance survey work now in progress in Massachusetts, it has been found that elm trees are so badly defoliated by this species in the towns of Great Barrington and Sheffield that it is impracticable to continue to scout there until the new foliage, which is already beginning to appear, will permit satisfactory scouting. It has, therefore, been found advisable to move the scouts farther north into Pittsfield, where there appears to be practically no leaf beetle damage. In some districts of Pennsylvania improved foliage conditions are noted, since heavy rain and wind knocked off the leaves killed by beetle attack, and new growth is beginning to show on the trees. Scouting conditions are reported as ideal in the central and northern parts of the Binghamton, N. Y., work area, as a considerable amount of wilting is showing up and very little elm leaf beetle damage is in evidence.

Business as usual during elm removals.--W. P. A. crews in the Wilkes-Barre, Pa., area encountered difficult topping and felling problems during the month. A 35-inch elm in a small back yard, surrounded by fences, shrubs, trees, flower gardens, lawn, and buildings required the most careful attention. The butt had to be cut down to a height of about 25 feet before it could be dropped, and required the roping down of small butt pieces, in several instances without the benefit of serviceable crotches. Five days were spent on this tree by one of the crews. Two diseased elms in the Wilkes-Barre Public Square also required careful topping. These trees were over the trolley and electric bus feeder lines, which presented sufficient danger, but with the continuous flow of traffic the danger was greatly increased. Both trees were removed without mishap. One other infected Wilkes-Barre street tree was also removed. This towered over high voltage lines and required topping down below these wires.

Work resumed on W. P. A. field projects.--Work was resumed on July 7 by W. P. A. men on the New Jersey and West Virginia Dutch elm disease eradication projects. The men returned to work in Pennsylvania on July 11, and in New York on July 21. By the end of the month, the project had been resumed in every work area except Ohio. A total of 912 security-wage workers were employed at the end of July, as compared with 1,330 at the time the project was suspended on June 28. Every effort is being made to reach a quota of 1,527 in order to complete summer scouting.

Crew works from boat to remove diseased elm.--Removal of a 48-inch confirmed tree was completed the latter part of the month in Bucks County, Pa. This elm leaned over Little Neshaminy Creek at about a 20° angle at a point where the water was 6 feet deep. It was necessary for the felling crew to work from the Division's row boat. The top was lightened and block and tackle used to swing the tree to the creek bank. The resulting stump is being used by the boys in the neighborhood as a swimming platform.

Beetle infestation interferes with Dutch elm disease scouting.--A heavy infestation of the Japanese beetle in the section of the town of Wethersfield, Hartford County, Conn., along the Connecticut River, has resulted in defoliation of almost all species of trees in that locality. This seriously reduced the efficiency of scouting, since it required considerably more climbing of elms to determine their actual condition.

Egg clusters reappear in products cleared for forwarding.--Gypsy moth egg clusters were removed from three shipments presented for inspection during the month. Solitary clusters were found on carloads of lumber inspected at Garrish, N. H., and Westfield, Mass., prior to shipment to Elizabethport, N. J., and Shelton, Conn., respectively. Fourteen egg masses were removed from 7 cartons of birch logs examined at Danvers, Mass., for shipment to Syracuse, N. Y. In addition, 34 larvae and 35 pupae of the moth were taken from other consignments certified for movement from the regulated area.

New England Japanese beetle scouting started.--Surveys in classified nurseries and greenhouses in New England started on July 7. By the latter

part of the month 10 scout crews were working under the supervision of the Waltham, Mass., office. Sixteen of the men were on the Federal pay roll and 10 on State pay rolls.

Winter-sawed material now being milled and shipped.--Lumber shipments increased considerably in some of the gypsy moth districts, owing to the fact that material sawed during the winter months is now in dry enough condition to mill.

FOREST INSECT INVESTIGATIONS

Spray experiments for control of elm leaf beetle.--C. W. Collins, C. L. Griswold, and A. E. Lantz, of the Morristown, N. J., laboratory, report that for a series of years surveys have been conducted in certain northern New Jersey localities to record and compare the intensity and persistence of elm leaf beetle infestations, also the resultant injury to the trees. As a part of this program some areas were selected for spraying using lead arsenate at the rate of 4 pounds per 100 gallons of water to which 4 ounces of fish oil per pound of poison was added as a sticker. The spraying was done late in May 1940, at the time when adults were actively feeding and beginning to deposit eggs. In the areas selected, all elms were sprayed out from the center to a point where the concentration dropped off or to a point at least 300 feet from buildings where the adults ordinarily hibernate and return to the nearby elms the following spring. Very good control was obtained in all sprayed areas in 1940 and satisfactory control resulted in 1941; that is, the increase in the immediate centers or near hibernation points was not extensive nor alarming the second year after spraying.

Control projects inspected.--R. L. Furniss, of the Portland, Oreg., forest insect laboratory, spent several days during late June and early July with Forest Service officials checking various phases of the Black Hills beetle control projects on the Wasatch and Powell National Forests of Utah. On the Wasatch project treatment of infested lodgepole with a combination of fuel oil and orthodichlorobenzene was found very effective, when applied under favorable weather conditions. Snow and rain interfered with the use of this method. Fall-treated trees showed a retardation of brood development which gave promise of preventing ultimate emergence.

Spruce aphid causes heavy defoliation.--F. P. Keen, Portland, reports that after an absence of nearly 10 years, the spruce aphid (Aphis abietina Walk.) has again put in an appearance along the coast of Oregon, Washington, and Alaska and has caused heavy defoliation of Sitka spruce and the death of many suppressed trees. The defoliation appears heaviest in the lower crowns and where trees are sheltered from the wind; consequently, many understory trees have been completely defoliated and killed. The aphids disappeared during midsummer, and if they have an alternate host this has not been found. If this outbreak increases next year, a heavy loss of Sitka spruce stands along the coast may result.

Annual pine beetle survey started.--Mr. Keen also states that in order to check on western pine beetle conditions in the ponderosa pine stands of eastern Oregon and Washington, two 3-man survey crews were placed in the field on July 28. One crew, under J. M. Whiteside, will cover various forests in eastern Washington, and the second, under W. J. Buckhorn, will survey private and national forest areas in southern Oregon. This work will be further supplemented by survey crews, working under the direction of the Forest Service and the Office of Indian Affairs, so as to obtain complete coverage of the ponderosa pine forests of this region.

Larch sawfly infests forests of Idaho and Montana.--J. C. Evenden, of the forest-insect laboratory at Coeur d'Alene, Idaho, reports a severe infestation of the larch sawfly (Nematus erichsonii Hartig) throughout the western larch stands of Idaho and western Montana. This outbreak was first reported from the Flathead Forest, Mont., in 1933. During subsequent years the insects have spread southwestward, with severe infestation reported from the Kootenai, Cabinet, Lolo, Coeur d'Alene, St. Joe, and Clearwater National Forests. In some areas the defoliation has been severe, although no permanent damage has been recorded. This is the first available record of an outbreak of this insect within the larch forests of the Western States.

Mountain pine beetle epidemic in lodgepole pine in Yosemite National Park.--G. R. Struble, of the Forest Service, has recently sent in the following report of a new outbreak of the mountain pine beetle in the Yosemite National Park: "While traveling through the Bridal Veil Meadow country, I was astounded to see so many dying lodgepole pines. From a hasty examination it is evident that the mountain pine beetle infestation has already developed to epidemic proportions, not only along the roads, but also within the stands. My rough estimate is that there are from 200 to 500 trees per section carrying broods of the 1940 overwintering generation. The infestation is particularly heavy in the vicinity of the Bridal Veil Camp Ground, where a large percentage of the trees have faded within the last 2 weeks."

Susceptibility of sugar pine to mountain pine beetle to be studied.--The success of sanitation-salvage logging of high risk trees in reducing losses caused by the western pine beetle in ponderosa pine stands has brought about interest in the possibility of protecting sugar pine from the mountain pine beetle by a similar method of indirect control. So far little is known regarding the preference of this bark beetle for certain types of trees, but apparently it does show some selective habits in attacking sugar pine. In order to arrive at a basis for determining whether a preference does exist for certain age and growth classes of sugar pine, a study was initiated by G. R. Struble at the Miami, Fla., field laboratory. One plot of 20 acres in mature sugar pine has been established, in which all trees have been numbered and inventoried according to age, growth, and crown characters. A series of similar plots will be established and an analysis made of the characteristics of sugar pines that are killed by this beetle, both on the plots and on the areas that are surveyed annually for bark beetle losses.

Forest-insect control in Plumas National Forest.--During the last week in June the complete woods crew of the Clover Valley Lumber Company, of

Loyalton, Calif., comprising some 75 men to handle the falling, limbing, and bucking of an estimated 20 million board feet of pine timber, run 4 caterpillar tractors, 2 gas shovels, 8 logging trucks, and a railroad, turned to forest-insect control work. The objective is the prevention of excessive losses from bark-beetle infestations on more than 7,000 acres in the Dixie Creek drainage of the eastern Plumas area. The control method being used is the logging and utilization of highly susceptible or high-risk trees. This is the first attempt in California to put that method of control to a test on a practical commercial basis. Early in June, Forest Service and Bureau of Entomology and Plant Quarantine cruisers prespotted the high-risk trees in the area. During the latter part of the month, 10 sets of fallers began felling the timber and engineers and road crews laid out and constructed logging roads. On June 30 the caterpillars started skidding logs to the roads, the shovels started loading trucks, and the movement of logs from woods to railroad to the mill began in earnest. During the first 6 days of operation nearly 2,000,000 board feet in merchantable logs were salvaged from high-risk trees that could reasonably be expected to die within a few years. Values in these logs thus were made available for manufacture into soft pine lumber. This production record nearly equals the normal production in this area. It indicates that under certain topographic conditions at least, it may be feasible to log about one-quarter of the stand and control bark beetle infestations at a profit.

Termite prevention survey of defense housing projects.--The forest-insect laboratory at Berkeley, Calif., is conducting a survey to assist the defense housing agencies in the prevention of termite damage to wooden buildings. During April, May, and June, C. B. Eaton and Donald DeLeon covered a large number of the projects in the central California area where thousands of units are under construction. The survey consisted of inspection of building plans and of the local conditions where construction was under way. In a number of cases it was found that while the ordinary construction rules for termite prevention had been observed, added features, such as placing wooden steps in contact with the ground, or banking earth over termite-proofed foundations, had nullified the original precautionary measures. In other cases unwarranted expense had been incurred in using precautionary measures which were unnecessary. Recommendations made by this Bureau to the local construction agencies have for the most part been observed and it is believed that a considerable saving in costs, as well as in the prevention of early termite damage to defense buildings, will result from this service. This survey is now being extended to cover the numerous defense projects in southern California.

Termites and defense housing.--B. H. Wilford, New Haven, Conn., reports that for several months considerable attention has been directed to the termite proofing of dwellings planned for and under construction throughout New York and the New England States by the various federal defense housing agencies. First planning and early construction work by some agencies was begun before the Division of Forest Insect Investigations had knowledge of such activities. Consequently, the first buildings were designed and erected with either no consideration for termites or with some consideration for termites but little practical knowledge of cheap and effective protection. Where

termites were considered, each housing agency had its own ideas for guarding against them. In some instances superfluous protection was provided for at one part of a building and neglected in other, often more vulnerable, parts. In other instances ineffective measures were taken, uselessly adding to the construction costs. Gradually, the suggestions being made by the Division of Forest Insect Investigations to the defense housing agencies are bringing about uniformity in the protection measures. In many instances proper precautions can be taken without increasing costs. Unfortunately, however, to protect buildings of some architectural designs, additional costs are almost imperative. These cases present the real difficulties, since governmental restrictions on dwelling costs necessitate omissions of many normally necessary items. Thus, in the instances where termite protection means added expense, no matter how small, this protection is not being provided for. It is becoming more and more obvious that architects, construction engineers, and entomologists must work together and reach agreements on details to develop simple, acceptable, and inexpensive construction practices which will insure adequate protection against termites. As a result of the defense movement, it appears that this cooperation and some such changes are already taking place. This movement should not terminate, however, with the ending of the emergency.

A recently established dipterous parasite of the gypsy moth now widely distributed in New England.--W. F. Sellers, New Haven, Conn., states that the cooperative project organized with officials of the States of Massachusetts, Maine, New Hampshire, and Connecticut for the study of the distribution of Parasetigena silvestris R. D. was highly successful. Collections were made in 70 townships and recoveries of the parasite were made from 33. Twenty-nine of these represent new recoveries and 4 represent duplication of previous recoveries. The known area of distribution extends roughly from Sebago, Maine, in the north, to Ossipee, N. H., and Lunenburg, Mass., in the west, and southward to Thompson, Conn.

State	: Collections :	Recoveries of <i>P. silvestris</i>
	: <u>Number</u> :	
Maine-----	: 5 :	: Sebago, Standish, Biddeford
New Hampshire----	: 5 :	: Ossipee, Hooksett, Northwood
Connecticut-----	: 1 :	: Thompson
Massachusetts----	: 59 :	: Amesbury, Andover, <u>Boxford</u> , Burlington,
	: :	: <u>Chelmsford</u> , Dracut, Georgetown, Grove-
	: :	: <u>land</u> , Haverhill, Lawrence, Merrimac,
	: :	: Newbury, W. Newbury, Newburyport,
	: :	: N. Andover, Reading, <u>Rowley</u> , Salis-
	: :	: bury, Essex, Hamilton, <u>Ipswich</u> ,
	: :	: Middleton, Topsfield, Wenham, Lunen-
	: :	: burg, Berkley

The four localities underlined represent places where previous recoveries have been made. The parasitization ranged upward to 17.4 percent (87 puparia were recovered from a collection of 500 gypsy moth larvae made

at Georgetown, Mass.). Hooksett and Northwood, N. H., are more than 35 miles from the nearest liberation point. These results indicate that this parasite is rapidly becoming a valuable addition to the gypsy moth parasites already established in this country. The status of this parasite was previously discussed in the News Letter for July 1940 (v. VII, No. 9, pp. 8-9. Sept. 1, 1940).

Establishment of dipterous parasite of gypsy, brown-tail, and satin moths.--Mr. Sellers also states that Exorista larvarum L. was introduced into the United States from Central Europe between the years 1923 and 1932 and widely colonized in New England. Over 100 puparia of this parasite were recovered from 11 townships where gypsy moth larval collections were made this summer.

State	: Collections:	Recoveries of <u>E. larvarum</u>
	: <u>Number</u> :	
Maine-----	: 5 :	Standish
New Hampshire---	: 5 :	Northwood, W. Concord
Massachusetts---	: 59 :	Salisbury, Newbury, W. Newbury,
	: :	Lawrence, Wenham, Andover,
	: :	Ipswich, Berkley

The parasitization by this species ranged upward to 9 percent (45 puparia were recovered from a collection of 500 larvae made at Salisbury, Mass.). The parasite was also recovered from collections of brown-tail moth larvae made at Stratham and Rye, N. H., by W. S. McLeod, of the Imperial Parasite Service. Taxonomically this parasite is confused with the Nearctic species Exorista mella Walk. Past records indicate that the American species is rarely reared from gypsy and brown-tail moth larvae. The value of Exorista larvarum as a parasite of the gypsy moth depends on the number of alternate hibernating hosts that exist in the various localities. In this respect the parasite is similar to Compsilura concinnata Meig. Attention is called to the News Letter for September 1940 (v. VII, No. 11, p. 12. Nov. 1, 1940), where a case of superparasitization by C. concinnata and E. mella on the satin moth was discussed. At that time the Exorista was mistakenly referred to as mella instead of larvarum.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

W. P. A. gypsy moth work resumed in three States.--All Federal W. P. A. gypsy moth projects in Connecticut, Massachusetts, Vermont, New York, and Pennsylvania were terminated on June 30, as no funds had been provided for the continuance of the work after the end of the fiscal year. This necessitated the dismissal of all W. P. A. workers in the field and in the offices in Greenfield, Mass., and Wilkes-Barre, Pa. New requisitions for W. P. A. workers were prepared for presentation as quickly as the various gypsy moth projects for the new fiscal year could be approved by the State administrators and funds released for the resumption of the work. Although the project applications submitted to the State administrators in Vermont, Massachusetts, Connecticut, and New York were approved before the middle of

July, final authority to begin work was delayed. The authority was received and requisitions were presented during the week ended July 26 for work in Connecticut, Massachusetts, and Vermont, and actual work was begun during the last few days in July. Authority to start work in New York and Pennsylvania had not been received by the end of July, but was expected momentarily.

Less gypsy moth spraying work accomplished than had been planned.---It was not possible to spray as large an amount of gypsy moth infested area as originally planned, because of the scarcity of relief labor. Although the W. P. A. offices in several of the States promised additional labor during the spraying season, not more than half of the men requisitioned reported for duty. Many of those who did report resigned within a few days to accept vocational defense training or to work in private industry. Some of the men referred to the gypsy moth project lacked the physical qualifications for the performance of arduous labor, and were unsuitable for spraying work. Because of these conditions many of the crews were undermanned and could not easily handle the long hose lines, making it necessary to discontinue spraying frequently in order to shorten the lines. In many cases it was necessary to operate the sprayers on the single-shift basis, where double shifts had been planned. The lack of labor was particularly conspicuous in the Connecticut area, where it was possible to operate only 3 spraying machines on the single-shift basis. If sufficient man power had been available it would have been advantageous to use 10 or 12 machines, double-shift, in New England in spraying the infested areas needing such treatment. It was also found to be impossible to obtain enough men in Monroe County, Pa., to do urgently needed spraying work, and arrangements were made to transport workers from nearby sections of Luzerne, Lackawanna, Wayne, and Carbon Counties to man the sprayers in Monroe County. Additional difficulties were provided by the weather.

Regular gypsy moth employees continue various types of work.---Regular supervisory employees, who were released from supervision of W. P. A. enrollees, after suspension of W. P. A. work on June 30, were given various assignments so that as much as possible of the various types of work could be continued. When possible, observations were made in sprayed areas to determine the effectiveness of the spraying work. Examinations made up to the end of July disclosed that effective control of the insect had been accomplished in the sprayed areas, and that in numerous instances only a moderate amount of additional work will be required to complete extermination in those sections.

Preliminary gypsy moth defoliation reports.---Several members of the gypsy moth supervisory personnel began defoliation surveys of the infested area on July 7. These men worked alone in Maine and New Hampshire, cooperated with the State division superintendents of gypsy moth work in Massachusetts, and were assisted by State employees when possible in Connecticut and Rhode Island. Preliminary reports showed an increase in the lower brackets of defoliation in several towns in Maine, although the areas of complete defoliation appeared not much greater than in 1940. Considerable increases in defoliation in the lower brackets was noted in a few towns in New Hampshire, but little defoliation was reported in other towns where the 1940 defoliation

was severe. Reports from Massachusetts were variable, with large increases in some towns where there was little defoliation last year and large decreases in other towns severely defoliated in 1940. Little defoliation has been reported so far in Vermont and Rhode Island, and no records have yet been received from Connecticut.

Gypsy moth pupae collected for assembling-cage material.---The collection of female gypsy moth pupae for use in the preparation of the attracting material used in assembling-cage work was begun on July 7. With the exception of the agent in immediate charge of the field work, all the men engaged in collecting were inexperienced in that type of work. Because of their inexperience much of the material collected during the first few days was unsatisfactory, but the quality of the material improved greatly as the men gained experience. At the beginning of the work two Federal agents and seven men detailed from the New York Conservation Department collected the material in the field and handled it at the storehouse in Greenfield, Mass.

Gypsy moth spray hose transported from field for inspection and storage.---Spraying operations in the field were discontinued beginning about a week before the end of July, although the work was continued in a few places until July 28. The time of completion depended to a great extent on the difficulties encountered in removing the hose from the woods and the distances to be traveled in transporting the equipment to the storehouses in Greenfield, Mass., and in Moosic and Forty Fort, Pa., for examination and storage, as it was necessary to complete this work before the termination of W. P. A. work on June 30. The spray hose requires special attention after its return from the field. It is unloaded from the trucks, sorted, and piled in such a manner that systematic examinations and tests of all the hose and couplings may be made before it is stored for the winter. The hose used in gypsy moth spraying has a 1-inch waterway, is made in 50-foot lengths, and must withstand 1,500 pounds pressure. Hose that has deteriorated to such an extent that it will no longer withstand high pressure is set aside for other use or for disposal at public auction. The couplings, which are heavily constructed of bronze metal and give many years of service, are removed from the broken or worn-out hose and stored for future use. The hose is never coiled, but is laid out straight in storage bins, each bin having a capacity of approximately 125,000 feet. Up to July 19 about 125,000 feet of hose had been sorted, repaired, tested and stored at the Greenfield storehouse, and approximately 127,000 feet had been similarly treated at the Pennsylvania storehouses. A considerable quantity of the hose was discarded this year because of deterioration or breakage in service.

Brown-tail moth in gypsy moth infested areas.---A decided increase in brown-tail moth infestations has been noted in sections of Maine and New Hampshire. Although there were very few records of defoliation by this insect last year, a considerable number of such records have already been received for this season. Complete defoliation of many orchards has taken place, particularly at sites where no cutting of webs was done during the winter of 1940-41. In some towns, particularly in Allenstown, Canterbury,

Dunbarton, Epsom, Henniker, Hooksett, Louden, and Pittsfield, all in New Hampshire, the brown-tail moth infestation was so intensive that notable flights of the moths were reported. Such flights have not been previously reported for a number of years.

Advance information obtained concerning proposed logging operations.--- Considerable information has been obtained concerning the proposed cutting of birch logs in southern Vermont and western Massachusetts. The operators interviewed stated that logging operations will begin early in the fall and continue throughout the winter. A large amount of birch cut in the barrier zone area of these two States is transported by truck to mills in eastern New York, where no gypsy moth infestations are known to exist at present. Last year several small gypsy moth infestations were located and destroyed at their source by scouting the birch lots in advance of the cutting operations. Information was also obtained from operators in northern Vermont relative to the localities in that section of the barrier zone where the greatest quantities of Christmas trees and evergreen boughs are likely to be cut during the fall. Other data pertaining to logging and pulpwood operations were also gathered, all of which have an important bearing on the preparation of plans for gypsy moth scouting work in those sections during the coming winter and fall.

Burlap bands patrolled by regular employees.---Regular gypsy moth employees patrolling trees banded with burlap in Massachusetts and Connecticut found large numbers of gypsy moth larvae and pupae in the vicinity of stone walls and rock-littered areas in locations where there had been little or no opportunity to conduct intensive creosoting work earlier in the season. Smaller numbers of the insect were destroyed at less favorable sites.

Gypsy moth assembling cages set out in Pennsylvania.---The distribution of approximately 1,600 gypsy moth assembling cages by regular gypsy moth employees was completed in the Pennsylvania area shortly after the middle of July. The cages were set out in the townships of Carbondale, Lackawanna County; in Canaan, South Canaan, Lake, Salem, Sterling, Dreher, and Lehigh, Wayne County; and in Barrett and Paradise, Monroe County. These 10 selected townships are adjacent to the gypsy moth infested area on the east and northeast, and are outside of the area where it has been possible to conduct extensive scouting work. Regular visits were made to each cage to determine whether male gypsy moths had been attracted, and all specimens caught in the tanglefoot were carefully collected and definitely identified. Male gypsy moths were taken at several cages in Canaan, South Canaan, and Lake, in Wayne County, before the end of July. In the course of scouting in the vicinity of a cage in Lake Township, where male moths were taken, a gypsy moth infestation was found and treated directly across the road from the cage. Assembling cages were also set out in selected towns in eastern New York and northern New Jersey.

N. Y. A. employees continue gypsy moth work in Pennsylvania.---Four small groups of N. Y. A. enrollees continued gypsy moth work in the Pennsylvania area after July 1. One of these groups assisted in sorting, testing, and storing spray hose, while the other groups patrolled burlap bands at infested locations in Pittston and Plains Townships, in Luzerne

County. New N. Y. A. gypsy moth projects were approved before July 30, which will permit the employment of enrollees in the repair shops in Wilkes-Barre, as well as in the field. A small field force was started on July 28, and the numbers will be increased as additional supervision becomes available.

C. C. C. gypsy moth greatly reduced.--C. C. C. gypsy moth work under the supervision of this Bureau was greatly reduced from a high of 149 6-hour man-days during the week ended July 5 to only 40 man-days during the week ended July 26. The work was performed in Massachusetts and Connecticut until late in July, when work was discontinued in Connecticut because of the abandonment of camps and the transfer of gypsy moth foremen. During the latter part of July, C. C. C. gypsy moth work was performed only by one small crew from a camp in Massachusetts.

C. C. C. gypsy moth work performed during July.--C. C. C. gypsy moth spraying in Connecticut was terminated early in July, and the available men were used in banding trees at colony sites where no spraying was done this season, and in patrolling the bands and killing all gypsy moths found under them. When C. C. C. gypsy moth work was terminated in Connecticut a force from the Connecticut State gypsy moth office began patrolling of the bands in some of the areas that had been burlapped by the C. C. C. Three infestations, containing 582 acres, were sprayed by the C. C. C. in Connecticut this season, and 32,328 trees on 111 acres were banded. A single crew in Massachusetts continued to spray in the town of Florida, Berkshire County, until July 11. Although a supply of materials was available for further spraying, it was not possible to obtain a large enough number of enrollees to operate the equipment after that date. The small crew was assigned to banding trees at selected sites and to patrolling the bands. Areas that had been sprayed by the C. C. C. were inspected during the month. No feeding was observed and very few gypsy moth larvae or egg clusters were seen at any of the points examined.

PLANT DISEASE CONTROL

Blister rust infection in Oregon and northern California.--H. R. Offord reports the discovery of an important new pine-infection center in Oregon on Bucks Creek, Rogue River National Forest, in July. Twenty-seven infected western white pines were found. Associated with these white pines were heavily infected Ribes bracteosum and lightly infected R. binominatum and R. lacustre. Infection was found also on R. cruentum in the Rogue River gorge a quarter of a mile from Union Creek, and in this same area a single juvenile canker was cut from a small sugar pine tree. The identity of this canker is questionable and it will be sent to W. W. Wagener's office at San Francisco for identification. Infected R. lobbii was found close to the Dempsey mine near upper Bucks Basin. On the Klamath National Forest a single canker on sugar pine was found near the Cottonwood Creek blister rust camp. Considerable Ribes infection was found on the Klamath National Forest on most areas examined. D. R. Miller and Clyde Partington are now engaged in scouting for the rust on the Lassen National Forest. A considerable number of specimens of rust on Ribes have been submitted for identification, and, although so far but a small percentage of the specimens

have been tested, the few for which determinations have been made are about equally divided between Cronartium occidentale and C. ribicola.

New pine infections found in Wisconsin and Virginia.--T. F. Kouba reports that blister rust on white pine was found for the first time in Iron County, Wis., on June 29. Only 1 tree was found infected, but it was heavily infected. It was an 11-year-old tree planted along State Highway 77, 528 feet east of the City Hall of Montreal, Wis., and 27 feet north of the concrete highway. Infection was found on 1935 wood, and the tree was dead, save for 3 lateral branches. A large Ribes cynosbati bush, infected with the uredinial stage of the rust, was growing 12 feet west of the tree. Apparently the infected portion of the tree had fruited 3 times. An unusually heavy concentration of pycnia and pycnial scars were noted. Escaped Ribes sativum (cultivated red currant) bushes were growing about 150 feet away, but these plants were not infected with blister rust. Blister rust was found by Agent Miller on 25 Ribes cynosbati bushes and 17 pines in a 5-acre tract in Banner's Run, in Bath County, Va., while 2 infected Ribes and 5 pines on 1 acre were found infected on Hodges Road in the same county. This is the first year that pine infection has been found in this county.

About 1,500 employed on blister rust control in the Northwest.--While the blister rust control program in the Northwest is not so large this year as the one in 1940, owing to the curtailment of W. P. A. and C. C. C. work, the activities under regular funds have increased slightly. The largest field program is the regular Forest Service blister rust project, which includes 33 field camps employing approximately 1,000 men. Most of these camps are located in the center of the white pine type of north Idaho, but some of the camps are located in northwestern Montana and northeastern Washington. The State of Idaho and the Bureau of Entomology and Plant Quarantine, aided by contributions from the timber protective associations, are operating 5 camps, with a total of 170 workers in the State of Idaho. In addition to this the Bureau of Entomology and Plant Quarantine is operating W. P. A. projects in Idaho and Washington. There are approximately 200 workers in Idaho and 20 in Washington. In the western white pine region there has been a rather heavy turnover of workers in the Idaho cooperative camps, but replacements are made immediately. At the first of the week Mr. Walters, operation supervisor, was confronted with the problem of finding 1 of the cooperative camp employees, who got lost in the woods on his return from Sandpoint, Idaho, over the week end. Search parties were organized, and Tuesday morning the boy was found, still lost but in good condition, as he was traveling a forest road back toward Sandpoint. The Forest Service is also operating W. P. A. projects in Idaho and Montana to the extent that they were able to obtain labor assignments. As in previous years, several C. C. C. camps in the western white pine region are working on blister rust control. Both in the national forests and in Mount Rainier and Glacier National Parks, the low enrollment in the C. C. C. however, has reduced the size of this program considerably.

Poison ivy causing trouble in Maine.--W. O. Frost reports that poison ivy is causing considerable trouble in Maine this season and that he saw several blister rust control workers with rather severe cases the latter

part of June. Ivy plants head-high are encountered in the woods, and because of their height are not recognized until after the men have come in contact with the leaves. The men are provided with protective lotions but, in spite of this precaution, many of them are poisoned.

Blister rust spreading from cultivated red currants.--C. C. Perry, State leader in Massachusetts, reports that he inspected locations in Lynnfield and Middleton, where blister rust control work has been in progress, and visited one area where young pine infections (1938) had been found. In this case the associated Ribes were limited to escaped red currants. Mr. Brockway, District leader, estimates that this season at least 70 percent of the Ribes eradicated by the field crew in Essex County, Mass., have been escaped red currants.

Scouting started in Yellowstone and Grand Teton National Parks.--In order to keep a close check on the spread of blister rust into Yellowstone and Grand Teton National Parks, E. L. Joy, R. L. MacLeod, and C. A. Chapman started scouting in these units in the last week of July. The major efforts are being placed on inspection of concentrations of the highly susceptible Ribes petiolare in association with the two most susceptible pines, white bark and limber. Such areas offer an excellent opportunity to pick up either long-distance or local spread centers, because of the massing, susceptibility, and moist habitat of R. petiolare. It is also of importance that any local infection of these pines that has developed to the fruiting stage is most likely to consist of a sufficient number of cankers to cause abundant and readily discovered Ribes infection. During the course of this scouting work the additional project of preeradication survey in Grand Teton National Park will be conducted. This will consist of a strip checking of selected areas of white-bark pine that have been designated as having sufficient aesthetic or cover values to justify control. It is estimated that these areas total about 3,000 acres, all of which are located in the high and rugged Teton Range. Since no roads reach this area, travel will be by a pack-horse outfit.

Preliminary results of physiologic race survey.--Results of the physiologic race survey of wheat stem rust (Puccinia graminis tritici) in 1941, as of August 1, indicate a continued increase in race 17 and decrease in race 56, as compared with previous years. A total of 377 isolates have been identified from 278 uredial collections made in the United States and northern Mexico. Of 134 isolates identified from northern Mexico collections, race 17 constituted 60 percent, and races 38 and 56 approximately 15 percent each. Three other races constituted the remainder. From collections made in the United States, 243 isolates have thus far been identified. Race 17 constitutes approximately the same percentage of these isolates as in northern Mexico. Race 56, which is second in prevalence in the United States, constitutes about 25 percent of the isolates already identified, followed by races 19 and 38. Race 17 not only constituted 60 percent of the isolates but appears to represent a still larger proportion of the actual inoculum in the field, while race 56, which represents only 25 percent of the isolates, probably makes up a smaller proportion of the field inoculum. As a result, Tenmarq, which is immune from race 17 and susceptible to race 56, showed light infection early in the season, when soft wheats

susceptible to both races were heavily infected in the same localities. Isolates from Tenmarq have been primarily race 56. Later in the season heavy rust developed on Tenmarq, because the earlier light infection of race 56 in fields of this variety had had time to build up. The trend in population of races 17 and 56 for the period since 1939 is shown below.

Year	Total isolates in the United States	
	Race 17 Percent	Race 56 Percent
1939-----	10	55
1940-----	34	44
1941 (preliminary)--	59	25

Of 117 isolates identified in 86 collections from southern Mexico, race 38 constituted a majority of the isolates, followed by race 59. These 2 races have been the most common in other years also. Altogether, in the 2 regions of Mexico and in the United States, about 500 isolates have thus far been identified and 350 additional ones are now in process of identification.

Method of survey depends on topography.--During May and June survey crews in Missouri were working in Marion, Lafayette, Johnson, Saline, Howard, and Pettis Counties. The area covered totaled 550 square miles. The method of survey varied somewhat, depending on the type of territory being covered, but for the most part consisted of an intensive farm-to-farm survey. Some modification of survey methods has been made in this State in recent months, but all infested areas are now given an intensive strip scouting. More responsibility is being placed on crew foremen for determining the exact type of survey that will be used in a given type of territory.

Area of escaped bushes found in Platte River.--During the period March to June, survey crews in Nebraska eradicated barberry bushes on 22 properties, 15 of which were new and 7 of which had been reported previously. In determining the source of bushes located on 1 property in the vicinity of Scottsbluff, the crew supervisor was advised that the bush had been transplanted from an island in the Platte River. Later survey of the island resulted in the eradication of 65 bushes widely distributed for more than 2 miles along the river bank. Some of the larger bushes in the area were heavily rusted by the end of June, and early in July infection was prevalent on nearby grasses.

COTTON INSECT INVESTIGATIONS

The Peruvian cotton weevil parasite at Brownsville, Tex.--W. T. Hunt, of the Brownsville laboratory, reports that 5 shipments of Microbracon vestiticida Vier., a parasite of Anthonomus vestitus Boh. in Peru, were made by P. A. Berry, of the Division of Foreign Parasite Introduction, for

liberation in cottonfields at Brownsville to determine their possible establishment on the boll weevil. These shipments were made from Lima, Peru, between May 20 and June 17. They were en route from 3 to 4 days, the first arriving at Brownsville on May 24 and the last on June 20. It is thought that these are the first parasites introduced into the United States primarily for boll weevil control. A total of 3,012 adult parasites were shipped, of which 2,626 arrived alive. Of these, 1,594 were released in 3 fields and 1,032 were used for laboratory rearing. Field collections following the liberations have failed at the end of June to indicate their establishment. Oviposition was obtained in the laboratory by exposing boll weevil infested squares in a cloth-covered cage. The cage was covered on all sides, except the bottom, with black cloth and placed so as to admit light through the bottom, thus attracting the parasites to the squares placed in the bottom of the cage. Emergence of the adult parasites started 9 days after oviposition. Seventy-six parasites, 10 being of the second generation, were reared in the laboratory by this method during June.

The Peruvian cotton weevil parasite at Tallulah, La.--During July Paul A. Berry, of the Division of Foreign Parasite Introduction, made 4 shipments by air express of M. vestitica, a parasite of the Peruvian cotton weevil (A. vestitus) from Lima, Peru, to Tallulah, La. The parasites were en route from 3 to 7 days. R. C. Gaines reports that the first shipment, 7 days en route, consisted of 770 adults but on arrival at Tallulah 598 were dead and 172 alive. The second shipment, 3 days en route, consisted of 904 adults, only 130 of which were dead on arrival and 774 alive. Records were not made on arrival at Tallulah of the third and fourth shipments, as the parasites were liberated in cottonfields by placing the boxes in which they arrived under cotton plants in the fields where ants removed a number of the dead. The native parasite, Microbracon mellitor (Say), was present in both fields where releases of M. vestitica were made on July 12 and 15. Squares were collected on July 15, 17, 19, and 23, from which there were reared 8 M. vestitica and 11 M. mellitor between July 22 and 31. Boll weevil infested cotton squares in cages were exposed to M. vestitica for 48 hours and during the period July 22-25 there emerged 17 adults of M. vestitica and 4 of M. mellitor. All determinations of the parasites were made by C. F. W. Muesebeck.

Shortage of dusting machines handicaps cotton-insect control.--The demand for cotton-dusting equipment because of the high boll weevil infestations during June and July throughout most of the area from the Atlantic coast to central Texas and western Oklahoma caused a shortage in dusting machines. Many growers in the States where the weevils were abundant lost heavily because of their inability to obtain dusting machines to apply calcium arsenate. In Alabama and other States the use of the old-time pole-and-bag method of applying arsenical dusts was revived on recommendation of the extension workers in cases where dusting machines were not available. Spraying machines were brought into use in the cottonfields much more extensively than during previous years. The manufacturers of dusting machines reported that they could not remedy the situation because they were unable to obtain needed materials for the manufacture of dusting machines.

Calcium arsenate shortage.--For the first time in many years the supply of calcium arsenate in the Cotton Belt was practically exhausted during July. On July 23, W. A. Ruffin, extension entomologist of Alabama, wrote: "The supply of dust guns and calcium arsenate has been completely exhausted in this State." Similar reports came from Georgia, Mississippi, Louisiana, Texas, and Oklahoma. The appearance of the cotton leaf worm in six States by the end of July and heavy infestations of the bollworm made the situation more serious. It was reported that manufacturers of calcium arsenate were operating on a 24-hour basis in an effort to meet the emergency. Lead arsenate, paris green, and london purple, were used more extensively than for many years and various proprietary mixtures supposed to contain arsenical insecticides were sold in large quantities, especially in Texas.

Rotenone in calcium arsenate checks cotton aphids.--P. M. Gilmer, Tifton, Ga., reports that because of the heavy dusting schedules necessary to control the boll weevil on sea-island cotton the damage from the cotton aphid is a serious problem. On June 18 the first dusting with calcium arsenate and calcium arsenate mixtures was made on a series of plots. Seven later applications were made on July 8, 20, 25, 28, August 1, 7, and 12. The average number of aphids per square inch of leaf surface from July 25 to August 14 was about the same on the untreated check plots and the plots dusted with a mixture of calcium arsenate with derris so as to contain 0.5 percent rotenone. There were from three to four times as many aphids on the plots dusted with calcium arsenate and with a proprietary mixture of calcium arsenate and a zinc salt. This latter mixture did not hold down the aphid population, but the mixture containing rotenone was effective. On August 14 the respective counts were: Check, 27.75 aphids per square inch; calcium arsenate-rotenone dust, 29.30 aphids per square inch; the average of the other 4 treatments, 118.86 aphids (variation between 113.25 and 123.75) per square inch.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Condition of 1941 cotton crop in south Texas.--The first bale of cotton each season is usually produced in the subtropical area of the lower Rio Grande Valley of south Texas, which has, for the past several years, been under regulation on account of the presence of the pink bollworm. The present season was no exception to the rule, and the first bale of cotton for the 1941 crop was produced in Starr County and ginned on July 10. The planting of the 1941 cotton crop in the lower Rio Grande Valley was begun on February 1, in accordance with a State order designed to shorten the cotton-growing period as a pink bollworm control measure.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Effectiveness of derris dust mixtures against pea aphid varies with rotenone content.--J. E. Dudley, Jr., and associates, of the Madison, Wis., laboratory, performed a field test against the pea aphid (*Illinoia pisi* Kalt.) on late peas at Waunakee, Wis., during the period beginning June 20, 1941. The test was designed primarily to determine the influence of

rotenone content of a derris dust mixture on its effectiveness against the pea aphid. Three dust mixtures were employed in these tests with rotenone contents of 0.75, 0.50, and 0.25 percent, respectively, derived from derris root. Two percent of soybean oil was incorporated in the dust mixtures to function as a conditioner and pyrophyllite was used as the diluent. The dusts were applied with a power duster equipped with a 24-foot boom with 20 nozzles, the boom being entirely enclosed with canvas and a 40-foot trailer attached. The average speed of travel during treatment was 2.4 miles per hour. Temperature ranged from 82° to 70° F., and the relative humidity from 60 to 100 percent during the period of treatment. The results of this experiment are presented in the following table.

Percentage of rotenone	: Dust : Aphids per sweep :			Reduction			
	: applied :	: after :		: after			
	: per acre:	43 hrs.:	92 hrs.:	6 days:	43 hrs.:	92 hrs.:	6 days
	: Pounds	: Number	: Number	: Number	: Percent	: Percent	: Percent
0.75-----	: 36	: 26	: 11	: 11	: 85	: 94	: 92
0.50-----	: 40	: 37	: 18	: 17	: 79	: 90	: 88
0.25-----	: 43	: 55	: 27	: 24	: 69	: 85	: 82
Check-----	: 0	: 178	: 177	: 138	: --	: --	: --
Difference required ^{1/} for significance	: --	: 21	: 10	: 6.5	: 12	: 6	: 5

^{1/} There were 2 replicates of the check treatment and 6 replicates of the other treatments. Therefore, the check treatment was not included in the statistical analysis.

The dust mixture containing 0.75 percent rotenone was significantly superior to the mixture containing only 0.25 percent all three times the records were taken. At the expiration of the 6-day period the dust mixture containing 0.50 percent was significantly superior to the one containing only 0.25 percent. It should be noted that each time the infestation was recorded there was a definite trend indicating the increased effectiveness as the percentage of rotenone increased.

Cultural practices aid in control of tobacco flea beetle. --J. U. Gilmore and C. Levin, of the Oxford, N. C., laboratory, report that, in a control experiment directed against spring populations of *Epitrix parvula* (F.) in plant beds, encouraging results in reducing populations of this pest followed several cultural practices. One treatment, involving the pulling of all plants in the plant beds and the scraping of the ground with a hoe, demonstrated a reduction of 83 percent in the number of flea beetles emerging from such beds, as compared with plant beds which had not been disturbed. Another treatment in which the plots were plowed and harrowed showed a reduction of 59 percent, and a third treatment in which the plots were simply plowed showed a reduction of 45 percent in the number of beetles emerging therefrom.

Wheat product as carrier in poisoned bait for green June beetle.-- Tests conducted by Norman Allen and H. N. Pollard, of the Florence, S. C., laboratory, with various wheat products for carriers of paris green in the poisoned bait recommended for the control of Cotinis nitida L. in tobacco plant beds, indicated that wheat middlings, wheat shorts, equal parts of middlings and bran, equal parts of shorts and bran, or whole-wheat flour, were more effective than wheat bran alone. Three separate plant-bed tests were conducted by replicating each treatment from 6 to 8 times and examining each individual larva in an effort to determine the comparative value of the different wheat products. As a result, it was found that a bait composed of 1 pound of paris green and 25 pounds of wheat middlings and approximately $2\frac{1}{2}$ gallons of water was the most satisfactory wheat-products bait tested, being roughly twice as effective as a similar bait prepared by using wheat bran. This bait, although effective, killed only about two-thirds of the larvae, because all of the larvae do not come to the soil surface over a period of several days. For maximum efficiency, the infested area should be sprinkled or wetted with water just prior to applying the bait. Wetting the area increases the burrowing activities of the larvae and this increases the chances of them obtaining the bait. The bait should be broadcast over the infested area at a rate of 18 pounds, wet weight, per 100 square yards of plant bed area.

Dilute solutions of dichloroethyl ether protect seedlings of cantaloups and melons.--Tests at Walla Walla, Wash., by R. S. Lehman during 1940 and 1941 have shown that dichloroethyl ether in water will protect cantaloups from serious damage by wireworms (principally the Pacific coast wireworm Limonius canus (Lec.)) when this mixture is applied at the time the seed is planted, at the rate of $\frac{1}{2}$ pint per hill at a dilution of either 8 or 12 cubic centimeters per gallon of water. It was determined, moreover, that a second treatment of $\frac{1}{2}$ pint of the solution per hill 2 or 3 weeks after the seed was planted assured an improvement in the control in instances when wireworms were still numerous near the plants at this period in the development of the crop. R. E. Campbell and his associates of the Alhambra, Calif., laboratory, found that the use of dichloroethyl ether in dilute solutions afforded protection from wireworms (principally the sugar beet wireworm Limonius californicus (Mann.)) to sprouting melon seeds and young plants. In this connection the most interesting observations obtained from the 1941 tests related to the effect of dichloroethyl ether treatments on the germination of the plants. At all strengths used, ranging from 3 to 15 cubic centimeters of dichloroethyl ether per gallon of water applied at the rate of 1 quart of the solution per hill, germination of the plants was accelerated and the total percentage was greater than in comparable plots where water alone was used.

Cull dumps important breeding source of potato psyllids.--A survey conducted by R. L. Wallis, of the Scottsbluff, Nebr., laboratory, on potatoes growing in dumps of cull tubers, showed very high populations of Paratrioza cockerelli (Sulc.) and since June 10 adult psyllids have nearly doubled in numbers every 5 days. Adult psyllids averaged 95.3 per 100 sweeps of an insect net on June 25. There are approximately 1,200 to 1,500 potato-storage cellars in the North Platte Valley and most of the growers and dealers at sorting time dump cull tubers near the storage. Heating in

these piles causes early sprouting and growth, and the dense foliage provides an ideal breeding place for psyllids.

Derris, pyrethrum, and cryolite dust mixtures control bean leaf beetle.--L. W. Brannon, of the Norfolk, Va., laboratory, reports excellent control of Cerotoma trifurcata (Forster) on snap beans, in experiments conducted with the following materials: Derris-pyrethrum powder-sulfur dust (0.50 percent rotenone-0.10 percent pyrethrins), pyrethrum powder-sulfur (0.10 percent pyrethrins), commercial stabilized pyrethrum powder (0.080 and 0.164 percent pyrethrins), derris-sulfur (0.50 percent rotenone), and cryolite-sulfur dusts (70 percent sodium fluoaluminate). All materials gave significant reductions, ranging from 97 to 80 percent, in the bean leaf beetle infestation 24 hours after treatment. None of the materials tested gave significant reductions over each other, with the exception of the stabilized pyrethrum dust containing 0.080 pyrethrins. Excellent residual effects were noted as a result of infestation counts made on the various plots 7 days after treatment.

INSECTS AFFECTING MAN AND ANIMALS

Change in direction of research in Southeastern laboratories.--The regionalized plan of direction of research work in the Southeast was changed on August 1. Under the new arrangement the laboratories at Orlando, Panama City, and St. Lucie, Fla., will work independently and report direct to the Washington office. The mosquito research under way at New Smyrna, Fla., is so closely related to that at Orlando that the former will continue to function as a sublaboratory of the latter.

Screwworm remedy harmful to eyes of sheep when used excessively.--E. C. Cushing, of the Menard, Tex., laboratory, reports that tests on the effects of the ingredients of Smear 62, individually and in combination, in the eyes of sheep have shown that excessive amounts of the remedy and some of its ingredients, when applied at approximately 3-day intervals, are harmful.

Screwworm formula 62 satisfactory in Arizona and Texas.--Over 1,000 gallons of the new screwworm remedy developed at the Menard, Tex., laboratory have been tested in Arizona by livestock operators. This remedy has given excellent results under conditions in that State. The method of preparing the formula was also demonstrated by personnel of the Menard laboratory to several large dealers in livestock remedies and to members of the board of directors of the Texas Sheep and Goat Raisers' Association. The association is considering sponsoring the manufacture of the remedy for its members.

Screwworm formula 62 effective in treating fleeceworm infestations.--Mr. Cushing reports that 49 cases of fleeceworm infestations in sheep were successfully treated with screwworm formula 62. Mr. Cushing states that a considerable quantity of the smear is needed, unless the wool is first sheared from the infested area.

First record of Mansonia perturbans in Oregon and Washington.--A high population of M. perturbans Walk. was reported during July at Scappoose, Oreg.,

by E. F. Knipling, of the Portland, Oreg., laboratory. This species was also reported from Yakima, Wash., by C. M. Gjullin. These are the first records of this mosquito in Oregon and Washington.

Instruction at U. S. Public Health Service School at Norfolk, Va.--F. C. Bishopp, G. H. Bradley, and B. V. Travis assisted the U. S. Public Health Service in the training course being given to the first class of 18 sanitary engineers and doctors who are to be assigned to mosquito-control work in extra cantonment areas. General information on insects of medical and sanitary importance was presented by Dr. Bishopp, and mosquito biology, taxonomy, and methods of conducting surveys and of carrying on salt-marsh-mosquito control were discussed by Messrs. Bradley and Travis.

Number of eggs per female hornfly.--"Heretofore we have tentatively agreed with other investigators that the female hornfly produced a maximum of 24 eggs," reports W. G. Bruce, of our Dallas, Tex., laboratory, "but in recent tests it has been found that at least 168 eggs can be produced by 1 fly."

Lecture on medical entomology before U. S. Army medical officers.--On August 6, F. C. Bishopp gave an illustrated lecture on "Insect Problems of Medical Importance in the Tropics" before a group of Army medical officers who are taking a 1-month special course in Tropical Medicine at the Army Medical Center in Washington, D. C.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--One living and 6 dead larvae of the euribiid (trypetid) Anastrepha serpentina Wied. were taken at New Orleans on June 16 in grapefruit in stores from Brazil. Twenty-six living larvae of the euribiid Anastrepha sp., probably fraterculus (Wied.), were intercepted at New York on June 13 in grapefruit in stores from Brazil. Specimens of the aleyrodid Aleurotrachelus camelliae (Kuwana) were intercepted at Seattle on January 10 on the leaf of a Camellia japonica in cargo from Japan. This represents our first interception of this species. Three adult specimens of the bruchid Bruchidius dorsalis (Boh.) were found at Seattle on March 27 in Gleditsia japonica seeds in mail from Japan. A living specimen of the thrips Elaphrothrips dampfi Hd. was intercepted at El Paso on June 11 on pineapple in cargo from Mexico. A living larva of the scolytid Gnathotrichus aciculatus Blackm. was found at El Paso on May 28 in a tomato in baggage from Mexico. Six living larvae and 1 living adult of the cerambycid Gracilia minuta (F.) were taken at New York on July 2 in and on Carpinus betulus (wooden crates for crockery) in cargo from England. A living adult of the elaterid Heteroderes rufangulus Gyll. was found at New York on May 20 in excelsior in a box of grapes from Argentina. Fifteen living adults of the ostomid Lophocateres pusillus (Klug) were intercepted at Norfolk, Va., on April 14 under the bark of a walnut log in cargo from Australia. Specimens of the coccid Morganella longispina (Morg.) were taken at San Francisco on August 7, 1940, on Dendrobium spectabile in mail from Australia. A living adult of the curculionid Pachnaeus litus Germ. was found at New York on June 3 on white greens in cargo from Cuba. Living

adults, larvae, and pupae of the scolytid Pteleobius vittatus F. were intercepted at New York on June 11 in the bark of an elm log in cargo from England. This is our second interception of this insect; the first one was also made at New York, but the specimens were all dead. M. W. Blackman states that this scolytid is not known to occur in the United States.

Pathological interceptions of interest.--Diplodia henriguesiana Trav. & Spessa was found on May 24 at New York on orchids from Colombia. Gymnosporangium globosum Farl. was intercepted on May 22 at El Paso on Crataegus sp. leaves from Mexico. Arthur's manual does not include Mexico in the range of this rust. Helminthosporium allii Camp. was intercepted on July 23 at Baltimore on garlic bulbs in stores from Dutch East Indies. We have had few interceptions of this fungus except from Mexico during the last year or two. Heterodera marioni (Cornu) Goodey was found on July 14 at Baltimore in potatoes in stores from Argentina. Mycosphaerella citrullina (Smith) Gross. was found on May 3 at New York on squashes in stores from South Africa. Peronospora pisi (De Bary) Syd. was found on June 23 at New York in fresh pea pods in stores from Portugal. Phomopsis capsici (Mgn.) Sacc. was found on July 24 at Baltimore on peppers in stores from Brazil. Ustilago sphaerogena Burr. was intercepted on March 6 at Seattle on Echinochloa crusgalli straw in cargo packing from Japan.

DOMESTIC PLANT QUARANTINES

The grasshopper situation in general.--Grasshopper development, baiting, and dispersal, in the areas as a whole, reached a peak during July. In some areas to the north, hoppers of certain species had not yet reached the adult stage, while to the south the second generation was hatching. Baiting activities fell far short of anticipation on the basis of the egg survey of 1940. By the latter part of July approximately 20,000 wet tons of bait had been used, with an anticipated need for 10,000 more tons after harvest to protect late crops and winter wheat. About 75 percent of the bait was used in Kansas, Minnesota, Montana, Nebraska, and South Dakota, about half the total output having been distributed in Minnesota and Montana.

Grasshoppers greatly reduced in North Dakota.--The State of North Dakota has been a very heavy bait user in recent years. This year, however, owing principally to reduced infestations and weather conditions, only 550 tons of wet bait had been used up to the latter part of July with the anticipation that 100 additional tons would suffice. Most baiting was done in the eastern part of the State.

Other grasshopper infestations.--(1) In western Kansas light to moderate flights of grasshoppers were reported almost daily during the first part of July, reducing the populations in the southwestern counties by about 60 percent. Crop damage in this area during the month was estimated at from about 5 to 15 percent. (2) The two-striped grasshopper was the dominant species in the heavily infested northwestern counties of Minnesota, while in the east-central and southeastern counties infestations were spotted and of little economic importance. Baiting in this State was light during July, owing principally to the weather and to the rapid

growth of crops. (3) In Montana farmers in the north-central, most heavily infested part of the State, succeeded in holding crop damage to a minimum by continued baiting throughout the month. By July 26 approximately 5,000 tons of wet bait had been used in the north-central and south-central areas. (4) The dominant species in Nebraska consisted of Melanoplus mexicanus (Sauss.), M. bivittatus (Say), and Aeoloplus turnbullii (Thos.), necessitating the heaviest baiting in the Republican River Valley in the southwestern section of the State, as well as that part of eastern Nebraska comprised of area lying east of Dawson County and south of Wayne County. (5) In South Dakota injury to crops, especially to small grains, increased moderately, reaching an estimated 10 to 12 percent by mid-July. Principal injury was occasioned by clipping of wheat and barley, the greatest damage occurring in the east-central area of the State, where M. mexicanus, M. bivittatus, and A. turnbullii were about equal in numbers. Baiting declined rapidly in all areas during July after harvesting operations started. About 2,500 tons of wet bait were used.

Second generation of lesser migratory hoppers produced.--The second generation of the lesser migratory grasshopper developed in July in Arizona, Colorado, and Kansas. In Arizona adults were laying eggs late in June in Graham and Cochise Counties, previously reported as widely infested. In western Kansas the second generation was observed near the end of the month and was anticipated shortly thereafter in Colorado.

Grasshopper adult survey planned.--To plan for the adult grasshopper survey throughout the infested area, supervisors in the respective areas recently were called together at five strategic points and given instructions as to procedures, the extent of observations desired, and the areas to be covered. Information for the adult survey was well in hand prior to these meetings, through observations by supervisors and the control personnel.

Progress in control of Mormon crickets.--Heavy migrations of Mormon crickets occurred in July in several counties in Idaho, in Big Horn and Beaverhead Counties, Mont., in Juab and Tooele Counties, Utah, in Crook and Hot Springs Counties, Wyo., and in several areas in Nevada. Large-scale control operations were conducted, successfully halting the migrations and effecting kills of 80 to 100 percent. Warm, clear weather in July allowed long feeding periods for crickets and resulted in increased effectiveness of sodium fluosilicate bait. With the use of such bait, supplemented by power and hand dusting, and the use of metal barriers, cricket migrations from higher toward lower elevations were halted and crop damage reduced to a minimum. With two Bureau airplanes, bait was spread in Humboldt County, Nev., on more than 32,000 acres. A check of the effectiveness 48 hours later showed a 95-percent kill. In South Dakota volunteer crews spread bait on 7,350 acres, mainly in Lyman County. By mid-July the control program began to slacken and several crews were dispensed with.

Comparison of Mormon cricket control operations in 1940 and 1941.--More acres have been baited and dusted on account of Mormon crickets in 1941

than in the previous year. Toward the end of July, 485,000 acres had been so treated, as compared with 320,000 in 1940. The increased acreage covered was accomplished by the increased use of bait, by which means more than 445,000 acres were treated, as compared to 160,000 during the previous season. The effectiveness of the sodium fluosilicate bait has resulted in a reduction of about 80 percent in the acreage dusted by crews.

Mormon cricket infestations.--At the Warm Springs Indian Reservation in Oregon oviposition was 90 percent complete the first week in July, and control operations in Wasco and Jefferson Counties were terminated on July 3. Practically all cricket bands in Pine and Eagle Valleys in Gilliam County, Oreg., were killed by baiting before egg laying began. In Sheridan County, Wyo., more intensive populations in cropped areas were observed early in July than at the same period a year ago. Some damage to grains occurred. In the Big Horn Mountains of Sheridan County, however, it is of note that only light and scattered populations were found. Also in Yellowstone County, Mont., only light scattered infestations were present early in July, the heaviest populations existing in three areas south of Billings.

White-fringed beetles found in new localities.--Infestations of the white-fringed beetle were located in July for the first time at Irvington, Ala., 20 miles west of Mobile on the L. & N. Railroad, and at Grand Bay, Ala., also on the same railroad, near the Mississippi State line. At a more northern railroad point, Martin, Ala., in Dallas County, another infestation was located for the first time in this county. Beetles were found in abundance. Crews of inspectors are delimiting these various infested areas, tracing any shipments which may have been made from these points, and inspecting transportation lines therefrom. At Houston, Tex., and Memphis, Tenn., transit inspectors have been assigned to inspect railroad yards, nurseries, and other places likely to harbor the beetles. None were found at these cities. The species found at Grand Bay, Ala., was Pantomorus peregrinus Buch., the first infestation of this species to be found outside of Mississippi. One specimen of P. leucoloma Boh., was also found at Grand Bay.

White-fringed beetle emergence reaches peak in July.--According to cage-emergence records furnished by the Division of Cereal and Forage Insect Investigations, emergence of the beetles in New Orleans on July 22-23 was the highest of the season. In the Florala, Ala., area the greatest number of beetles was taken on July 2-3. In the area infested with P. peregrinus a high point emergence occurred in the Gulfport, Miss., area on July 3, followed by a second high in the third week of the month.

Some results of peach-tree inspection.--Peach-orchard inspection went forward in July cooperatively with the States on nearly 42,000 properties in 14 States, extending from South Carolina to California. Of particular interest was the discovery of the peach mosaic disease for the first time in Fannin County, Tex.; of 1 mosaic tree in Los Angeles County, Calif., a county in which the disease had not been found since 1939; of the finding of the phony peach disease for the first time in the Mississippi counties of Choctaw, Clay, and Lowndes; and of 1 such

infected tree in Pemiscot County, Mo., the first in that county since 1937. No infection was found in North Carolina, the second consecutive year that the disease has not been in evidence in that State. Only 1 phony infected tree was found in Jefferson County, Ill., as the result of inspection of formerly infected properties in 2 counties. In Chilton County, Ala., the most important commercial area of the State, phony peach inspection on a more extensive coverage than that of last year resulted in locating an increased number of diseased trees. In some Georgia orchards in the heavily infected commercial area there is an increase in the phony disease this year. In Tennessee inspection activities were completed in July, with the result that the number of infected trees found was less than that of 1940. Diseased, abandoned, and escaped trees were removed during the month with the assistance of W. P. A. laborers.

Quarantine status of peach nurseries.--Of the 389 nurseries inspected in the phony infected area, only two--one in Georgia and one in Texas--failed to meet the certification requirements of standard State quarantines. Of 161 nurseries in the mosaic-infected area, only 9 nurseries, growing less than 1,100 trees, are ineligible for certification. Inspections were made jointly with the States of these nurseries and their 1-mile environs. Budwood sources and their 1-mile environs in the mosaic-infected area were also inspected. All diseased trees were removed as provided by the quarantines, except in those nurseries listed as ineligible for certification.

CONTROL INVESTIGATIONS

Quassin much less toxic to houseflies than pyrethrins.--Studies of the toxicity of acetone solutions of quassin and other materials, applied to individual houseflies with a micropipette by E. R. McGovran, demonstrated that these materials were of a very low degree of toxicity, as compared with the pyrethrins. The materials used in these tests were prepared in pure form in most cases by E. P. Clark, of the Division of Insecticide Investigations. The biological tests were made by placing 0.002 ml. of acetone solution of the materials on the ventral surface of the abdomens of chilled houseflies. The mortality of untreated and acetone-treated flies was 2 percent, indicating that the quantity of acetone applied to each fly did not cause a rise in mortality. When 2 mg. of pyrethrins were added to 1 ml. of acetone 40-percent mortality of the flies resulted. At 4 mg./ml. of pyrethrins there was 77-percent mortality. Quassin, isoquassin, tenulin, helenalin, picrotoxin, and lapicol at 50 mg. per ml. of acetone and isotenulin at 25 mg./ml. caused from 0 to 10-percent mortality.

Fumigation of gladiolus cut flowers.--In cooperation with the Division of Japanese Beetle Control, Heber C. Donohoe, White Horse, N. J., fumigated 16 varieties of gladioli bud stalks supplied by 3 interested growers. The schedule used was 2 pounds of methyl bromide per 1,000 cubic feet for 2 hours at a temperature above 70° F. The stalks were at the stage of development in which they are commercially cut and shipped. Following treatment, they were returned to the growers for observation. All 3 reported independently after 5 to 6 days, during which

all buds opened, that the treatment had improved the bloom and that no injury of any sort occurred.

Fumigation of nursery stock for Japanese beetle.--In cooperation with the Division of Japanese Beetle Control, Mr. Donohoe reports the development of a new methyl bromide fumigation schedule for nursery stock, to be used in obtaining Japanese beetle quarantine certification, and the modification of a second schedule previously developed. The new schedule requires a dosage of $1\frac{1}{2}$ pounds per 1,000 cubic feet for $2\frac{1}{2}$ hours at a minimum temperature of 73° F. The modification establishes a temperature minimum of 67° for the present 70° schedule of 2 pounds for $2\frac{1}{2}$ hours. Schedules thus far completed now make a continuous series through most of the range of soil temperatures prevailing during nursery stock shipment. These include:

Dosage (Pounds)	Period* Hours	Minimum temperature °F.
$2\frac{1}{2}$	$4\frac{1}{2}$	50
$2\frac{3}{4}$	4	54
$2\frac{1}{2}$	$3\frac{1}{2}$	57
$2\frac{1}{2}$	3	60
$2\frac{1}{2}$	$2\frac{1}{2}$	63
2	$2\frac{1}{2}$	67
$1\frac{1}{2}$	$2\frac{1}{2}$	73

INSECTICIDE INVESTIGATIONS

Haller visits field stations.--During the period June 16 to July 30, inclusive, H. L. Haller visited 29 field stations and laboratories of the Bureau. The purpose of the trip was to become better acquainted with insecticide problems in the field to discuss the possibilities of applying in limited field tests some of the synthetic organic compounds that have shown promise as insecticides in the laboratory, and to discuss possible substitutes for pyrethrum and derris for use during the national emergency.

Tripterygium --a Chinese insecticidal plant.--The successful introduction into the United States of a Chinese insecticidal plant by W. T. Swingle, of the Bureau of Plant Industry, has made available limited amounts of it for entomological and chemical study. The plant, called lei kung teng, "Thunder-God vine," by the Chinese, and known to botanists as Tripterygium wilfordii, has been used for centuries by Chinese market gardeners for the control of insects attacking cruciferous plants. Cuttings brought from the Far East 6 years ago are now growing well in the Department's Plant Introduction Garden at Glenn Dale, Md. The powdered roots obtained from these plants, as well as extractives of the root, have shown promise as a stomach insecticide against a number of insects. Chemical studies by F. Acree, Jr., and H. L. Haller have shown that the insecticidal principle is in the bark

of the root and, from a fraction of an extractive that was toxic to the codling moth larva, a small quantity of an alkaloid has been isolated. Attempts are now being made to characterize the alkaloid and to determine whether or not it is the only insecticidal constituent of the plant. Chemical studies by Schechter and Haller have shown that the red pigment tripterene, in the bark of the root, is identical with the pigment celastrol, in the root of the common bittersweet (Celastrus scandens), which is closely related botanically to Tripterygium. A few entomological tests with the root of this plant have been made, but further studies are needed. In an effort to discover a domestic source of supply of this promising new insecticide, the Division of Insecticide Investigations is desirous of testing any fresh root of Celastrus scandens that may be collected in different parts of the United States, and would greatly welcome any samples that may be submitted by the field stations of the Bureau.

Two new sodium arsenites discovered.--Nelson in July 1941 reported a study of the 3-component system $\text{Na}_2\text{O}-\text{As}_2\text{O}_3-\text{H}_2\text{O}$ at 35°C . Two new sodium arsenites were discovered, $\text{Na}_2\text{O} \cdot 3\text{As}_2\text{O}_3$ and $2\text{Na}_2\text{O} \cdot \text{As}_2\text{O}_3 \cdot 7\text{H}_2\text{O}$. The compound $5\text{Na}_2\text{O} \cdot 2\text{As}_2\text{O}_3 \cdot 26\text{H}_2\text{O}$ claimed by Schreinemakers and De Baat, was not obtained in these experiments. In the last few years sodium arsenite has been used in large quantities in the control of harmful insects. For the years 1938-40 Federal and State agencies used annually 1,442,000 gallons of sodium arsenite solution (equivalent to 6,885,000 pounds of dry sodium arsenite) for the control of grasshoppers and white-fringed beetles, and 352,000 pounds of sodium arsenite powder against Mormon crickets, a total of well over 7.25 million pounds for these insects alone. Commercial sodium arsenites used as insecticides, according to Nelson, contain 82 to 85 percent As_2O_3 and dissolve readily in water. The principal compounds present in these commercial products are $\text{Na}_2\text{O} \cdot 3\text{As}_2\text{O}_3$, the arsenious oxide content of which is 90.5 percent, and $\text{Na}_2\text{O} \cdot \text{As}_2\text{O}_3$, the arsenious oxide content of which is 76.2 percent. These results are published in the Journal of the American Chemical Society for July 1941 (v. 63, No. 7, pp. 1870-1872).

Apparatus used in determining particle size of dry powdered insecticides and fungicides.--Gooden, in the Analytical Edition of Industrial and Engineering Chemistry for July 1941 (v. 13, No. 7, pp. 483-484), described a powder compactor for air-permeation experiments, which is useful in determining the particle size of dry powdered insecticides and fungicides. This new device for compacting powders builds up within the sample tube a column of any desired height, the compacting process proceeding from bottom to top concurrently with the deposition of the material. The combined process of loading and packing involves little more work than the simple task of loading alone. Designed particularly for use with the self-calculating air-permeation apparatus for measuring surface mean diameter of powders, it gives promise of equal usefulness in other fields involving permeability of powder beds to gases.

New extraction apparatus.--Schechter and Haller, in the Analytical Edition of Industrial and Engineering Chemistry for July 1941 (v. 13, No. 7, pp. 431-432), described an automatic continuous percolator which embodies a number of improvements over the one described by them in 1938 (ibid., v. 10, No. 6, p. 328, June 15). This type of apparatus has been used to

extract large amounts of plant material and has worked satisfactorily in every case, with very little loss of solvent and very little attention after the apparatus has been adjusted.

BEE CULTURE

Significance of colonies remaining negative after inoculation with American foulbrood.--A. P. Sturtevant, Laramie, Wyo., reports: "In the American foulbrood resistance testing work, it has been found that irrespective of the strain of bees, certain colonies never show any apparent disease when inoculated by the standard spore-sirup-inoculation method, whereas other colonies may develop varying amounts of disease, depending on their activity in cleaning such disease out. It has been felt that even in the so-called 'negative' colonies a certain number of larvae must have contracted the disease, but that these colonies are so active in their clean-up behavior that such infected larvae are removed before they are seen by the observer. Recently further work has demonstrated that this probably is true. Based on our present knowledge of the age at which larvae are susceptible to infection (see News Letter v. 6, No. 11, p. 31, and v. 7, No. 3, pp. 27-28) and using the manipulative procedure followed by Woodrow in inoculating individual larvae, 4 groups of colonies comprising 18 colonies headed by queens of 2 different lines of resistant stock and 1 line of apparently susceptible stock were treated as follows: The queens of each colony were confined in excluder cages on empty combs for 24 hours, forcing the queens to lay eggs in these combs. The combs of eggs thus obtained were then placed in the center of the brood nests of their respective colonies. Just at the time the eggs started to hatch, or very shortly thereafter, each colony was inoculated by the standard-spore-sirup method (500,000 spores of Bacillus larvae per ml. in one liter of sugar sirup). At the time of sealing the larvae in the cells the combs were placed in screen cages, so that worker bees could not get in to remove any larvae developing infection. At the end of approximately 21 days, or at the time when the adult bees were starting to emerge, these combs were removed and every cell of brood was examined for diseased brood. The results of these observations showed that a certain number of diseased larvae or pupae occurred in every comb. For the first group these ranged between 3 diseased larvae out of a total of 847 brood cells in the comb to 42 diseased larvae out of a total of 961 brood cells, whereas for the second group the range was between 10 diseased larvae out of a total of 846 to 29 out of a total of 997. Three out of the first group of 10 colonies have remained otherwise negative since inoculation, whereas 2 out of 8 of the second group have remained negative. There apparently was no significant difference in the amount of diseased brood observed in the combs from the colonies of the various lines of stock under observation. These results seem to substantiate the belief that some disease must develop even in the 'negative' colonies, but that it is cleaned out so rapidly that it is never seen, thus indicating that such colonies are the most active in this type of behavior. This also lends added strength to the method used for several years in most instances in selecting the next year's breeding queens from such 'negative' colonies."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Status of sweetpotato weevil.--The long-dormant problem of how to classify the forms of Cylas formicarius (F.) has been revived recently by L. A. Mayer, in charge of the Bureau's Foreign Plant Quarantine station at Savannah, Ga. Mr. Mayer noted that the characters on certain specimens seem to contradict the nomenclature currently used in referring to the weevil. This is in line with what was learned more than 20 years ago by W. D. Pierce, who pointed out (Jour. Agr. Res. 12 (9): 604-608, 1918) that the sweetpotato weevil included more than one distinguishable form and proposed that the North American specimens be known as variety elegantulus Summers of formicarius. Although it now appears that Dr. Pierce's analysis of the Old World material was not carried quite far enough, his main conclusions are substantiated by a preliminary study of many additional specimens in the formicarius complex which have been received during the last several years. It is recommended, however, that the American form be treated as a subspecies, rather than a variety, whose designation will be Cylas formicarius, subspecies elegantulus (Summers).

The spread of two introduced European weevils.--The rapid diffusion rate of some foreign insects in the Nearctic region is well illustrated by the American history, fragmentary as it is, of Amalus haemorrhous (Hbst.). This European weevil was first reported from North America in New York State in 1923, though it is now known that the species was present several years earlier, a series from the Wirt Robinson collection (now in the National Museum) having been taken at West Point, N. Y., in 1915 and 1916. W. J. Brown (Can. Ent., April 1940, pp. 77-78) records it from Iowa (1928) and, in Canada, from Quebec (1927), Ontario, and Manitoba. Blatchley records it from New Jersey (1925), and Frost, from Massachusetts (1926 and 1932). To these localities may be added the following, from specimens in the National Museum: Ohio (1935), Michigan (1925), Wisconsin (1927), Minnesota (1935), Idaho (1932), Oregon (1937), and Utah (1938 and 1939). Evidence of the spread of another and more recently discovered European weevil has recently been received in the form of a specimen of Sitona lineatus (L.), which was collected on Dutch white clover at Moscow, Idaho, by T. A. Brindley (July 9, 1941). This species was first reported from North America at Victoria, Vancouver, by Downes in 1938 and has since been found abundantly on San Juan Island, Wash. Its fate in this country is of particular interest from the viewpoint of insect diffusion, as it is one of the comparatively rare cases of a Palearctic weevil gaining its first foothold on this Continent on the Pacific coast, the Atlantic seaboard, as is well known, being the usual nursery for recently introduced European Curculionidae.

Serica peregrina Chapin in Maryland.--Adults of the introduced scarabaeid Serica peregrina Chapin (until recently recorded under the name Serica similis Lewis) were collected at Baltimore, Md., on July 11, 1941, by G. H. Dieke, of Johns Hopkins University. This species has been known from Long Island for several years but has not been recorded as established elsewhere in the United States

Two European moths in North America.--In the course of making identifications of moths from Washington State, the study of the genitalia of a pair of Microlepidoptera from Bellingham proved them to be the European Swammerdamia pyrella (Vill.), not previously recorded from North America. The larva of this species feeds on the leaves of apple and prune. The material was collected on August 13, 1932, by J. F. Gates Clarke. Moths submitted by E. I. Smith, of Seattle, Wash., were found, on examination of genitalia, to be the European species Anacamptis populella (Clerck), also not heretofore known from the United States. This series of moths was reared from Salix and was accompanied by preserved larvae and pupae.

Further additions to the collection of bees.--Two shipments of types and determined bees were received from T. D. A. Cockerell in July. They included the types of 36 species of bees and determined specimens of 135 species. Of these the types of 15 species and determined specimens of 50 species previously were not represented by named material in the collection of the United States National Museum.

Changes in names of Orthoptera.--For several years it has been thought that a thorough study of literature and the proper application of the International Rules of Zoological Nomenclature would make advisable a number of changes in the generic and family names of some Orthoptera. H. R. Roberts, of the Academy of Natural Sciences of Philadelphia, has recently published the results of such an investigation (Amer. Ent. Soc. Trans. 67: 1-34, 1941), conducted with the cooperation of certain members of the Division of Insect Identification. The changes advocated are based on genotype designations, which are earlier than those previously familiar to orthopterists, these designations causing various generic names to apply to groups of species different from those to which they have been applied in the past. Of the numerous changes important in the nomenclature of Orthoptera, a few of those discussed by Mr. Roberts are of general interest. The correct spelling of the family names of the walkingsticks and mantids are Phasmatidae and Mantodeidae, respectively, rather than the former spellings, Phasmidae and Mantidae. Tetrix replaces Acrydium as a generic name for "grouse locusts," the latter name being applied more correctly to a genus of oedipodine grasshoppers. Both Scudderia and Phaneroptera have been used for the same genus of narrow-winged katydids in recent years, but a previously overlooked, valid genotype designation, to which Roberts calls attention, supports the name Scudderia for this group. Roberts also presents arguments in favor of the use of the generic name Acheta for our common field and house crickets, assimilis F. and domesticus L., for which Gryllulus has been used by certain European and American authors in recent years. Use of Acheta, however, is predicated upon further action by the International Commission, which may not be taken; and employment of Gryllulus implies taxonomic distinctions, which are open to some question, between European and American members of this group. Consequently, it seems advisable to continue, for the present at least, to use the generic name Gryllus for our two common species mentioned above

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BUREAU OF
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NEWS LETTER

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FOR AUGUST 1941

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BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO
SPECIAL NATIONAL DEFENSE ASSIGNMENTS

Badman, Cecil S., Agt., Forest Ins., on furlough, inducted, Select.
Serv., June 18, 1941

Finney, Gerald M., Agt., Forest Ins., inducted, Select. Serv.,
Jan. 29, 1941.

Herreman, Dermont E., Jr. Fld. Aide, Truck C. Ins., 1st Lt., O.R.C.,
called to active duty Aug. 7, 1941.

Marucci, Philip E., Fld. Aide, Fruit Ins., inducted, Select. Serv.,
Sept. 8, 1941.

Woke, Paul A., Asst. Ent., Cont. Inv., Lt., H.V.S., U.S. Naval Res.,
Naval Medical School, Washington, D. C., called to active duty
May 27, 1941.

FRUIT INSECT INVESTIGATIONS

A parasite of the olive scale.--Specimens of an encyrtid parasite, Aspidiotiphagus citrinus Craw., have been reared from males and females of the olive scale (Parlatoria oleae Colv.) by Oscar G. Bacon of the Fresno, Calif., laboratory. Two individuals emerged from 400 scales on leaves of Virginia creeper placed in emergence boxes on July 14. Other material which was rather generally parasitized yielded 10 of the parasites. The species is said to occur in a number of scale hosts and has been reported in Southern Europe, Brazil, California, and tropical Pacific islands (Essig: Insects of Western North America). Determination was made by A. B. Gahan.

Oriental fruit moth infestation in peaches unusually low in New Jersey. --There have been fewer worms of Grapholitha molesta Busck in peaches in the orchards of southern New Jersey this year than for many years. This is the conclusion reported by H. W. Allen, of the Moorestown, N. J., laboratory. In a survey of Elberta peaches at harvesttime in Burlington, Camden, and Gloucester Counties it was found that injury due to the fruit moth was less than in any other season since 1930, and less than a third of the injury caused in 1940. In one orchard the fruit-moth injury was only one-half of 1 percent. No orchards were found in which the fruit moth injury was higher than 15 percent. The fine quality of the peaches marketed from that section recently has been due to a large degree to their freedom from fruit-moth worminess. Weather conditions during the season of 1941 have been highly favorable for a rapid increase in fruit-moth population. The fact that this did not occur is without doubt due principally to the unusually high parasitization of the second brood of twig-infesting larvae, which averaged 81 percent, as compared to 67 percent in 1940.

MEXICAN FRUITFLY CONTROL

Few fruitflies trapped.--August trap recoveries of fruitflies in Texas indicated that the fruitfly population in the lower Rio Grande Valley was at its usual low point for this season of the year. Over 31,000 trap inspections were made and the only Mexican fruitflies taken came from the Laredo district, opposite the Mexican border town of Nuevo Laredo. These flies probably drifted across the river to the Texas side. Because of irregular blooming periods last season, many citrus plantings put on an off-bloom crop of fruit. Early in the summer it appeared that some of this fruit might mature and become a source of early fall infestation. Repeated inspections, however, have not only failed to disclose any infestations, but they have shown that very little difference exists between fruit of this early bloom and that of normal bloom. Very little rainfall was recorded in the regulated area in August, but normal growth was made by the citrus crop. Indications for this season's fruit production are that there will be little difference from last season's tonnage.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Domestic collection and emergence of European corn borer parasites for release in 1941.--C. A. Clark, Moorestown, N. J., reports that approximately 17,000 corn borer larvae were collected in southeastern Massachusetts and about the same number in central Connecticut in the fall of 1940, and that from these hosts 65,509 adult parasites of imported stock were reared in the spring of 1941 for liberation in the field. The principal species reared were Macrocentrus gifuensis Ashm., Lydella grisescens R. D., Inareoleta punctoria Roman, and Chelonus annulipes Wesm. Emergence of the parasite adults was timed to synchronize their release with the borer in the field in a suitable stage for attack. Total parasitization by the foregoing species in the domestic collections from Massachusetts was 41.5 percent and from Connecticut 20.4 percent, corresponding closely with estimates made on the basis of data obtained during the survey of the field status of parasites in the fall of 1940. M. gifuensis and C. annulipes were obtained from the Massachusetts collections and more than three-fourths of the supply of L. grisescens came from this source. Over 90 percent of the I. punctoria adults reared were from the Connecticut collections.

European corn borer in early market sweet corn in western New York.--H. L. Chada conducted a survey of corn borer infestation in 25 fields of early market sweet corn from July 30 to August 6, 1941, in a section of western New York comprising the counties of Niagara, Orleans, Monroe, and Wayne. An average of 5.3 borers per plant was found in this tier of counties, the abundance of the insect being somewhat greater in the western than in the eastern part of the section. The maximum population in a single field was 13.7 borers per plant, in Niagara County. Midsummer pupation in Niagara County was 1.3 percent, based on a count of 556 specimens, and in Orleans County it was 0.8 percent, based on a count of 243. No pupation was found in counts of 441 and 274 individuals in Monroe and Wayne Counties, respectively.

Midsummer pupation of European corn borer in early sweet corn in Ohio.--A. M. Vance reports that in early market sweet corn near Toledo, Ohio, the percentages of first-generation corn borer that pupated immediately in 1940 and 1941 were similar. Counts taken in 20 fields July 25-31, 1941, showed 21.7 percent pupation and about 7 percent moth emergence. In 1940, in 18 fields examined on August 7-8 in the same vicinity, pupation averaged 28.4 percent and moth emergence 3.8 percent. Midsummer pupation in 1941, in accord with the generally earlier seasonal development of the corn borer in Ohio, was at least a week in advance of that in 1940. Only 6.6 percent pupation had occurred in examinations made during the period July 29 to August 2 in 1940, as compared with 9.4 percent found on July 16-23 in 1941.

Infestation of European corn borer in white potatoes in Michigan -- Mr. Vance also reports that an examination of 2 large fields of Irish Cobbler potatoes in Lenawee County, Mich., on July 30, 1941, showed populations of the European corn borer of 86.8 and 61.6 borers per 100 plants, respectively. Pupation of the first-generation borer infesting the plants was 22.9 percent in the former field and 43.2 percent in the latter. Apparently, these potato fields were the earliest in the vicinity and the plants in them had reached a stage of growth attractive to the moths at oviposition time.

JAPANESE BEETLE CONTROL

Japanese beetle fumigation.--Beetles declined in numbers at the loading points on the Eastern Shores of Delaware, Maryland, and Virginia late in the month, so that it was possible to discontinue fumigation at Edge Moor, Del., on August 26 and at all other points the following day. The heaviest fumigations of the season were during July and the first 3 days of August, after which they gradually diminished. A total of 133 refrigerator cars were fumigated in August and 878 cars during the season. This was a decrease from previous years, due principally to the short crop on the Eastern Shore. The New Jersey crop was moved by inspection of the cars and potatoes so that fumigation was eliminated. During August 313 cars were fumigated empty with HCN, making a total of 1,017 cars for the season. This is a considerable decrease from previous years. In the New York and Philadelphia areas beetles were not present in sufficient quantities to warrant fumigation. Inspection and certification of cars and potatoes in New Jersey

in place of fumigation greatly increased the need for inspectors. To relieve the situation two men from the treating section were assigned for most of the month on truck and car certification. Assistance was also given by relieving the inspectors of routine chemical treatments of nursery stock. A demonstration of methyl bromide fumigation was held during the month at the establishment of a grower of potted strawberry plants in southern New York. This grower is interested in the construction of a chamber for fumigating next year's crop, which he expects to be a large one. At the demonstration 800 of his potted plants were fumigated, to take care of his summer orders, as he had no other way of certifying them, all of his plots being infested. Two refrigerator trucks loaded with sweet corn and 1 loaded with beans were fumigated in New Jersey. The loads of sweet corn were fumigated at the White Horse office after loading in the Asbury Park and Newark markets. This method of certification simplifies the movement of this produce, as it would require several inspectors a considerable time to hand-inspect the ears.

Planting dates changed to conform to beetle emergence.---Beetle damage was greater on the Eastern Shore than ever before. In the summer of 1940 the damage was apparent in some sections of Virginia. Many of the Eastern Shore farmers accordingly planted corn 30 days later than usual in order to avoid heavy beetle damage and obtain a better yield per acre. Thus, corn was planted around May 15 this year, instead of April 15. Even with the later planting date, damage was severe. Some farmers report that they will have only from one-third to one-half the regular yield of corn per acre. Much damage was also done to small orchards and shade trees. Many trees were completely defoliated during the heavy flight. This visible damage has focused public attention on the problem, and individuals, county leaders, and State leaders are working on methods of control and eradication.

Japanese beetle infestation in New York City area.---Continued checking of infestation conditions in this area revealed very few beetles in New York City proper but heavy infestations on Long Island and in Westchester County within a 50-mile radius of New York City. Residents on the north shore of Long Island reported thousands of beetles washed ashore and an inspector in that section substantiated this report. These beetles apparently originated in Connecticut. Fishermen and boatmen on Long Island Sound encountered large numbers of beetles in the air and in the waters of the sound. Live beetles in the water attached themselves to the sides of boats and crawled up out of the water.

State unable to purchase needed lead arsenate.---A communication from C. H. Brannon, State entomologist, North Carolina Department of Agriculture, states: "Out of some 60 invitations for bids we received only 1 full bid from a small concern; therefore, we will have to pay a high price for lead arsenate if we get it at all." The State Department called for bids on 261,250 pounds of the material to be used in conjunction with their Japanese beetle control campaign.

Increased truck shipment of farm products.---Owing to the heavy movement of defense materials by rail and their priority over farm produce, more truck shipments of produce resulted during the inspection season. This

was especially true in the movement of perishable commodities, where a few hours' delay would mean almost total loss of the shipment. There was an especially heavy movement via refrigerator trucks of certified cantaloups, potatoes, and cabbage from the Eastern Shore.

Autogiro scouting for Dutch elm disease.--During the greater part of July and August autogiro scouting was performed for the purpose of locating Dutch elm diseased trees in parts of the major disease area where ground scouting will not be performed outside of developed areas. Owing to the extent of the area covered, the work could not be done systematically. It was therefore necessary to cover sections where elms were most common. This type of scouting was carried on in New Jersey and New York, using the cabin autogiro carrying a pilot and an observer, and in Connecticut with the Division's open autogiro, with the pilot acting as observer. Particular emphasis was placed on the location of spots where the disease is intensified or is likely to become so. It is expected that similar work may be done next year and that by comparing conditions observed in 1941, 1942, and the following years, some indication of the development of the disease can be recorded. It is not expected that the locations mapped from the air will be visited by ground crews; however, areas of special interest may be referred to research or State officials for further investigation. Few diseased spots were found, probably because the disease has not had an opportunity to become intensified following previous scouting and sanitation work. In most of the areas in New Jersey and to a slightly less extent in New York, the elm leaf beetle had so severely damaged the foliage of the elms that detection of disease symptoms was seriously handicapped. Early in August new foliage had begun to show on some of the defoliated trees and thus some of the difficulties for the observer were removed.

Summer scouting handicapped by insufficient personnel.--Failure to reach the desired quota of W. P. A. employees between the first of July and the last of August has reduced the effectiveness of Dutch elm disease suspect scouting. The time lost because of insufficient personnel has made it necessary to increase the original number of men requested in all work areas, in several instances as much as 50 to 75 percent. Further delay in filling requisitions for men will reduce the efficiency of the fall and winter work. As an example of the difficulties experienced in procuring qualified W. P. A. men, 1 of the State leaders reported that of 61 men who have performed services on the project since the end of July, the personnel is scattered throughout 19 towns and 6 counties of the State. In 6 of the 19 towns there is but 1 man reporting from each, and in only 5 of the total number of towns are there as many as 5 men reporting. In 1 group of 29 referrals it was found that 15 of the men were over 60 years of age and the average age of the entire group was 58. Not one of the group had worked for the project previously nor had any experience that made him adapted for the work.

Elm virus mistaken for Dutch elm disease in Ohio.--A news item in the August 4 issue of the Athens, Ohio, Messenger erroneously reported that Dutch elm disease is causing elms to die in Gallipolis, Ohio. Undoubtedly phloem necrosis, which appears to be prevalent in that area, is being

confused with the Dutch elm disease. Advance survey scouting under way around the Athens disease area extends into Gallipolis, and inspections made by the scouts for symptomatic elms showed no signs of the presence of Dutch elm disease.

Heavy attacks by Scolytus in Athens, Ohio, area.—An unusual condition has been found to exist in the Athens area in the vicinity of McArthur, Wellston, and Gallipolis. Scolytus multistriatus Marsh. has attacked elms in such vast numbers as to cause their galleries to be so crowded that some beetles went below ground level to complete the maternal channels. At these locations large numbers of elms are dying as a result of the infectious "root rot" disease, phloem necrosis. In cases where death is not too rapid, causing the bark to become too dry before beetles enter, the elms are literally alive with attacking beetles. In some instances, galleries were found 6 inches below ground. Apparently the beetles entered above ground level and burrowed their way down to find unoccupied space to deposit their eggs.

First appearance of Dutch elm disease in Massachusetts.—The first authentic case of Dutch elm disease infection in Massachusetts was confirmed during August in the town of Alford, Berkshire County, which adjoins infected territory in New York. The first specimens were collected from the tree on July 29, and a re-collection was made in August. Both collections gave a good growth of the Dutch elm disease fungus. Discoloration was heavy in the tree and ran back into the 1940 wood. Intensive scouting was done in this town, where the trees seemed to be in rather bad shape. Three other specimens from Massachusetts in 1940 yielded the Dutch elm disease fungus in the original culture, but no reconfirmation could be obtained on additional collections.

Dutch elm disease confirmations in detached areas.—A tree tagged at the time of the advance survey scouting in Baltimore, Md., has been confirmed as infected with Ceratostomella ulmi. This tree has a d.b.h. of 14 inches and is located in Latrobe Park. This is in the neighborhood of Fort McHenry and the locations of confirmed trees previously found in Baltimore. Two previous confirmations have been recorded from Baltimore—one in 1933 and another solitary tree in 1936. A first-record confirmation for Morgan County, Ohio, was reported on August 9. This is the first case of the disease found outside the Athens County limits in the Athens disease area. The tree, a slippery elm, has a 26-inch multiple trunk. It is located in Section 33 of Marion Township.

Big turnover in cable reels.—Cable reels are in such demand for defense orders that gypsy moth inspectors have been requested by several concerns to inspect and certify the reels for shipment the same day they are ready for shipment. Heretofore shippers made it a practice to accumulate a number of reels before requesting inspection. Now as soon as a reel is empty it is returned to the cable manufacturer.

FOREST INSECT INVESTIGATIONS

Recently established parasite of gypsy, brown-tail, and satin moths determined as Exorista larvarum (L.).--W. F. Sellers, New Haven, Conn., and R. T. Webber, Morristown, N. J., state that the dipterous parasite discussed under this name in the News Letter for July 1941 (v. VIII, No. 9, p. 14, Sept. 1, 1941) is definitely this species. The determination was based on morphological differences discovered by the late T. H. Jones and the writers in all three larval instars between Exorista mella Walk. and Exorista larvarum L.

Fire destroys thinning plots.--C. B. Eaton, Berkeley, Calif., reports that the 19,000-acre Sugar Hill fire of August 2, 1940, on the Modoc National Forest, completely wiped out the Fandango Thinning Plots, established in 1938. These plots were set up in the Fandango Logging Chance to test the value of various thinning treatments as a means of indirectly controlling mountain pine beetle damage in mixed pole stands of ponderosa pine and white fir, the theory being that, if the vigor of the pine could be improved by removing the competing fir, the pine would succumb less readily to mountain pine beetle attacks. Unfortunately, the proof of the theory will never be derived from this experiment, for the fire destroyed nearly every vestige of plot markings, as well as the trees themselves. The presence of beetle-killed pine poles in the midst of fir thickets on parts of the area, together with the slash from recent logging operations, provided excellent fuel which must have contributed greatly to the intensity of the fire.

Differences between high- and low-risk trees shown photographically.--Mr. Eaton also reports that progress has been made in depicting photographically the difference between ponderosa pine trees of low and high risk to bark beetle attack. In 1940 a photographic study of risk classes was made on the Black's Mountain Experimental Forest for the purpose of obtaining a series of photographs that illustrated the different risk types, and to determine whether or not change in risk could be followed through photographs. Pictures of 47 trees were taken both in color and in black and white, from permanently established photographic stations. It is planned to repeat this series of pictures annually. From last year's pictures several plates have been made up illustrating the risk types. Judging from the number of calls received for copies of these plates, the pictures are proving to be useful. It is expected that these illustrations, together with the written descriptions of the classes, will enable timber markers to recognize beetle-susceptible trees more readily, in marking stands for sanitation-salvage cutting.

Termites found on San Clemente Island.--Donald De Leon and Mr. Eaton report the presence of termites on San Clemente Island, 70 miles northwest of San Diego. In the course of inspections of Navy housing facilities at the Naval Air Station and Fleet Training Base on the island to check on measures used in building construction to prevent termite damage, Messrs. De Leon and Eaton collected a number of specimens of a subterranean termite (probably Reticulitermes) in grade stakes and old pieces of lumber near the buildings. The finding of termites in this locality was somewhat unexpected,

in view of the fact that the island is practically barren, although there is evidence that it has been timbered in times past. Fragments of tree trunks have been removed from the ground in the course of excavations for roads and buildings, according to the construction engineer on the island. The termites probably occurred in the locality originally when the island was part of the mainland, and have apparently survived in such wood fragments as have been present in the soil. No damage has occurred to Navy buildings on this site, chiefly because of the fact that the construction methods preclude the possibility of termite attack.

Elm leaf beetle attacks isolated elm plantings in the Sierras.-- G. R. Struble reports that, during the 1941 season, the elm leaf beetle (Galerucella xanthomeloena (Schrank)) completely defoliated the elm trees planted a few years ago to shade the Forest Service headquarters building near Northfork, Calif. This insect has become established in the Sacramento and San Joaquin Valleys, where it attacks planted elm trees regularly unless the trees are protected by sprays. At times the beetle invades the towns and communities in the mountain districts bordering these valleys where widely scattered, isolated plantings of elm trees have been made for shade. One such case occurred in the floor of Yosemite Valley. Eastern elm trees planted here during the early settlement of the valley escaped defoliation for more than 50 years. Suddenly the beetle appeared about 1933 and for several years caused severe defoliation. Spray control was applied by the National Park Service and the insect disappeared in the locality.

Oregon's white firs affected by "gout disease".--The "gout disease of fir," caused by the balsam woolly aphid (Dreyfusia piceae Ratz), has been found seriously affecting the health of lowland white firs at several points in the Willamette Valley. These European aphids were first found by R. L. Furniss, of this Bureau, at Senator Charles McNary's farm, "Fircone," near Salem. Later others were found in the city park at Corvallis, along the Willamette River near Wilsonville, and at Oak Grove near Portland. These aphids cause a white cottony encrustation on the bark of affected trees and nodules to form at the buds or twig terminals. Trees become sickly in appearance and the lower branches die. In the Northeastern States and Canada this disease is reported as causing the death of large quantities of balsam fir. So far in Oregon, it has been found only on Abies grandis, and it is not known whether it will become a serious pest of other balsam firs.

Hylurgopinus rufipes reared from stripped elm bark.--A sudden need arose in August at the Morristown, N. J., laboratory for a bulk supply of H. rufipes (Eich.) free from Ceratostomella ulmi. Late in July a trip was made by C. L. Griswold to Massachusetts to obtain the material. Infested elm logs were found but their large diameters made it impracticable to saw or load them. An examination revealed that H. rufipes was present in late larval instars and in the pupal stage, so the infested bark was removed from the logs and brought to the laboratory. From this stripped infested bark, with an estimated area of about 150 square feet, over 66,000 adults of

H. rufipes issued between August 2 and September 8, with a small emergence still continuing on the latter date. Experience has shown that H. rufipes rarely develops successfully in stripped bark if its larvae are less than two-thirds grown.

Scolytus multistriatus feeding in crotches of trees infected with Dutch elm disease.--W. D. Buchanan, of the Morrystown, N. J., laboratory, reports that adults of S. multistriatus Marsh., free of Ceratostomella ulmi, were caged in June on 10 nursery elm trees that had developed foliar symptoms of the Dutch elm disease the same month. An examination of the trees was made and a complete ring of color was found in the spring vessels adjacent to the bark. After the beetles had fed for a period of 5 days, and ingested some of the discolored tissue, 234 were collected in separate gelatin capsules from twig crotches in which they were feeding. These beetles were cultured for the presence of C. ulmi by P. V. Mook, of the Bureau of Plant Industry, who recovered the fungus from 3, or 1.3 percent, of them. It was evident that the 3 infested beetles contained only a light load of the fungus, owing to the fact that it was necessary to hold the culture plates for 45 days before it could be identified. These data support previous studies and imply that a very small percentage of beetles free from C. ulmi become contaminated with the fungus by crotch feeding. Thus the importance of transmission by beetles having been contaminated by feeding in crotches of diseased trees is probably of minor importance in the spread of the disease, as compared with beetles becoming contaminated in brood galleries.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Labor shortage hampers gypsy moth work.---W. P. A. gypsy moth work was resumed late in July in Connecticut, Massachusetts, and Vermont, after a temporary suspension since June 30, caused by lack of funds. It has not been possible to obtain the required number of W. P. A. workers in any of the three States, and many of the men who are referred to this project are physically incapacitated for scouting work because of advanced age. Those unfit for scouting are being reclassified to the "unskilled" grade and employed as laborers. A large percentage of the workers recently assigned to the gypsy moth project have had no experience in gypsy moth work, as many of the former gypsy moth employees obtained private employment or were assigned to W. P. A. defense projects after the termination of gypsy moth work at the end of June.

Gypsy moth assembling cages placed in three States.---The placing of assembling cages in selected towns in the vicinity of the gypsy moth infested area in Pennsylvania, in eastern New York, and northern New Jersey was completed by the first of August. The men assigned to that work immediately began making regular visits to the cages to collect any male gypsy moths that might be attracted to them. The cages consist of a number of plane surfaces coated with tanglefoot and provided with an attractant material prepared from the tips of the abdomens of female gypsy moths. The tanglefoot is also applied to the bark of nearby trees. Male gypsy moths are attracted by the bait and adhere to the sticky surfaces. They

are carefully collected and sent to the central office for positive identification. When a male gypsy moth is found at an assembling cage, the surrounding area is examined for gypsy moth infestation.

Preparation of attractant for future assembling-cage work.--A large number of female gypsy moth pupae for use in the preparation of the attractant material for assembling-cage work during the summer of 1942 has been collected and processed. Collections were first made at heavy infestations in the central section of Massachusetts, but the material proved unsatisfactory because of the prevalence of wilt disease. Later collections from southeastern Massachusetts, where the wilt disease had not appeared, gave much better results. The emergence of the moths was rapid, and required the services of a number of men to handle and clip them for the attractant preparation. The progress of the work indicates that the number of charges obtained this year will be considerably greater than was possible in 1940.

Mixed results from gypsy moth defoliation surveys.--Practically complete defoliation records taken in Maine indicate that there will be a marked reduction from last year in the number of acres of woodland showing all grades of gypsy moth defoliation from slight to complete. Partial records from New Hampshire indicate a considerable reduction in that State also. Reports from a few towns in Connecticut show no defoliation except in a few white oak trees located in a group of towns in the extreme southeastern corner of the State. Opposite results are indicated by complete records from two other States. A decided increase in defoliation over last year was recorded in Massachusetts, and the records for Rhode Island show a slight increase this year.

Brush-disposal machine used where burning would endanger forests.--The brush-disposal machine developed by this activity was recently transferred from the Greenfield storehouse to Sharon, Conn., where it is now converting into sawdust and small chips the piles of brush left at the sites of gypsy moth infestations discovered during the fiscal year 1941.

Green June beetle mistaken for gypsy moth.--A letter from R. W. Sherman, of the Dutch elm disease project, called attention to an article in the McConnellsville Herald, of McConnellsville, Ohio, concerning the discovery of the gypsy moth in that locality. A regular supervisory employee was sent to McConnellsville immediately from the Pennsylvania area. The insect reported as the gypsy moth was found to be the green June beetle (Cotinus nitida Linn.).

Gypsy moth thinning operations promote resistant growth.--Large numbers of ash and maple seedlings were recently observed in Adams, Mass., in an area where poplar and wild apple trees were removed in the course of gypsy moth selective thinning work last winter. This area is a good example of the replacement of unusable growth favored as food by the gypsy moth by

valuable species of trees which are much less favorable for gypsy moth development.

Beavers flood area in Massachusetts.--A crew detailed to gypsy moth scouting work in West Stockbridge, Mass., recently found a large area flooded by beaver activity. The trees in this section cannot be examined until the water is frozen sufficiently to support the weight of the men.

Green-striped maple worm and elm leaf beetle in western Massachusetts.--Recent reports to the gypsy moth office from western Massachusetts indicate that there are numerous outbreaks of the green-striped maple worm and the elm leaf beetle in Berkshire County and vicinity. The foliage of some of the elm trees where spraying was not done has been so heavily skeletonized by the elm leaf beetle that the leaves are rapidly dropping to the ground and many of the trees are practically denuded of their foliage. Severe damage by the green-striped maple worm was also reported.

Scouting work pressed in difficult mountainous regions.--W. P. A. gypsy moth crews assigned to duty in the Vermont barrier zone area are now scouting mountainous areas in remote localities in order to complete the examination of the greatest possible amount of the most difficult area while the minor dirt roads are in reasonably good condition. Much of the area is ledgy, and a thorough examination requires more time than is needed in more favorable locations. The foliage in the extreme northern portion of Vermont is unusually heavy this year. This condition has made scouting by the 40-foot method rather difficult, as the crew members cannot readily keep their neighbors in view and carefully examine the upper branches of the trees. It has been necessary to space the men less than 40 feet apart in some sections in order to perform the work satisfactorily.

Assembling cages denote gypsy moth infestations in Pennsylvania.--Soon after placement, 15 male gypsy moths were found at a single assembling cage in Salem Township, 34 moths were attracted to 16 cages in South Canaan, and several moths were collected at a cage in Paupack Township, all in Wayne County, Pa. With a single exception, all of the South Canaan attracting cages were in a compact group in the north-central part of the town. The bulk of the egg clusters at this infestation were concentrated on 1 large willow tree where 1,800 egg clusters had been treated up to the close of W. P. A. gypsy moth work on June 30. The infestation in Salem is located in a group of 9 old apple trees which contain large cavities and are otherwise in poor condition. Most of the egg clusters are undoubtedly located in the cavities, and can only be treated by cutting down the trees and splitting them open. This work cannot be done until W. P. A. labor is again available in Pennsylvania. An infestation of approximately 200 egg clusters was found in the vicinity of the attracting cage in Paupack, centered in a cluster of 4 American linden trees. The lindens are growing in open country, and the infestation appears to be limited to a few acres. This infestation is located about

three-quarters of a mile northeast of the Salem infestation. Because of the recoveries in these towns, assembling cages were also set out in the adjoining towns of Cherry Ridge and Texas, also in Wayne County. As no male gypsy moths had been found since August 13 at assembling cages put out in Lackawanna, Monroe, and Wayne Counties, the work of removing these cages was begun during the latter part of the month.

Assembling-cage patrols find bear damage and incipient forest fire.--The employee detailed to visit gypsy moth assembling cages set out in Barrett Township, Monroe County, Pa., found that one of the cages had been disturbed by a bear. The animal had eaten all of the tanglefoot and the bark on which it had been spread. Similar damage by bears has been reported in previous years. An employee visiting cages in Lehigh Township, Wayne County, met berry pickers walking out of the woods along an old trail. Shortly after passing them he discovered a lighted cigarette which had been carelessly thrown into dry leaves. The leaves were smouldering when found, and the prompt arrival of the gypsy moth employee undoubtedly prevented a serious forest fire in this area. Because of artillery practice on the Tobyhanna Military Reservation, which extends into several townships, it was necessary to exercise extreme care in visiting the assembling cages set out in Dreher and Lehigh Townships, Monroe County.

N. Y. A. gypsy moth work in Pennsylvania.--The N. Y. A. gypsy moth project in Lackawanna County, Pa., was closed on August 8 because of the exhaustion of the 1941 project funds. A project for the fiscal year 1942 had not been submitted for approval at that time. The N. Y. A. field project in Luzerne County for the fiscal year 1942 is in operation, and the men detailed to the work were engaged in patrolling burlap bands and performing clean-up work in the townships of Pittston, Plains, and Jenkins during the first part of August. The dead wood and debris piled up during the cleaning work will be burned later in the season, when the fires will not endanger the forests.

C. C. C. gypsy moth work in Massachusetts and Connecticut.--A total of 407 6-hour man-days was used by the C. C. C. on gypsy moth work east of the barrier zone in Massachusetts and Connecticut under the supervision of this Bureau during the 4-week period of August. One crew was used during the entire period in Massachusetts, whereas in Connecticut a crew was used during the first 3 weeks only. The work in Connecticut was then discontinued, and the C. C. C. gypsy moth foreman in charge of the crew was notified that his services were terminated because of a reduction in supervisory personnel. The work done during the month consisted mainly of patrolling burlap bands and thinning work, with some rebrushing done in an area in Granby, Conn., where thinning and spraying work had been performed in previous years. The burlapping work was discontinued during the week ended August 16. Most of the burlap had been applied during the first part of July. Very little was attached to the trees during June, as most of the men were used on spraying work during that month. In July 2 camps in Connecticut where the enrollees had put up burlap this season were

abandoned, and arrangements were made for a crew from the Connecticut State gypsy moth office to tend the burlap set out by one of these camps. The gypsy moth crew from a third camp tended the burlap set out by the other abandoned camp, in addition to its own. In Massachusetts and Connecticut combined, 42,395 trees were banded on 149 acres, and 347 caterpillars and 174 pupae were destroyed at burlap bands during the recent larval season.

PLANT DISEASE CONTROL

Barberry bushes destroyed in southwestern Colorado.--The following table summarizes the progress that has been made in the eradication of native barberries (Berberis fendleri) in La Plata, Archuleta, and Adams Counties since July 1.

County	Area : covered : Square miles	Properties : inspected : Number	Bushes : found and : eradicated : Number	Amount of : chemical : used : Pounds
Adams	50	22	0	0
Archuleta ^{1/}	8	9	278,135	1,800
La Plata ^{1/}	18	28	390,247	6,386
Total	76	59	668,382	8,186

^{1/} Areas of native barberry.

In addition to the above, recheck work has been done in Berberis vulgaris areas in Adams, Arapahoe, Jefferson, Douglas, Elbert, Pueblo, Kit Carson, and Morgan Counties. Fruiting bushes were located in a few areas where the initial survey was conducted in 1936.

Rust damage limited to small areas near barberry bushes.--Conditions for the development of stem rust were very favorable throughout Colorado this season. Rust was first observed on barberry bushes on May 9 in the southwestern part of the State and on May 19 in a Berberis vulgaris area near Loveland. Winter wheat escaped damage, except in fields immediately adjacent to native barberry bushes. The amount of rust on spring wheat varied considerably, with severe losses in some areas where barberry bushes are numerous. Losses for the State as a whole will not exceed 1 percent.

Stem rust caused relatively little damage in 1941.--This year, in general, was a relatively light stem rust year, for both winter and spring wheat. This is particularly interesting in view of predictions of probable disaster to this year's crop made on the basis of abundant fall infection in 1940. Had a general epidemic developed, it would have been the result of a combination of many favorable factors, but as events

developed, they simply offer another opportunity to point out the difficulty of long-range prediction in a situation so complex as a stem rust epidemic. As a whole, there was little stem rust damage in 1941 to hard red winter wheats, a number of varieties such as Tenmarq being resistant to the most prevalent physiologic races. The damage, which was high in certain local areas but rather light for the area as a whole, was mostly to soft wheats. As a result of heavy infection on soft wheat, the damage in north Texas averaged about 20 percent in the area bounded roughly by Fort Worth, Dallas, Sherman, and Gainesville. Soft wheat in north-central Oklahoma was also severely damaged, making the crop loss at least in the eastern part of that area approximately as heavy as that in northern Texas. One small section in southwestern Kansas was damaged to the same extent, and there was some damage in northwestern Missouri along the Missouri River. In both Missouri and Kansas the effect of early maturity in enabling susceptible wheat to escape damage was clearly evident. Early wheat was not injured by rust for the most part, but late fields in the same sections were damaged. In the western sections of these States, where abundant moisture promoted unusually favorable crop prospects early in the season, stem rust was unimportant. Other pathological factors did reduce yields, however, including black chaff, basal glume rot, and scab and some of the reduction caused by these diseases will undoubtedly be attributed to stem rust. Leaf rust, which overwintered abundantly and became seriously epidemic, probably was responsible for heavier losses than stem rust in the Mississippi Valley. It is estimated at the present time that the loss to winter wheat from stem rust did not exceed 2 or 3 percent for any State, either west or east of the Mississippi. Stem rust caused little loss to spring wheat on the whole. Thatcher wheat was not affected by stem rust, and susceptible varieties of bread wheat, such as Ceres and Marquis, were damaged only locally. Among these areas was one near Rapid City, S. Dak., and another in Mountrail County, N. Dak. There was some loss in the Panhandle of Nebraska and in occasional fields in various sections elsewhere. Loss to durum wheat also occurred in occasional fields in northeastern North Dakota in that part of the durum area east of Devils Lake and Rocklake. But the aggregate loss to all spring wheat caused by stem rust was very slight, and State loss estimates probably will not exceed a trace. Preliminary data thus far obtained from slide exposures this year indicate that stem rust spores in quantity came into the spring wheat area at about the same time as in 1940, that is, about the middle of June; but in 1940 small numbers of spores came into the area early in June, whereas this year they were almost absent. The number of spores caught during the second half of June this year was not so great as in some previous years.

Race 17 most prevalent in Winter Wheat Belt.--Identification of physiologic races in collections made in winter wheat areas is well on the way to completion. Races 17 and 56 continue to be most common, with race 17 isolated more than twice as often as race 56. This is the first year since 1933 that any race has been more prevalent than race 56. Such a shift in race population presents a new problem in breeding wheats for stem rust

resistance. In the case of the durumms, for instance, all commonly grown varieties are susceptible to race 17. Thatcher wheat, however, will continue to be resistant, Tenmarq and Kanred should be resistant, as they are immune to race 17, while most of the other commonly grown winter wheats are susceptible. Race 19 was isolated almost without exception from durum wheats in Texas, although race 17 was very common there. Apparently, therefore, race 19 was better able than race 17 to attack the durumms, under the conditions that prevailed in Texas this year.

Spokane business men see control work on annual "show-me trip." Members of the Timber Products Bureau of the Spokane Chamber of Commerce spent their sixth annual "show-me trip" on the Coeur d'Alene National Forest on June 21 and 22, as guests of the Forest Service. Sixteen members of the group and Stuart Moir, forester for the Western Pine Association, made the trip. Hosts and guides included Meyer Wolff, C. C. Strong, Howard Drake, and Neal Nelson of the Forest Service; M. Bradner, Charles Wellner, and E. Rapraeger, of the Experiment Station; and J. C. Evenden, of forest-insect control, and E. L. Joy, of blister-rust control, from this Bureau. Saturday afternoon was spent inspecting white pine cultural experiments on the Deception Creek Experimental Forest, and Sunday was occupied with inspection of the results from various cutting methods on the forest. Included was a trip through the Ohio Match Company logging operations. Blister rust infection centers and the effectiveness of control work were observed and discussed during both days of the trip, a keen interest being displayed in the progress of this project.

Another former "blister ruster" becomes supervisor of a white pine forest.—Announcement has been made of the transfer of P. E. Melis to the position of supervisor of the Clearwater National Forest in Idaho, one of the six major white pine forests of Region 1. Others who started on blister rust and are now employed on the national forests of Idaho include C. C. Strong, supervisor of the Coeur d'Alene National Forest, Neal D. Nelson, assistant supervisor on the Coeur d'Alene, B. A. Anderson, assistant supervisor on the Kaniksu, and W. G. Guernsey, assistant supervisor on the Beaverhead National Forest. Mr. Melis started on blister rust work in 1924. In 1927 he entered the forestry branch of the Indian Service and in 1936 transferred to the Forest Service in Region 1, where he has held the positions of chief of planting, acting chief of wild life management, and supervisor of the Helena National Forest.

Eradication of wild black currants effective.—C. C. Perry reports that W. P. A. crews working in Northampton and Southampton, Mass., have found that the initial work in wild black currant areas was exceptionally effective, as practically no bushes are being found this season in areas which formerly supported an unusually large population. One of the crews in Northampton is finding a scattering distribution of wild black currants

and prickly gooseberries. All bushes, especially the wild blacks, are generally and heavily infected.

Tennessee mountain crew celebrates completion of Ribes eradication task.—To celebrate the completion of the reeradication work on the Boomer job, which Walter Stegall, the blister rust control agent, regarded as one of the most difficult and dangerous eradication jobs encountered by his crews since the work started in 1934, members of the eradication crews held an old fashioned "chicken fry," mountain style, during the lunch hour at the Boomer job-site. Every member of the Cocke County, Tenn., blister rust crews attended the "fry" and every man expressed feelings of enthusiasm, enjoyment, and a full stomach. Several men said it was one of the nicest get-togethers they ever attended.

W. V. Benedict reports on infection in sugar pine region.—Early in August Mr. Benedict and C. P. Wessela looked over infection conditions on the Beaver Creek control unit of the Klamath National Forest. While they had already heard reports of heavy Ribes infection on this area, as well as other areas on the Klamath, they were not prepared for what they found. Mr. Benedict states: "I can recall no extensive infection area examined by me in the past where rust development has been so swift. In 1938 infected Ribes were found relatively lightly scattered in this area; in 1939 no infection was located; and in 1940 2 incipient cankers were discovered and no infected Ribes. This year, fruiting cankers, while not abundant, are not uncommon, and Ribes infection is something terrific. It is the extensiveness and abundance of infection on Ribes that is so illuminating. Ribes sanguineum is the principal offender in this locality. Like R. roezli of the Sierras, it is found under the trees on all sites. We examined many bushes on all sites across some 6 sections. About two-thirds of the bushes examined were infected. In many cases all of the leaves on plants containing several hundred feet of live stem carried infection and many leaves of a high percentage of the bushes examined were completely smothered in rust; so yellow, in fact, that one could spot the infection from the top surface of the leaves some distance away. This heavy intensification of rust on Ribes this year is probably due largely to the abnormally wet season prevailing throughout Oregon and California, although the increasing volume of near-at-hand aeciospores got things off to a good start. Although the Klamath camp labor strength has been doubled in an effort to clean up the worst infection centers before fall, there is little doubt that a very large amount of infection will be returned to pines. While Mr. Wessela and I were checking infection near where crews were working on August 2, a crew boss brought in a trunk canker on 1937 wood about 1 foot long and 2 inches in diameter, fruiting heavily." Numerous sugar pine infections were reported on the Lassen Forest, with heavy infection on Ribes in the general vicinity of fruiting cankers. Two days of scouting around Viola, where Ribes infections were found in 1938 and 2 incipient cankers found in 1940, brought to light 30 infected

sugar pines with 61 cankers. Reed Miller reports finding a blister rust infected pine with 2 cankers 6 miles south and east of the previous southernmost known limits of the disease. This is practically at the southernmost point on the Plumas Forest and is south and west of the northern border of the Tahoe Forest, in the SE $\frac{1}{4}$ sec. 9, T. 20 N., R. 8 E., on Sly Creek. The cankers had not yet sporulated.

COTTON INSECT INVESTIGATIONS

Cotton bollworm.--The cotton bollworm has caused more than usual damage to cotton over all of the Cotton Belt this season and has been particularly serious in central Texas. In this area large acreages are planted to corn and grain sorghums on which the bollworms build up and the moths migrate to cotton. K. P. Ewing, of Waco, Tex., reports that from 6 to 10 squares and bolls per stalk that were saved from the boll weevil by dusting were later destroyed by the bollworms in many fields. The shortage of dusting machines and calcium arsenate has prevented some farmers from dusting; and others who have attempted control by dusting with calcium arsenate were not entirely successful. Calcium arsenate gives fairly good control against the newly hatched larvae but is not effective against the larger larvae; also dusting by airplane has not been as successful as dusting with ground machines. Ewing has often observed that bollworms were more abundant on cotton infested with aphids and has advanced the theory that the moths were attracted to the cotton by the honeydew. Studies by E. E. Ivy, of the Waco laboratory, also indicate that the presence of aphids affected the control of bollworms by predators. Several coccinelids, chrysopids, and the anthocorid Triphleps insidiosus Say were found to destroy many bollworm eggs and young larvae, but where aphids were abundant they fed on aphids and the number of bollworms destroyed were greatly reduced. It was also noted that Orius nymphs were rather resistant to a mixture of calcium arsenate and nicotine dust, which gives hope to the possibility of increasing bollworm control by destroying the aphids by insecticides, thereby causing Orius, and perhaps other predators, to consume more eggs and young larvae.

Other parasites received from Brazil and Peru.--L. W. Noble reports that, through the cooperation of the Division of Foreign Parasite Introduction, another parasite of the pink bollworm, Microbracon vulgaris (Ashm.), was received at Presidio, Tex., on August 23. These parasites were collected by H. L. Parker at Sao Paulo, Brazil, on August 7 and shipped by air express on August 14 by way of Hoboken, N. J., to El Paso, Tex., and by train to Alpine, Tex. Of the 230 adults sent from Brazil, 22 females and 2 males were in good condition on arrival at Presidio. During the last week of August oviposition on the pink bollworm was observed and it is thought that breeding stock can be maintained. This is the second pink bollworm parasite received from Brazil, as on October 21, 1940, a shipment of 75 Calliephialtes dimorphus Cush. was received. From this shipment 52 male and 7 female adults emerged. This was increased to 838 larvae, which were placed in cold storage for the winter. A shipment of Triaspis vestitica Viereck, a parasite of the Peruvian square borer

(Anthrenomus vestitus Boh.), was also received at the Tallulah, La., laboratory. These parasites were sent by Paul A. Berry from Lima, Peru. Mr. Berry had previously forwarded several shipments of Microbracon vestiticida Viereck. As it would probably be difficult to keep this species going through the winter, it was decided to liberate all adults in weevil-infested fields this fall. Very little is known as to rearing methods for T. vestiticida.

Cotton aphid control.--The results of work last season aroused great hope that the increase in cotton aphids, which often follows the use of calcium arsenate, could be prevented by the addition of derris to the calcium arsenate used throughout the season or by incorporating a zinc salt in the calcium arsenate during the manufacturing process. Several insecticide dealers placed mixtures of calcium arsenate and derris on the market and considerable quantities were used for boll weevil control. Many growers who had previously not dusted with calcium arsenate because of fear of building up aphids tried the mixture this season. The severe boll weevil infestations this year afforded ideal conditions for tests under farm conditions. The results from the addition of derris have not been as satisfactory as expected. In all cases observed the mixture held the aphid populations below that of the calcium arsenate treatment and in many cases prevented a damaging aphid infestation from developing during the dusting period. In South Carolina, Georgia, and Florida aphid populations following its use have remained fairly low until the crop was about mature, and in most cases satisfactory control was obtained. In Mississippi, Louisiana, and Texas control was not so good and in many cases enough aphids were present when dusting was discontinued so that they increased to damaging proportions before the crop matured. The difference in results seems to vary with the type of soil. On the lighter, sandy soils of the Southeast aphid control was better than on the heavier, dark soils of the Middle Cotton Belt, and this is thought to be associated with differences in the acidity and fertility of the soil and to the pH of the cell sap of the cotton plant. The production of a zinc-safened calcium arsenate by one of the insecticide manufacturers was based on the Division's findings on the relationship of the pH of cell sap and aphid development. It was hoped the addition of a zinc salt would produce a neutral calcium arsenate that would not increase the pH of the cell sap and cause accelerated aphid multiplication. The control obtained with zinc-safened calcium arsenate was likewise not satisfactory in experimental plots, or by growers under the conditions of heavy aphid infestations that prevailed this season. It is of interest to note that in some sections airplanes were successfully used for applying nicotine sulfate for cotton aphid control. So far as is known, this is the first season that airplanes have been used for applying nicotine sulfate to cotton.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Inspection of gin trash is conducted each year throughout the cotton-growing regions of the United States to determine the status of pink bollworm infestation in areas regulated on account of the pink bollworm and to ascertain whether or not there has been any spread of this insect into free areas. Inspections are also

carried on in Mexico, in cooperation with the Mexican Department of Agriculture, in cotton-growing areas adjacent to the international border, and at other strategic points. Inspection of trash from the 1941 cotton crop began in the lower Rio Grande Valley on August 4, and at the end of the month a considerable amount of work had been done in south Texas, both inside and outside of the regulated area, and in adjacent areas of Mexico. Results of inspection at the close of August indicate a substantial decrease in pink bollworm infestation in the lower Rio Grande Valley of Texas and Mexico. In the lower valley of Texas 15 specimens of the pink bollworm were found in Cameron County through examination of around 700 bushels of trash, as compared with 3,241 worms from a less amount of trash for a comparable period in 1940. Only 3 pink bollworms were found in Hidalgo County, as compared with 368 specimens from comparable amounts of trash for the same period last season. A light infestation was found to be present again this year at El Indio, in Maverick County, Tex., and a few specimens have been found in Brooks County, in the Coastal Bend area of south Texas. In the lower valley of Mexico 261 specimens of the pink bollworm were taken in the Matamoros area through examination of 1,038 bushels of trash, as compared with 5,428 specimens from 807 bushels of trash inspected in August 1940. In the Reynosa section examination of 661 bushels of trash yielded 36 specimens, as compared with 509 worms for the same period for the 1940 crop.

Big Bend area.--In 1938 a special control program was inaugurated to reduce the extremely heavy pink bollworm infestation in the Presidio-Ojinaga area of the Big Bend of Texas and Mexico, resulting in a remarkable reduction of infestation in the 1939 and 1940 cotton crops. At the end of August, sufficient observations had been made in the 1941 cotton crop to determine that the control measures in practice in that area continue to be effective in holding the advantages gained, and that, for the third consecutive year, there will be no appreciable damage to the cotton crop by this insect.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Insecticidal control of the pepper weevil.--R. E. Campbell and J. C. Elmore, of the Alhambra, Calif., laboratory, have submitted the following report regarding developments in the control of Anthonomus eugeni Cano by the use of insecticides: "The pepper weevil situation in southern California presents some interesting developments, most of which are satisfactory from our viewpoint. The infestation is general and severe over the entire pepper-growing area. Where the growers have carried out a consistent plan of dust applications, they are obtaining excellent control, but where the dust applications have been poorly timed or insufficient in number, very poor control is being obtained. At the beginning of the season we emphasized the necessity of at least three light applications at 5-day intervals, after which a period of 10 days could elapse, and then at least three more applications should be made. A number of the best growers have carried out these recommendations very consistently, with excellent results. Other growers, however, let longer periods elapse between applications. During

these periods infestations occurred and such growers are losing a considerable portion of their crop. We can go into a pepper field, examine the pods, and make a very accurate estimate of how many dust applications the grower has made and especially estimate the periods between applications, depending on whether we find feeding punctures, egg-laying punctures, small larvae, or pupae and adults. An interesting picture is also presented in regard to the effect of the different treatments on aphids. Where undiluted calcium arsenate alone was used aphid infestations got under way immediately. We have found no fields where the growers continued to use calcium arsenate, and apparently when they shifted to cryolite (45-percent sodium aluminum fluoride) containing rotenone the aphid infestation did not increase and in some fields it actually decreased. Wherever rotenone has been added to the cryolite or the calcium arsenate there has been a lessening in the aphid population. With cryolite alone the aphid population remains below the danger point, but with calcium arsenate it does not. In our own plots the use of 0.5 percent rotenone in either cryolite or calcium arsenate has reduced the aphid population. We have made an additional observation which shows that in both fields where 10-percent powdered molasses (by weight) was added to cryolite containing rotenone there was a further reduction in the aphid population. This suggests the possibility that the powdered molasses, acting as a sticker, makes the rotenone more effective."

Toxicity of rotenone apparently influenced by diluent used.--L. W. Brannon, of the Norfolk, Va., laboratory, reports the following results of an experiment conducted on snap beans for the control of the Mexican bean beetle (*Epilachna varivestis* (Muls.)), in which nine diluents for derris were compared (each diluted to contain 0.50 percent of rotenone): "Although 1.75 inches of rain occurred 6 hours after the first insecticidal treatment (June 14) and 0.26 inch occurred 29 hours after the second treatment (June 26), fair control of the Mexican bean beetle was obtained with most of the rotenone-bearing dust mixtures used in the experiment. Nine diluents were tested with derris (each dust mixture diluted to contain 0.50 percent of rotenone) to determine the most effective insecticidal carrier for this material for control of the Mexican bean beetle. Preliminary results of the experiment indicate the following relative rating of the diluents: (1) Talc, (2) sulphur, (3) pyrophyllite, (4) redwood-bark flour, (5) walnut shell flour, (6) diatomaceous earth, (7) infusorial earth, (8) clay, and (9) tobacco dust. Derris-clay and derris-tobacco dust gave practically no protection against the insect. Control was not so satisfactory as usual with any of the materials, owing to the above-mentioned rainfall, which occurred shortly after each insecticidal treatment. These results appear to confirm results of tests conducted in 1940 with commercial rotenone-bearing dust mixtures in which variations in the degree of control were attributed to changes in the toxicity of the rotenone as affected by the diluent used. Since precipitation of 1.25 inches occurred 6 hours after the first treatment and 0.26 inch 29 hours after the second treatment, the relative adhesive qualities of the various diluents may be a prime factor in causing these variations in control

Population of tobacco moths in farmers' packhouses reduced by clean-up program.--W. A. Thomas and C. F. Stahl, of the Oxford, N. C., laboratory, report that as a result of a clean-up program instituted in 5 farmers' packhouses in the vicinity of Farmville, N. C., during 1940, involving the removal of all tobacco trash and other farm remnants, populations of Ephestia elutella (Hbn.) were reduced greatly, as reflected in collections made in 1941. The number of moths collected by uniform methods in the packhouses under observation dropped from 2,538 in 1940 to 498 in 1941. In contrast to this, the populations of tobacco moths in the local storage units were much higher in 1941 than in 1940.

Methyl bromide effective against cigarette beetle in fumigation tests.--In experiments performed with Lasioderma serricorne (F.) by R. W. Brubaker and W. D. Reed, of the Richmond, Va., laboratory, using methyl bromide at dosages of 1, 2, 3, and 4 pounds, respectively, per 1,000 cubic feet, at reduced pressures, it was found that 100 percent of the test insects were killed at the dosage rates of 2, 3, and 4 pounds, respectively, in 6 replicates, when the exposure period was 3 hours and the pressure was reduced to approximately 29 inches on a standard mercury gauge. The results obtained with the 1-pound dosage rate were highly variable, however, the mortality at this dosage rate ranging from 44 to 100 percent in the 6 replicates. A total of 250 well-grown larvae of the cigarette beetle were used in each test in a 33-cubic-foot vacuum chamber. Prior to the beginning of each test, the insects were imbedded in bales of imported tobacco in a manner simulating natural conditions of exposure.

Toxicity to cabbage caterpillars of commercial rotenone-containing dusts and similar laboratory-mixed dust.--W. J. Reid, Jr., reports that in an experiment performed on the 1941 spring crop of cabbage at Charleston, S. C., wherein the performance of five representative and widely used commercially prepared rotenone-containing dust mixtures and a similar laboratory-mixed dust mixture, were compared on small, well-replicated field plots of cabbage, the toxicity of the various dust mixtures, based on numbers of caterpillars surviving one application of each insecticide, was closely related to their rotenone content, which varied considerably, although the insecticide materials were labeled as containing 1 percent of rotenone or, in the instance of the impregnated dust, as being equal in effectiveness to such a strength. In general, all of the materials except the impregnated one (a product containing 0.31 percent of rotenone) were superior to the check in toxicity to the cabbage looper (Autographa brassicae (Riley)), and this product either was or had a tendency to be inferior to the others. The dust mixtures containing more than approximately 0.75 percent of rotenone (which included the laboratory mixture) were, or had a tendency to be, superior against that species to those mixtures containing less than that percentage of rotenone. Against the imported cabbageworm (Pieris rapae (L.)), all of the materials except the impregnated product were superior to the check, and the other materials usually were superior to this product. Against the larvae of the diamond-back moth (Plutella maculipennis (Curt.)), which was second in abundance

but very unevenly distributed, no significant differences between treatments were demonstrated. In general, these results corroborate those obtained in similar experiments during the autumn of 1940.

INSECTS AFFECTING MAN AND ANIMALS

Cooperative dogfly project.--The United States Public Health Service is using part of the funds provided it for sanitation in and around army camps to control dogflies in the Tyndall Field area, Panama City, Fla., and the Eglin Field area near Valparaiso, Fla. The Bureau is cooperating in this work by supplying some equipment and personnel, the latter on reimbursable basis. W. E. Dove, of the Panama City laboratory, is serving as technical supervisor of the project which stretches over 165 miles of shore line between Carrabelle and Pensacola Beach. The control project is designed to clear the beaches of the dogfly in the vicinity of the Army Air Corps camps, and consists of spraying piles of fermenting bay grasses on the beaches with a mixture of creosote and oil.

King made consultant, Florida State Board of Health Malaria Bureau.--W. V. King, of the Orlando, Fla., laboratory, has been made a member of the newly formed Board of Consultants of the Florida State Board of Health Malaria Bureau. At the first meeting of the Consultant Board, on August 23, consideration was given to a proposed organization and work plan for the new Malaria Bureau. The Consultant Board also gave consideration to the supervision by the new Bureau of the general mosquito-control work in the vicinity of Army and Navy posts.

FOREIGN PLANT QUARANTINES

Stowaway insects in airplanes.--R. G. Oakley of Honolulu, Hawaii, reports that, according to his records, available inspections of trans-ocean airplanes have resulted in 212 interceptions of living insect stowaways (i.e., insects not associated with plant material) at Miami, and 1,021 such interceptions at Pacific midocean inspection points. The inspections at Miami were made from January 1938 to June 1939 and those at Honolulu from April 1936 to March 1941, by the U. S. Public Health Service; those at Guam from July 1937 to July 1939, by a Bureau inspector; and those at Midway from December 1936 to April 1941, and at Canton Island from July 1940 to April 1941, by representatives of the Hawaiian Sugar Planters' Association. Included in these interceptions were 22 families of Diptera; 21 of Coleoptera; 7 of Hemiptera; 8 of Lepidoptera; 5 of Hymenoptera; 2 each of Orthoptera and Dermaptera; and 1 each of Isoptera, Corrodentia, Collembola, Thysanoptera, and Siphonaptera. Approximately 211 species were involved altogether, but 354 of the interceptions belonged in only 76 species in 8 of the 72 families, namely, Muscidae, 233 interceptions (mostly houseflies) in 4 species; Chloropidae, 151 in 6 species; Drosophilidae, 118 in 7 species; Formicidae, 106 in 25 species; Culicidae, 75 (mostly *Culex quinquefasciatus* Say) in 8 species; Calliphoridae, 65 in 8 species; Blattidae, 57 in 9 species; and Tenebrionidae, 49 in 9 species. Approximately two-thirds of these species (exclusive

of houseflies) represent groups of economic importance, including Anopheles litoralis King, presumably from the Philippines, at Honolulu, where no malarial mosquitoes are known to occur; Nephotettix apicalis Mats., a cicadellid rice pest in Guam stopped at Midway on an east-bound plane; a chrysomelid (Phytorus sp.), found on a plane from the Philippines at Guam, where a leaf beetle of this genus is destructive to forest growth and mango leaves; the fall armyworm (Laphygma frugiperda (S. & A.)), intercepted at Miami; Prodenia litura (F.) at Midway; and the Argentine ant (Iridomyrmex humilis Mayr) at Guam, probably from Honolulu. Although the insects tabulated were alive when collected, many of them seemed to be in poor condition as a result of the pyrethrum spray applied by Pan American Airways stewards prior to landing or owing to plane vibrations or other factors incidental to the trip. Among the dead insects found have been some species of economic importance which never survive the trip. Observations having shown that insects may enter planes at inspection points, Pan American Airways requires that planes be kept closed or carefully screened so the number of insects entering planes after fumigation and prior to departure is reduced to a minimum. Particularly aggressive steps have been taken by the Hawaiian Sugar Planters' Association to intercept pests en route as stowaways on clippers passing the Islands of Midway and Canton. Trained inspectors stationed at those posts not only thoroughly inspect and spray all planes, but maintain a vigilant watch over the local faunas to note and eradicate any established foreign newcomer using the islands as stepping stones to Hawaii. The Association also maintains an identification unit at Honolulu where specialists identify pests intercepted at the protective stations, together with those taken by the U. S. Public Health Service at Honolulu, and incorporate them into a fast-expanding collection for further study and reference.

Potatoes from Peru heavily infested.--Potatoes from Peru found in ships' stores aboard the Finnish S. S. Wipunen when it arrived at New York on May 30, 1941, showed 50-percent damage caused by the larvae of a curculionid, identified by W. H. Anderson as probably Rhizopsidius tucumanus Heller. Seventy-eight mature living larvae were taken from a sample of approximately 100 pounds of potatoes. A living larva and pupa of Gnorimoschema plaesiosema (Turner) = tuberosella Busck, determined by H. W. Capps, were also taken from the potatoes.

Seed leis infested.--G. F. Callaghan of Honolulu, Hawaii, reports that specimens of the weevil Dynatopechus aureopilosus Marsh. were intercepted in Honolulu on January 17, 1940, in a seed lei of Leucaena glauca in parcel post addressed to the mainland. This insect, described from Samoa in 1931, where it is said to infest seeds of Erythrina indica, had not been previously recorded from Hawaii. Subsequent inspections of seed leis made in Honolulu curio shops, as well as investigations of known and possible hosts in the field, have failed to disclose the source of infestation, although the weevils continue to be intercepted in parcel post periodically in seed leis of Macuna sp., M. urens, M. gigantea, Dioclea violacea, Canavalia sp., Jobs-tears, and Leucaena glauca. Origin of a few of these leis was traced to Hilo, Hawaii, through correspondence

with sailors of the fleet who had mailed them. One sender advised that many of his shipmates had purchased numerous leis, as prices were cheap, but had thrown them overboard when so many "baby cockroaches" emerged from them. While few facts concerning the insect in Hawaii are known, its apparent preference for leguminous seeds, some of which harbor as many as 20 adults, might indicate it as an undesirable pest to have on the mainland. To prevent its introduction, by means of parcel post, all known infested material found is fumigated with methyl bromide, through the cooperation of the Territorial Board of Agriculture and Forestry, before being allowed to proceed to destination. According to H. M. Armitage, collaborator in charge at San Francisco, there is no record of Dynatopechus aur-eopilosus Marsh. having been intercepted in California.

Citrus diseases intercepted.--Recent interceptions of citrus diseases included citrus canker (Bacterium citri (Hasse) Doidge) on lemons in stores from Java at New York, on August 23; on rough lemon in stores from Java at Boston on August 12; and on orange in stores ostensibly from Union of South Africa, but real origin unknown as citrus canker was reported to have been eliminated from South Africa some years ago. Sweet orange scab (Elsinoe australis Bitancourt & Jenkins) was found on oranges in stores from Brazil on August 9 at Boston and on August 15 at Baltimore, and on tangerines in stores from Brazil on August 4 at New Orleans. Citrus black-spot (Phoma citricarpa McAlp.); which was recently reported as having become established in South Africa, was intercepted August 16 at Boston in a lemon in stores from the Union of South Africa.

Grass diseases intercepted.--Examination of Heteropogon contortus used as packing for a cargo shipment from Straits Settlements inspected at New York on October 23, 1940, disclosed several diseases for which determinations have just been received. These included Balansia sclerotica (Pat.) v. Hoeh., one of the ergotlike fungi; Melanconium hysteriopsis Pat., a relative of the sugarcane rind-disease fungus; Pleospora andropogonis Niessl.; and a rust, Puccinia sp., which could not be determined. The host is a good forage grass in dry parts of the Southwest and hence these diseases might be of considerable economic importance if introduced. A smut, Cintractia sp., was found contaminating seed of molasses grass (Melinis minutiflora) from Costa Rica, when inspected on January 27 at New York. Another smut, just determined as Tilletia rugispora Ellis, was found at New York on October 30, 1940, in a head of Paspalum plicatulum used as packing for Mexican pottery. Cerebella andropogonis Ces., listed in Stevenson's manual as occurring in Ceylon, was intercepted at New York on August 22 in 80 pounds of Paspalum dilatatum seed from Australia.

DOMESTIC PLANT QUARANTINES

Grasshopper-baiting operations decline.--Baiting by farmers for the control of grasshoppers declined sharply in all infested States early in August, and throughout the month continued on a greatly

reduced scale, with heaviest distribution in Michigan, Minnesota, and Nebraska. Slightly increased baiting was noted in the Panhandles of Texas and Oklahoma, where second-generation lesser migratory 'hoppers began to attack margins of wheatfields.

Adult-grasshopper survey.--The 1941 fall adult-grasshopper survey was completed late in August, surveys having been made in 19 States. The purpose of this survey was mainly to determine general areas where populations were of sufficient importance to indicate the need for an egg survey. It is anticipated that parts of 13 States will be surveyed for eggs later in the season. A special survey of areas of Cochise and Graham Counties in southeastern Arizona infested by Melanoplus mexicanus Sauss. was completed early in August and indicated populations of light to threatening intensity in the Dos Cabezos and Sunset-Bonita areas of these 2 counties.

Development of second-generation M. mexicanus.--Rapid development of the second generation of the lesser migratory 'hopper' occurred in southern Nebraska, eastern Colorado, western Kansas, and the Panhandles of Texas and Oklahoma to the extent that hatching was 60 percent complete in Nebraska, and 100 percent complete in the Texas southern Panhandle area. Populations range to 20 per square yard in fields and 50 in margins of small grains in the Texas and Oklahoma Panhandles. Populations were lighter in the other areas infested. Some marginal damage occurred, increasing demands by the farmers for bait.

Mormon cricket control.--Control operations were brought to a close in mid-August in all infested areas, following which supervisors directed full-time attention to the adult-cricket survey, which was completed at the close of the month. The outstanding feature in the Mormon cricket control operations during this season is found in the almost complete change from dusting to baiting operations. The earlier methods for the control of this pest revolved largely around hand dusting, which later was superseded by power dusting, and in 1941 by baiting. In 1940 more than 122,000 acres were power dusted, whereas less than 23,000 acres were dusted in 1941. On the other hand, 160,000 acres were baited in 1940, and more than 500,000 in 1941. The swing from dust to bait has permitted coverage of more than an additional 200,000 acres. While actual figures are not yet available, it is believed that the cost is not in proportion to the increased acreage treated. Of the acreage baited, more than one-fifth was baited by airplane. The use of planes permitted baiting in areas difficult of access to ground-spreading machines, and resulted in very effective work.

Meeting of State leaders' Grasshopper Control Advisory Committee.--Members of the State leaders' Grasshopper Control Advisory Committee, supplemented by State leaders from Nebraska and Wyoming, met on August 15 and 16 with Bureau representatives for a discussion of various problems, including the availability of control materials for future work; handling and storage during the winter of Federal bait spreaders loaned to the States; concentration and storage of bait materials; the 1941 adult and egg surveys; research problems; and matters of policy dealing with control procedure in future years.

White-fringed beetle survey.--During the month of August intensive inspection activities have been carried on in the environs of all known points of infestation. As a result of this work, the beetle has been found in isolated spot infestations, ranging from a very few acres to approximately 500 acres. Practically all such infestations were found in the almost immediate vicinity of the area now regulated by the restrictions of Federal and State white-fringed beetle quarantines. In connection with this activity, practically all nurseries within a distance of approximately 100 miles of known points of infestation have been inspected with negative results. At the close of the month of August this type of inspection is being extended to cover larger nurseries at somewhat greater distances and to include similar activities in transportation centers such as Montgomery, Ala., Jackson, Miss., and other points to which large quantities of materials had been shipped from infested areas.

White-fringed beetle control activities.--At the close of the month of August control activities had been discontinued, owing to a drastic decline in adult beetle population, except in the areas infested with Pantomorus peregrinus Buch. and in five isolated areas of infestation where control is being applied during the entire period of beetle emergence for the purpose of determining the effectiveness of known suppressive measures, as a possible means of eliminating the pest. Continuation of control in the areas infested by P. peregrinus was considered advisable, owing to late emergence of the beetle.

Study being made of sweetpotato weevil host plants.--During the month of August a general over-all survey was started in Alabama and Mississippi, south of the areas in which eradication activities have been conducted since the beginning of project activities in 1937, to obtain more complete information than is now available relative to the distribution, abundance, and status as to infestation of native perennial host plants of the sweetpotato weevil of which Ipomoea pandurata and I. saggitta are the two most prevalent varieties. This study is being made so that information may be made available for use in considering whether or not it is practicable to extend eradication activities in these two States to the coast.

Phony peach disease inspection reaches peak --During August more than 2 $\frac{1}{4}$ million peach trees on over 20,000 properties in 8 States were inspected for phony peach and peach mosaic diseases. Nearly all of this inspection was conducted in the Southeast for the phony disease, the mosaic inspection being largely completed earlier in the season. Important mosaic inspection, however, was conducted in eastern Texas, the farthest known eastern limits of this disease. Some second inspection was conducted in California, where limited numbers of newly infected mosaic trees were discovered. In the Southeast more than 40,000 phony trees were found, of which over 11,000 were removed, the lag in removals being largely due to temporary shortage of W. P. A. labor in Georgia where most of the diseased trees were found. In addition, more than 180,000 escaped trees were removed, largely in Alabama and Tennessee.

Growers furnish labor for infected-peach-tree removal.--Peach growers furnished sufficient labor in Houston, Macon, and Peach Counties, Ga., for the removal of approximately 10,000 infected trees this season, thereby materially assisting progress of the work. Inspections for phony disease proceeded satisfactorily in Alabama, Arkansas, Georgia, Louisiana, Mississippi, South Carolina, and Texas, except for delays in obtaining labor for tree removal in Chilton County, Ala., and generally in Georgia. Labor availability in the latter State had improved substantially at the end of the period.

Seasonal decline in peach mosaic activities.--Inspection for peach mosaic disease in eastern Texas was discontinued late in August, owing to the poor condition of the foliage, making it difficult to diagnose the disease. Removal of diseased and abandoned trees was discontinued in Mesa County, Colo., during the harvest, while some abandoned-orchard removal was undertaken in Delta County.

Chinch bug control program concluded for year.--The chinch bug control program was concluded early in August. From June 6 to July 10, 1941, 285,920 gallons of creosote was purchased and shipped to 55 counties in 7 States, namely, Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, and Oklahoma. Kansas was the largest user of this material, having been furnished with 114,800 gallons. During the season, cooperators reported that 445,485 rods of barrier were constructed for the protection of 226,505 acres of crops, involving the participation of 3,794 farmers. Officials of affected States estimated that approximately \$883,000 worth of crops were saved which consisted principally of corn, with smaller amounts of sorghum and sudan grass.

Mole cricket situation in Florida.--Reports from growers in several sections of Florida, as well as surveys conducted by representatives of this Bureau during the summer, indicated that a very heavy infestation of mole crickets could be expected during the fall with consequent severe damage to fall-planted crops, particularly in the Plant City area. During the latter part of August, the Bureau received requests from the Florida Mole Cricket Control Committee for furnishing poison bait for the control of these insects in Hillsborough, Manatee, and Hardee Counties. A mixing station, therefore, has been set up in Plant City, and arrangements have been made for establishing mixing stations in other parts of Florida, when and if they are needed. An allotment for mole cricket control has been made from funds appropriated for the control of incipient and emergency outbreaks of insect pests and plant diseases. Supplies of bait ingredients have been purchased to take care of expected needs of this season. This Division assigned a project leader to take charge of the work and to cooperate in surveys with the Division of Truck Crop and Garden Insect Investigations and the Florida Mole Cricket Control Committee. Two men were also assigned from the white-fringed beetle project to supervise mixing stations. The activity of the Bureau in mole cricket control consists of the purchase and mixing of bait materials, furnished to the Florida Mole Cricket Control Committee for distribution to growers through their representatives in the various counties of Florida. Bureau representatives work in close

cooperation with the Florida Mole Cricket Control Committee in determining needs and in making proper distribution of bait materials.

Transit inspection --As a result of a news item in the August 11 issue of the Memphis, Tenn., Press Scimitar, the transit inspector at Memphis intercepted eight shipments of soil which originated in the Japanese beetle area. One sample was found to contain a dead adult Japanese beetle which originated in Camden, N. J. The samples were retrieved from the personal baggage of delegates to a convention in Memphis, and the soil was to be mixed with a portion of soil from the Mississippi Delta in which it was proposed to plant cotton, the stalks of which would be taken to the 1942 international convention of this organization. The alertness of the Memphis inspector thus prevented a possible infestation of Japanese beetles from being introduced into the vicinity of Memphis by means of these soil samples. Delegates to the convention, when advised of the hazard involved, whole-heartedly cooperated by turning over all soil samples to the inspectors.

INSECTICIDE INVESTIGATIONS

Isolation of compounds in sesame oil and prickly ash responsible for synergistic effect with pyrethrum --The discovery by C. Eagleson, of the Division of Insects Affecting Man and Animals, that sesame oil only, of a large number of vegetable and fish oils tried, enhances the toxicity of pyrethrum insecticides to houseflies, made it appear desirable to determine the nature of the principle responsible for this synergistic effect. Accordingly, H. L. Haller and L. D. Goodhue separated sesame oil into four fractions, by distillation in a molecular still. Tests against houseflies by W. N. Sullivan, of the Division of Control Investigations, showed that the synergistic principle was to be found in the first two fractions. From them a previously known colorless crystalline compound, sesamin, was isolated, which with pyrethrum insecticides produced a much higher mortality of houseflies than the same concentration of pyrethrum alone. Sesamin is a complex organic compound having the molecular formula $C_{20}H_{18}O_6$. It is chemically unreactive, all six of its oxygens being in ether form. In subsequent studies Mr. Haller and F. B. LaForge have prepared asarinin, a mirror image of an isomer of sesamin, and Mr. Sullivan has shown that it, like sesamin, also enhances the toxicity of pyrethrum insecticides. The asarinin was isolated from the bark of the southern prickly ash (Zanthoxylum clava-herculis). Whether or not it also is to be found in the northern prickly ash (Zanthoxylum americanum) remains to be determined, as the Division has thus far been unable to obtain a sample of the root or bark of this plant.

Insecticide symposium --On September 8 to 12, inclusive, the American Chemical Society held its semiannual meeting at Atlantic City. The meeting was attended by seven members of the Division. At a symposium on insecticides, fungicides, and hormone sprays, organized

by R. C. Roark, introductory remarks were made by him and the following four papers were presented by members of the Division:

- C. M. Smith and L. D. Goodhue: The Present State of Our Knowledge Concerning Particle Size and Efficiency of Insecticides.
- H. L. Haller, L. D. Goodhue, and H. A. Jones: The Constituents of Derris and Other Rotenone-Bearing Plants.
- H. L. Haller, F. B. LaForge, and W. N. Sullivan: Some Compounds Related to Sesamin. Their Structures and Their Synergistic Effect with Pyrethrum Insecticides.
- L. E. Smith: Some Synthetic Organic Compounds Developed by the Bureau of Entomology and Plant Quarantine.

Representatives of several companies showed interest in the question of particle size and in manufacturing compounds for insecticidal use on a large scale. Phenothiazine, phthalonitrile, and xanthone were some of the compounds discussed in this connection.

BEE CULTURE

Effect of environmental factors on nectar secretion.--The following is taken from a report of work by Geo. H. Vansell, Davis, Calif., on the effect of environmental factors on nectar secretion: "Alfalfa plants exposed to light from mazda bulbs from 5 to 10 p. m., beginning February 15, were blossoming freely by March 10. Two alfalfa plants which showed a difference of 24 percent in the quantity of sugar in their nectars last year, were again checked this year. When on dry soil the difference in amount of sugar in the nectar was 17 percent and on wet soil 26 percent. Between these two plants the sugar content of the nectar appears to show constant characteristic difference. This characteristic difference may have significance from a breeding standpoint, if it proved to be hereditary. Under a humidifier an Acala cotton plant yielded involucre nectar in quantity, each gland yielding 54 microliters. The sugar content was from 17 to 24 percent. A blossom nectary yielded a tiny amount of nectar with 7.2 percent. The leaf-gland nectar was 11.9 percent sugar. Unlike the vetch and acacia, the extrafloral nectaries did not yield until after the flowers appeared. Cotton plants in the field at Davis yielded so little nectar that they attracted no bees."



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BUREAU OF
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N E W S L E T T E R

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BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO
SPECIAL NATIONAL DEFENSE ASSIGNMENTS

Clement, Clarence, Clk.-Stenog., Gypsy Moth Control, Chief Yeoman,
U. S. Naval Res., Newport, R. I., called to active duty September 8,
1941

Flowers, Dan L., Agt. (Inspector, WFB), Dom. Pl. Quar., U. S. A.
Air Corps, Maxwell Field, Ala., enlisted September 3, 1941.

Hoyer, Richard G., Agt., Truck Crop Ins., joined Canadian Air Force
May 2, 1941.

Maratea, Domenic J., Asst. Biol. Aide, Fruit Ins., inducted, Select.
Serv., March 18, 1941.

Schroeder, Philip M., Fld. Aide, Forest Ins., O.R.C., U. S. A., called
to active duty December 2, 1940.

Shierk, Daniel E., Msgr., Admin. (Mail Room), inducted, Select. Serv.,
September 21, 1941.

Whitcomb, Edward L., Jr. Fld. Aide, Truck Crop Ins., inducted, Select.
Serv., October 9, 1941.

Winburn, Temple F., Assoc. Ent., Cer. & For. Ins., U. S. A. Res.,
called to active duty September 6, 1941.

FRUIT INSECT INVESTIGATIONS

Plum curculio control by soil treatment with dichloroethyl ether.---
The results of the large-scale orchard experiments conducted by Oliver I.
Snapp at Fort Valley, Ga., this year for the control of the plum curculio
attacking peaches show that two applications of dichloroethyl ether emulsion
applied to the soil under the spread of peach trees, with jarring to catch
overwintered adults, are just as effective against this insect as the regu-
lar schedule of lead arsenate sprays on the fruit. One application of the

ether with either one application of lead arsenate or jarring to control overwintered beetles resulted in considerably more curculio-wormy fruit than that from the treatment in which two applications of ether were made. Jarring, as a supplementary control measure, caused a 3.9 percent increase in curculio-free peaches, there being 95.1 percent more wormy peaches on the trees that received the full schedule of lead arsenate sprays than on the trees that received these sprays plus jarring throughout the season.

Oriental fruit moth control by mass liberation of parasites.---
H. W. Allen and M. H. Brunson, of the Moorestown, N. J., laboratory, report that mass liberations of parasites against the oriental fruit moth in peaches have now been made through a period of five consecutive seasons. From the data accumulated it is possible to form a fairly accurate idea of the effect of such liberations in controlling infestations of the fruit moth in the current season's peach crop. The following table shows the percentage of ripe-fruit infestation in check and liberation orchards at the time of harvesting Elberta peaches.

Year	: Infestation in :	
	: check orchards :	: Infestation in liberation orchards
	: (average) :	: Average : Values for each orchard
1937-----	: 6.0 :	: 1.7 : 1.7
1938-----	: 20.9 :	: 14.3 : 26.2; 11.3; 5.4
1939-----	: 26.4 :	: 21.2 : 42.5; 14.5; 6.5
	: 25.9 :	: 7.5 : 15.4; 7.9; 5.8; 4.0; 3.9
1940-----	: 39.4 :	: 23.7 : 36.6; 28.9; 15.9; 13.4
	: 16.2 :	: 8.9 : 13.7; 9.5; 3.4
1941-----	: 7.7 :	: 4.7 : 11.3; 3.7; 2.1; 1.7
	: 6.9 :	: 3.0 : 4.3; 3.5; 1.2

These results indicate that while these liberations have not always been followed by low fruit infestation there has been in the liberation orchards a general and substantial reduction from the level of infestation in the check orchards. In the 26 liberation trials there have been only 4 instances in which ripe-fruit infestation was in excess of the average of the check orchards, in which no liberations were made.

Outbreak of shot-hole borer.---E. J. Newcomer, of the Yakima, Wash., laboratory, reports that Scolytus rugulosus (Ratz.) appeared in large numbers in a cherry-growing area near Sunnyside, Yakima County, Wash., in September. Investigation showed that thousands of adults had emerged from piles of cherry and apricot limbs that had been removed from trees in the spring and piled up to be used as firewood. These adults have been attacking

nearby healthy cherry trees and, by boring into the buds or bud spurs, have killed a great many of next year's fruit buds. On account of the copious secretion of gum, however, the adults did not succeed in making oviposition burrows. It is possible that a succession of mild winters may have allowed this insect to become more numerous, as prunings have accumulated for many years, but the beetles had not been noted previously in any large numbers.

Exposure of dried-fruit insects to low temperatures.--Recent tests of the lethal effect of certain time-temperature combinations on three species of insects common in dried fruits have shown unexpected contrasts. The work was done by Charles K. Fisher, of the Fresno, Calif., laboratory, in commercial cold-storage rooms held at temperatures of about 32° F. (relative humidity 90 to 100 percent), and 38° (relative humidity about 95 percent). Adults of the saw-toothed grain beetle (Oryzaephilus surinamensis (L.)), full-grown larvae of the Indian-meal moth (Plodia interpunctella (Hbn.)), and full-grown larvae of the raisin moth (Ephestia figulilella Greg.) were tested in an attempt to find the minimum exposures that will assure complete mortality. The resistance of the raisin moth larvae may have been increased by previous exposure to outdoor winter temperatures. The other test insects had been accustomed to warmer conditions. Although the work is still in progress, the following records are given to indicate the comparative hardihood of the three species tested.

Insect	Exposure at			
	32°		38°	
	Period	Mortality	Period	Mortality
Saw-toothed grain beetle	<u>Days</u>	<u>Percent</u>	<u>Days</u>	<u>Percent</u>
adults-----	22	100	33	100
Indian-meal moth larvae-----	23	100	47	100
Raisin moth larvae-----	125	86	130	74

MEXICAN FRUITFLY CONTROL

Citrus census completed.--The number of citrus trees in the area regulated under Quarantine 64 increased over 418,000 between August 1, 1937, and August 1, 1941. A citrus census has just been completed and, according to this tabulation, there are 7,458,981 citrus trees in the 7 counties comprising the regulated area. Of this number of trees, almost 800,000 are pink-type grapefruit.

No Anastrepha ludens found in September.--Trap inspections approximating 33,000 resulted in the taking of only 1 A. serpentina Wied., and 1 Toxotrypana curvicauda Gerst., in Texas in September. No specimens of A. ludens Loew were found in Texas during the month. Fruit had matured enough in limited areas by the close of the month to pass the State maturity requirements and the harvesting season was officially opened on October 1.

JAPANESE BEETLE CONTROL

Drought affects nursery shipments.---Drought throughout the entire Japanese beetle regulated area seriously affected shipments of nursery stock. In the New York City area the total rainfall during September was 0.11 inch and nurserymen reported lack of moisture in the ground to depths of 18 to 36 inches. Despite this condition, nine carloads of stock were shipped under certification from the Long Island area. Digging of this material was difficult and expensive, owing to the dryness, so most of the growers postponed shipping, except rush orders. As a precautionary measure, the soil balls of trees dug were immediately soaked with water before loading into freight cars. Reports indicate that most of the material shipped arrived in good condition. Inspectors in the field anticipate a decided rush in nursery-stock inspections at the first rainfall. In New Jersey late truck crops and apples were severely damaged. Fruit is undersized and off-color. Wells are very low and in some instances have dried up completely. Dahlia growers in South Jersey experienced severe damage and loss. The plants have not developed and the bloom is unfit for sale. Many of the dahlia growers depend on their cut-flower sales to cover part of their running expenses. Reports from the Delmarva Peninsula state that many types of nursery stock have made little growth, and in some instances have died. The number of strawberry plants per acre in many instances will not be half the expected yield.

Soil treating under way in 7 States.---A total of 163.2 acres in 13 cities was treated with lead arsenate for Japanese beetle control during September. Treatments were completed in 7 localities, and the work was continued into October in the remaining localities. Cities in which the treatments were applied and the respective acreages covered, were as follows: Atlanta, Ga., 10.9; Chamblee, Ga., 0.8; Chicago, Ill., 45.2; Highland Park, Ill., 33.4; Elkhart, Ind., 3.3; Fort Wayne, Ind., 9.2; Richmond, Ind., 13.3; Dearborn, Mich., 9.2; Detroit, Mich., 14.9; Melvindale, Mich., 3.0; St. Louis, Mo., 5.6; Newark, N. Y., 9.1; and Greensboro, N. C., 5.3.

Restrictions on farm products lifted for season.---Owing to cessation of the 1941 flight of adult Japanese beetles early in September, restrictions on the movement of fruits and vegetables via refrigerator car and motortruck were rescinded for the season, effective September 8. This was about a week earlier than the usual date for lifting the seasonal quarantine. Cut flowers continued to be a hazard, because of the beetle's habit of crawling down into flower bloom when relatively quiescent. Consequently restrictions on the movement of cut flowers continued through October 15.

Increased Japanese beetle infestation in farm products in Baltimore.---The total number of beetles found in connection with inspection of farm products at the Baltimore inspection platform during 1941 was 1,362. This was a considerable increase over the 285 beetles removed in 1940, and the 146 found in 1939. The total numbers of packages inspected during the respective years were 608,416, 753,257, and 546,381.

Dutch elm disease eradication difficult in Pennsylvania.--One crew spent an entire week in eradicating a large elm, heavily infested with bark beetles, in Huntington Township, Luzerne County. Because of its location, this elm, 50 inches in diameter, required careful roping and handling of small pieces. To add to their difficulties, the workmen had to contend with a nest of honeybees and a concrete-base filling. An infested elm removed in Quakertown Borough grew in a back yard, with a house standing within 10 feet on two sides and a maple and a Kentucky coffeetree within 25 feet in another direction. The tree was a full, open-grown elm 55 inches d.b.h., 90 feet high, and had a 110-foot branch spread. A major leader 34 inches d.b.h. projected completely over the house, almost touching it. Another hung over wires and the maple tree, and still another large leader grew over the coffeetree. The tree had to be topped to the main crotch and all cuts lowered carefully by ropes. Several cuts over the house had to be double crotched. A total of 46 lowered cuts was made before the base could be sawed. No damage whatever was incurred. Work was started the last week of the month on the eradication of a 62-inch confirmed tree located in a tomato field in the borough of Wyoming, Luzerne County. On this tree the dying smaller branches were found to be heavily infested with larvae of Scolytus multistriatus Marsh. In parts of the crown and on the leaders 1941 color was found.

First-record Dutch elm disease confirmations.--First-record finds of infected trees were reported during the month in the following towns and townships: Connecticut--Hartford County, town of Southington (a first record for the county); Litchfield County, towns of Cornwall, Goshen, and New Hartford; Middlesex County, town of Clinton; Pennsylvania--Bucks County, Lower Southampton Township; Delaware County, Haverford Township (also a first record for the county); Wilkes-Barre, Pa., area--Luzerne County, Hunlock Township. The confirmation in New Hartford Town, Litchfield County, is the first and only diseased tree located in the Connecticut border zone through the collection of beetle samples. The first-record find in Cornwall Town, Litchfield County, represents the most northern infection thus far reported in Connecticut. The diseased tree at Clinton, Middlesex County, is the nearest tree yet confirmed to the isolated Old Lyme, Conn., infection. The confirmation in Lower Southampton Township, Bucks County, Pa., leaves only one township in the county from which the disease had not been reported.

Summer sanitation work in Westchester County, N. Y.--Satisfactory results have been obtained in summer sanitation work in Westchester County, despite numerous difficulties. When the W. P. A. men returned to work in July it was anticipated that the lack of foremen would be a serious handicap, and it was necessary to raise men from unskilled laborers to foremen. These men were lacking in experience, but they tackled their jobs with enthusiasm. They worked in small crews and produced results that won them favorable comments from the public.

Dutch elm disease workers released to pick apples.--In the fruit-growing area of southern New York demands were made on the Dutch elm disease district project offices for apple pickers. Approximately 300 workers were needed in Dutchess County alone. The peak of the picking season lasted from 2 to 3 weeks. The worker was returned to work without the formality of reassignment by the W. P. A. office, if he had not been away from the job an entire work period.

Farmer with rifle threatens scout crew.--A Dutch elm disease crew engaged in strip-scouting a small piece of woodland in Bucks County, Pa., was suddenly confronted by a farmer armed with a high-powered rifle. After a hasty explanation and identification by the scouts, the farmer lowered his gun and ejected a cartridge from the chamber. His reason for being suspicious of strangers was that recently someone had stolen 250 chickens from him. He left the scouts after extending an invitation to come on his place at any time.

W. P. A. enrollees return to work in Athens, Ohio, area.--In the Athens area, where no W. P. A. workers had been employed by this Division since the suspension of the Dutch elm disease project there at the end of June, 175 men were assigned to work in mid-September. A total of 120 were assigned from Vinton County and 55 from Athens County. Practically all of these were without experience in Dutch elm disease eradication work.

Training schools for Dutch elm disease scouts.--Training schools were conducted in Pennsylvania and Ohio the last week in September to instruct newly assigned W. P. A. employees in scouting for beetle-infested or potentially beetle-infested elm wood. Very few of the men had previously worked on the project. The problem of supervision was also becoming acute in these two areas, because of lack of foremen.

Fire hazard increased.--With continued dry weather through most of September, the danger of fire increased to the point where the burning of elm woodpiles could be done only in swamps, gravel pits, or other safe locations. Many woodpiles were on hand at the end of the month awaiting better burning conditions.

Limited permit issued under modified gypsy moth quarantine regulations.--The first formal agreement under administrative instructions effective July 8, 1941, authorizing the issuance of limited permits for certain restricted articles, was signed by a manufacturer of gas-purifying materials in Astoria, Long Island, N. Y. Under this agreement the firm agrees to comply with certain prescribed sanitation provisions in handling uncertified wood shavings received in tight box cars from points within the gypsy moth infested areas. These sanitation provisions require strict control of the shavings from the time they arrive at Astoria in box cars until they are chemically treated with soda ash and iron filings in their conversion into material for filtering illuminating gas. A special type of limited permit was printed to take care of such shipments. These are issued in triplicate, the original to accompany the shipment to destination, the first carbon for the file of the issuing inspector's field office, and the second carbon for immediate forwarding to the inspector

assigned to be present at the destination point upon arrival and unloading of the material.

Record shipment of lumber for Defense.--R. H. Flaker, district gypsy moth inspector at Rochester, N. H., reports that a great deal of lumber is being moved to supply various needs incidental to the National Defense effort. Over 3,000,000 board feet of lumber was inspected and certified from his district during September, the largest amount for any month on record. With few exceptions, the only dry lumber now available in this section is that from the storage sites of Government-owned hurricane lumber. This Division has been saved considerable expense by the excellent location of storage sites selected for the Government-owned lumber. Whenever possible, open fields have been selected for the air-drying of the lumber. It is stacked in high piles, making it possible to store a large amount in a comparatively small space away from tree growth and bushes. As a rule, it is the custom of many mill operators to pile lumber in low piles, using only slabs for bed pieces on waste land, among bushes and tree growth at the scene of the mill operation. Although use of waste land incurs little or no expense during the period of air-drying, there are disadvantages to this type of stacking. The lumber may become infested by the gypsy moth, and therefore requires piece-by-piece inspection. There is an additional fire hazard, and lumber is often stained from being piled close to the ground. Practically the only danger of moth infestation of lumber stored in open fields, where there is no activity during the larval period, is the presence of high, smooth-bark trees from which the moth might be wind-blown into the lumber piles. Mr. Flaker reports instances in which the moth has been blown approximately 300 feet from a tall tree. He has observed that, when lumber is piled in or near bushes and is found to be infested, the infestation may be found at any height of the pile, but is more abundant near the bottom; however, egg clusters have been found in the first few layers on the top of lumber piles, even in areas where there is only small growth.

Gypsy moth egg clusters removed by inspectors.--From products offered for inspection and certification during the month, inspectors removed 241 gypsy moth egg clusters. In addition, 984 egg clusters were found on materials inspected prior to their manufacture or preparation for shipment as novelties for subsequent shipment to nonregulated area. Among the heavily infested products examined were 4 carloads of paving blocks inspected at Milford, N. H., for shipment to Harlem River, N. Y. These were found to contain 32, 39, 35, and 47 egg clusters, respectively. A less-than-carload lot of lobster buoys examined at East Providence, R. I., for shipment to Milford, Conn., netted another 41 egg masses. Four lots of nursery stock inspected at 2 Massachusetts and 2 Connecticut establishments yielded 8 egg clusters. No heavy infestations were found in lumber inspected, as only 39 egg clusters were found in 9 carloads, in the entire amount of lumber inspected during the month.

New England gypsy moth inspections.--Owing to extremely hot and dry weather during the month, there was considerable reduction in the digging

and shipping of nursery stock from points in New England. A number of carload shipments were canceled in Rhode Island. At the end of the month very little stock had been dug for fall planting because the ground was so dry that it was impossible to get a good ball of dirt with the plants. This continued drought had so diminished the water supply in some districts that smaller sawmills depending on water for their power were forced to curtail their operations. A chocolate company in Cambridge, Mass., is sending small birch-log containers with each 2-pound box of candy. Several thousand shipments will probably be made during the Christmas season. The birch containers are inspected at the manufacturer's plant before being made up and decorated for shipment to the candy plant.

Changes in temporary personnel in New England.--Ten temporary inspectors were employed on gypsy moth inspection during the month--5 in Connecticut, 2 in Massachusetts, and 1 in Maine on nursery inspection work, and 2 in Vermont on inspection of lumber and pulpwood. One inspector paid by the State of Massachusetts was employed in the Boston district, in cooperation with the Federal inspectors, for the inspection of products requiring certification for the corn borer. Nursery and greenhouse scouting for Japanese beetle was completed in Maine on September 3, in Massachusetts and New Hampshire on the 6th, and in Rhode Island on the 11th. Eleven of the inspectors were on the Federal pay roll, 2 on the State of Maine pay roll, 3 on the Rhode Island pay roll, and 6 on the Massachusetts pay roll.

Projectile shipments accompanied by certified lumber.--At Hanover, Mass., considerable old lumber is used on carload shipments of projectiles for the Navy consigned to ports along the East coast. The lumber originates from wrecked buildings in Boston and vicinity, but later this supply will not be sufficient. Lumber will then be purchased from local dealers and will require actual inspection before certification. The destinations of these shipments are not known until a few hours before they leave their point of loading.

FOREST INSECT INVESTIGATIONS

Beetles controlled by salvage logging.--In 1940 a 1,000-acre tract of ponderosa pine near Bly, in southern Oregon, was covered by sanitation-salvage logging operations and 13 percent of the trees and 18 percent of the volume, representing the most beetle-susceptible portion of the stand, was removed. Trees to be cut were marked by Bureau men, basing their judgment on studies of the characteristics of high-risk trees. According to F. P. Keen, of the Portland forest-insect laboratory, a recent check cruise of this area showed a 90-percent reduction in the 1940 volume of beetle-killed timber, as compared with that killed in 1939. The partial loss found up to September indicates that this same reduction apparently would be sustained during 1941. Thus the results, so far, indicate that this method is much more effective in controlling pine beetles than the direct fell-peel-burn method; and also much less expensive to apply. In accessible timber it can be carried on with a net profit, instead of at an expense uncompensated for by any return from salvage. It is hoped that the results will be effective for at least 5 years.

Mountain pine beetle development retarded in northern Utah.--On September 16 and 17, in preparation for a large-scale control project on the Wasatch National Forest, 20 spotters were given instruction by R. L. Furniss, of the Portland forest-insect laboratory, in the practice of marking lodgepole pine infested by the mountain pine beetle. During the instruction period it was found that a large percentage of the trees attacked in 1940 still contained numerous larvae, pupae, and new adults. Inasmuch as snow had already fallen and cold weather had begun, it was evident that there would be little, if any, additional emergence this year; therefore, plans were made to treat those trees containing an appreciable number of hold-over brood. Additional evidence of retarded development this year was the preponderance of new brood occurring in the egg stage, whereas larvae normally overwinter. This retarded development was attributed to two factors--the abnormally short, wet season of 1941; and the high elevation of the control area, which is approximately 10,000 feet.

Mountain pine beetle found on Mount Rainier glaciers.--For many years high barren ridges have been utilized as logical unit boundaries in pine-beetle-control operations. It was reasoned that spread over such ridges would be slow in comparison with spread within a stand of susceptible timber. That the high ridges do not act as a complete barrier to dispersal was suspected and is now substantiated. Living mountain pine beetles were found on July 30 by Mr. Furniss on Sarvent Glacier, at an elevation of 7,000 feet, in Mount Rainier National Park. This glacier is on a divide between the White River and Cowlitz River drainages. Control is being carried on in the White River drainage, an area of intensive recreational use, but for various reasons infestation has been allowed to develop in the Cowlitz River drainage, an undeveloped area of little current recreational use.

Matsucoccus gallicolus Morrison infestation lighter on Cape Cod, heavier in Pennsylvania.--Thaddeus Parr, New Haven, reports that a recent inspection of pitch pine areas on Cape Cod, Mass., indicates that the infestation is considerably lighter than it was 2 years ago. The number of shoots killed on infested trees near Provincetown is about 50 percent less than was the case in 1939, and no trees were observed which had been killed by the insect during the last 2 years. The area infested, however, has increased during the last 2 years, the insect having spread westward as far as East Sandwich. The most westerly infestation by M. gallicolus previously noted on the north side of the cape was at Orleans. In Pennsylvania, however, examination of the pitch and shortleaf pine plots at Mont Alto and Mount Union shows that the number of twigs killed was greater in 1941 than in 1940, although fewer leaders were killed in 1941 than in the previous year. The data on the Pennsylvania plots are summarized in the following table.

Plot No.	Species	Location	Current twigs killed				Current leaders killed				Trees dead			
			1933	1939	1940	1941	1938	1939	1940	1941	1938	1939	1940	1941
I	Pitch pine plantation	Mont Alto, Pa.	2,393	3,262	3,824	5,016	56	61	75	62	0	2.8	21	5.2
II	Shortleaf natural stand	do.	216	316	564	640	20	22	17	23	8.26	7.6	128	15.4
III	Pitch pine plantation	Mount Union, Pa.	173	169	401	883	0	0	2	1	0	0	0	0
IV	do.	do.	939	757	1,604	1,222	26	21	21	13	0	2.8	0	3
V	Pitch pine natural stand	do.	1,237	1,295	1,000	1,146	27	24	16	8	0	0	0	0

More on habits of *Hylurgopinus rufipes* (Eich.).--Accumulated data, supplemented by additional information obtained this year by R. T. Webber, tend to corroborate previous observations that most *H. rufipes* pass the winter as adults. Spring emergence varies considerably from year to year. In 1941 adults were first observed on April 14 and stragglers continued to issue up to June 15. The height of emergence was during the period Mar 1-25. Upon emergence, the overwintering adults immediately seek breeding material and give rise to progeny, most of which hibernate as adults in normal elms. The emergence of adults of this first generation ranges over a long period. First emergence was noted on July 14 and adults are presumably continuing to issue (September 24) from material attacked on May 2. Judging from a limited amount of sampling, certain individuals will evidently pass the winter as larvae. Since the earliest emerging adults of the first generation will produce progeny when held in confinement, probably a partial second generation may occasionally occur in the field. Ordinarily, however, most adults from this first generation go to normal living elms, rather than to elm breeding material. This is clear from a large-scale experiment involving several thousand beetles that had a choice between approximately 100 normal elms and an amount of attractive breeding material. The beetles made comparatively little attempt at reproduction in the breeding material, but fairly swarmed to the normal living elms, frequently boring in or making their bark cells in wood 3/4 inch or more in diameter.

Some results of fumigation of elm bark-beetle larvae.--R. R. Whitten states that all tests were conducted in July 1941 at the Bureau's quarantine station at Hoboken, N. J., through the cooperation and assistance of G. G. Becker, of the Division of Foreign Plant Quarantines, and J. W. Bulger, of the Division of Control Investigations. After treatment the material was reared at the Morristown, N. J., forest-insect laboratory. The material fumigated consisted of 4-foot elm logs infested with approximately half-grown larvae of *Scolytus multistriatus* and *H. rufipes*. Five logs were used in each test and 5 untreated logs were held under similar conditions as checks. Treatments were made in 50- and 100-cubic-foot fumigation chambers during a time when the air temperature registered 88° F. In September each log was carefully examined for bark-beetle-emergence holes and was then barked and the bark-beetle galleries were counted. Notes were also made on the presence of any living bark-beetle larvae. Data and results on fumigating the larvae with hydrocyanic acid gas and methyl bromide are presented in the following table.

Fumigant	: Dosage : : per 1,000 : : cu. ft. :	: Exposure :	: Chamber : : vacuum :	: Total		: Total : : bark beetle emergence
				: bark-beetle galleries	: S. multistriatus : H. rufipes	
	: Pounds	: Hours	: Inches	: Number	: Number	: Number
HCN-----	: 4.0	: 2.0	: 30	: 146	: 55	: 0
CH ₃ Br-----	: 1.5	: 2.0	: 0	: 132	: 37	: 0
Do-----	: 1.5	: 2.0	: 30	: 114	: 9	: 0
Do-----	: 3.0	: 2.0	: 0	: 71	: 9	: 0
Do-----	: 3.0	: 2.0	: 30	: 129	: 59	: 0
Do-----	: 5.0	: 2.0	: 0	: 57	: 5	: 0
Checks-----	: --	: --	: --	: 137	: 31	: 1 417

1/ Many live bark-beetle larvae found in two logs

No serious defoliation by European spruce sawfly in 1941.-- P. B. Dowden, of the New Haven, Conn., laboratory, reports as follows on the present status of the European spruce sawfly: "During 1941 there has been practically no defoliation by Gilpinia polytoma Htg. in southern New Hampshire and southern Vermont. In the areas severely defoliated previously it now is difficult to find living cocoons, and on the outskirts of these areas the infestation has remained very light. State entomologists in Maine have reported larval disease as common in the northern part of the State, with a consequent reduction in infestation. In eastern Maine there has been little change from 1940, with generally light to medium infestations. In central Maine (Katahdin section) and western Maine (Rangeley section) there have been moderate increases in infestation at a number of points. Notwithstanding the reduction in infestation at many of the areas formerly defoliated severely, there are still a number of places where a moderate infestation persists. Many of these are in old growth stands, notably Cornell Mountain, in the Catskills of New York, Green Peak and Mount Equinox in southern Vermont, and the Scott's Bog area of Pittsburg in northern New Hampshire. The infestation at Deer Mountain, in Pittsburg, N. H., on the other hand, has decreased noticeably since last year. A light infestation also persists in a number of plantations in New York State."

Severe outbreak of the saddled prominent in New Hampshire.--J. V. Schaffner, Jr., New Haven, reports on the results of a recent survey of infestations of Heterocampa guttivitta (Walk.) in the White Mountains of New Hampshire. During July and August reports were received from S. H. Boomer, assistant pathologist, of the Division of Plant Disease Control, North Conway, N. H., and V. S. Jensen, silviculturist, of the United States Forest Service, Bartlett, N. H., concerning severe infestations of this insect and the areas being defoliated. Through the courtesy of the White Mountain Airport officials, Mr. Boomer was able to fly over some of the mountains the first week in August to see the extent of the defoliation in that area. He estimated that some 4,000 acres of beech, maple, and birch were from 90- to 100-percent defoliated, and as much or more about 30-percent defoliated. Extensive defoliated areas were located on the eastern side of North Mote up to about 2,000 feet elevation; the top and northwest side of White Horse Ledge; northern and southern slopes of Attitash; the south side of Iron Mountain, extending up to limits of the hardwoods; the north side of Bartlett Haystack; patches on the north side of Kearsarge and the southern side of Spruce Mountain; the north and west sides of Cathedral Ledge; and some on Table Mountain and Thorn Mountain. The insect passes the winter in the pupal stage in the duff beneath the trees and it is subject to heavy mortality by rodents and predaceous insects, particularly Calosoma frigidum Kby. Through the cooperation of the Forest Service, several areas were examined in September to study the injury, to obtain data on the present status of the infestation, and to collect pupae for parasitization records. It was difficult to collect large numbers of pupae in the areas examined, partly because of the large number already destroyed. An average of 59 percent

of the pupae had been destroyed by predators in each of three areas examined, while in another area 91 percent had been destroyed. In 1 section of a rodent burrow, not more than 2 feet in length, the remains of 17 pupae which had been eaten, were found. In the areas observed where the trees were 100-percent defoliated only a very small number showed any degree of refoliation prior to September 23.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Field conditions excellent for gypsy moth work.--Although frosts of varying intensity occurred during September, particularly in the northern part of the area, most crops apparently suffered little damage and tree foliage was not thinned out appreciably. The prolonged dry period provided excellent conditions for most types of gypsy moth work, but also resulted in the development of a severe fire hazard in the woodlands. It has not been possible to burn accumulated brush piles, and a continuation of the dry weather may necessitate the banning by State authorities of all persons from the woodlands. This would seriously interfere with gypsy moth field work.

Property owners in barrier zone area visited by cooperation of official.--On September 5 and 6, J. C. Holton, who is in charge of cooperative field relations for the Bureau, made a field trip through the Massachusetts and Connecticut portions of the gypsy moth barrier zone. Contacts were made with the owners of property where selective thinning of favored food species and gypsy moth spraying work was done at infested sites during previous years. These property owners have cooperated satisfactorily with the gypsy moth project, and fully appreciate the effort being made to prevent the westward spread of the insect.

Few able-bodied men available for gypsy moth work in Connecticut.--The employment situation is particularly difficult in Connecticut, owing to the large amount of Defense work in progress in that State. Many of the men assigned to gypsy moth work are aged and physically unable to perform scouting work. Of the able-bodied men assigned, many fail to report and others leave after a short period to enter private industry.

Brush-disposal machines at work in Connecticut and Massachusetts.--Large quantities of brush and other waste wood accumulated as a result of gypsy moth thinning operations in Sharon Township, Litchfield County, Conn., during the fiscal year 1941 were reduced to chips and coarse sawdust in September by a brush-disposal machine developed by this activity. Dust rising from a nearby dirt road had settled on the brush, and the gritty particles quickly dulled the cutting knives. As several sets of blades are available for use, delays were confined to the time required to remove the dull blades and replace them with a sharp set. The dull blades were formerly ground at some nearby machine shop, at considerable expense and inconvenience, but they are now sharpened quickly and economically on an automatic grinder recently installed at the Greenfield, Mass., repair shop. The work in Sharon was completed about the middle of September and the equipment was moved to State property in the neighboring township of Cornwall, where large quantities of brush had accumulated. Another similar machine was operated in the town of Sandisfield, Berkshire County, Mass., during the month.

Advance information as to future movement of forest products.-- Information has been obtained by regular field supervisors concerning the areas where spruce boughs will be cut, beginning about October 15, in southern Vermont and in Berkshire County, Mass. These boughs are pressed into bales weighing approximately 100 pounds, and are shipped in large quantities to urban areas where they are used to cover graves and flower beds, and for holiday decorations. Similar information was obtained from operators and shippers relative to the probable origin and volume of sawlogs, lumber, pulpwood, and similar forest products likely to be transported from infested areas in the gypsy moth barrier zone to uninfested localities outside of the zone. This information will enable the planning of gypsy moth work so that such areas may be scouted in advance of the harvesting and logging operations, while conditions are favorable for the examination of the tree growth, and will permit the destruction of any gypsy moth infestations that may be present. Indications point toward increased activity in both industries, and a considerable movement of forest products from the gypsy moth infested area is anticipated.

Large gypsy moth infestation found in Berkshire County.--Gypsy moth scouting work in Massachusetts progressed slowly during September, because only a small force of inexperienced men was available. An infestation containing several hundred egg clusters was discovered in Richmond Township, adjacent to the New York State line, in Berkshire County. The known infested area covers about 5 acres, but the outside limits have not yet been reached. A number of gypsy moth pupae were found and destroyed at this infestation during the first week in September, although very few pupae are normally found after the middle of August.

Evidence of heavy larval and pupal mortality found in Hampshire County.--A report from the town of Cummington, which borders the barrier zone in Hampshire County, Mass., states that the workers are finding that most of the gypsy moth egg clusters located in that section are old, rather than new. This definitely demonstrates that there was a heavy mortality of gypsy moth larvae and pupae this season in the section scouted, although this condition probably does not prevail throughout Hampshire County.

Tree growth favorable to gypsy moth development removed in barrier zone area.--Large numbers of hollow and otherwise defective apple trees were cut down by W. P. A. gypsy moth employees at infested sites in the Massachusetts barrier zone area. Many thorn apple trees were also removed. The destruction of these trees will not only facilitate future scouting and control work, but will also eliminate two varieties of tree growth whose foliage is greatly favored by the gypsy moth.

Apple picking and lumbering reduce available man power.--The Vermont State Employment Service found it necessary to assign most of the W. P. A. workers carried on the gypsy moth pay roll to apple picking in some sections of Vermont. This action compelled the temporary suspension of W. P. A. gypsy moth work in Bennington County, a drastic curtailment of activity in Rutland County, and lesser reductions in other sections early in September. The apple picking did not progress as rapidly as had been

anticipated, as the labor shortage necessitated the employment of inexperienced men, but most of the W. P. A. employees should be returned to gypsy moth work soon after October 1. One small group of apple pickers resumed gypsy moth work in Addison County near the end of September. Additional men are needed in Orleans County, where much scouting work remains to be done. Although this section is not located in the apple-growing area, increased demands for labor in the lumbering industry is reducing the number of men available for gypsy moth work.

New gypsy moth infestation found in Addison County.--A crew of regular gypsy moth employees recently discovered a woodland infestation in a stand of mixed hardwoods in Salisbury Township, Addison County. Only three new egg clusters were found, but dense foliage on the oak trees, which are very abundant in the area, prevented a satisfactory examination of the stand at that time. Close scouting of the area will be done after the leaves have fallen.

Forest Service cooperates in gypsy moth scouting work.--At a conference in Wilkes-Barre, Pa., attended by A. F. Burgess, C. T. Davis, W. H. Hanley, and A. J. Pruett, of this Bureau; Stanley Mesavage, industrial forester for the Wyoming Valley Chamber of Commerce; and R. D. Forbes and Clement Mesavage, of the Allegheny Forest Experiment Station of the United States Forest Service, arrangements were made for the instruction of W. P. A. men employed by the Forest Service and engaged in a special survey in the gypsy moth infested area of Pennsylvania in how and where to look for the gypsy moth, and for them to report any evidence of the insect they might find in the course of their work to the gypsy moth suboffice in Wilkes-Barre. This arrangement will continue for an indefinite period, provided the Forest Service officials do not find the additional cost of doing the work excessive. Mr. Pruett, who is thoroughly experienced in gypsy moth work and has an extensive knowledge of forestry practices, has been assigned to instruct the men in gypsy moth scouting methods.

N. Y. A. crews perform cleaning work in infested areas.--N. Y. A. crews assigned to gypsy moth work in Luzerne County were engaged in picking up, examining, and piling deadwood in infested areas during September. In one area in Jenkins Township, where this type of work is in progress, large quantities of treetops and limbs remain after the cutting of mine props last year. The burning of these piles of debris will be delayed until the opening of the deer-hunting season on December 1, as this is one of the few localities in the township where gypsy moth work can be performed safely at that time. Under existing conditions it would be extremely difficult to scout this area and apply effective treatment work, and it is estimated that the removal of the treetops and limbs will reduce by at least 50 percent the cost of future scouting and treatment work.

Scouting work begun at assembling cage sites.--The work of removing gypsy moth assembling cages put out in the Pennsylvania area last summer was completed early in September, and check-up work was begun at the sites of the cages where male gypsy moths were found. The preliminary work includes a rough examination of the area in the immediate vicinity of the cages in an effort to locate the infested sites quickly and economically.

If the infestations cannot readily be found by this method, intensive work must be performed later in order to determine definitely whether a gypsy moth infestation is actually present in the region.

W. P. A. gypsy moth work resumed in Pennsylvania.--W. P. A. employees assigned to gypsy moth work in Pennsylvania began reporting for duty on September 9, and approximately 500 men were employed by the end of the month. Very few of the men have had previous gypsy moth experience, and there was a serious shortage of men qualified for the skilled grade. No men were available in Wayne or Monroe Counties, where a large amount of gypsy moth work is planned for the current year, and work in those counties will entail the transportation of crews for long distances from the source of labor supply in adjacent counties. Many of the regular employees who took their vacations during the period when W. P. A. gypsy moth was suspended, had returned to duty by the middle of September and assisted in organizing and training the new crews.

Scouting begun along Susquehanna and Lackawanna riverbanks.--Gypsy moth scouting along the banks of the Susquehanna and Lackawanna Rivers was begun by several crews about the middle of September. Tree growth, driftwood, and rubbish along the course of the rivers, from the vicinity of the city of Scranton to Hanover Township, in Luzerne County, is carefully examined each year during periods of low water in order to exterminate any gypsy moth infestations that may be present, and thus prevent the transportation downstream of egg clusters or parts of egg clusters by later high water.

Clean-up work started at large gypsy moth infestation in South Canaan.--A crew of unskilled W. P. A. workers commenced rough creosoting and brush cutting at a gypsy moth infestation in South Canaan, Wayne County, during the latter part of September. A large percentage of the egg clusters found were old, their appearance indicating a normal emergence of caterpillars during the past larval season.

Beavers flood large area in Wayne County.--Beaver colonies are abundant in some sections of the Pennsylvania area where gypsy moth work is conducted. A crew scouting in Cherry Ridge Township, Wayne County, recently discovered a flooded area, several acres in extent, in which some of the trees were dead. Two new dams were responsible for the flood, while evidences of 6 old dams were found in the same general locality, and the number of dead trees indicated that beavers had been present for several years. The scouting of a large number of trees in this area was necessarily deferred until the freezing of the water and boggy ground.

C. C. C. gypsy moth work discontinued.--During the first week in September all C. C. C. gypsy moth work east of the barrier zone that has been done under the supervision of this Bureau, was discontinued because of a severe reduction in the number of camps and the necessity of reducing the cost of supervision within the remaining camps, which resulted in the termination of employment of the remaining C. C. C. gypsy moth foremen. This cooperative work was started during the summer of 1933 and continued for more than 8 years. At the peak of operations gypsy moth

work was done from 50 different camps located in Connecticut, Massachusetts, Vermont, and a few along the western border of New Hampshire, by as many as 2,300 enrollees. Such an extensive program was not maintained for a long period, owing to reductions in the C. C. C. personnel, and the great bulk of the work was performed between the Connecticut River and the eastern edge of the barrier zone. The work that has been done is helpful not only locally but also to the barrier zone itself, by decreasing the intensity of gypsy moth infestations just east of the zone and reducing the danger of westward spread of the insect. During the early part of this period all of the work was hand labor, such as scouting, creosoting, chopping, and burning, but increasing emphasis was later placed on the thinning of infested woodlands to reduce the percentage of favorable gypsy moth food plant growth. In many instances the woodlands were left in an improved condition and much less susceptible to gypsy moth increase. The practice of burlapping trees at the sites of infestations, which is one of the control methods used extensively in earlier work, was revived because of the absence in the C. C. C. of spraying equipment, and this type of work proved very effective in reducing the intensity of gypsy moth infestations. A limited amount of spraying equipment was made available for C. C. C. work by the State of Connecticut and by this Bureau during the last 3 years.

Gypsy moth work accomplished by the C. C. C.--During the period of slightly more than 8 years that C. C. C. gypsy moth work was performed, approximately 1,127,000 6-hour man-days were used and, based on 240 working days per year, a daily average of approximately 580 enrollees was distributed from northern Vermont to Long Island Sound. A gross acreage of over 3,607,000 acres of woodland was examined, and treatments were applied at the sites of many of the most dangerous infestations. Nearly 6,000,000 isolated trees were examined, approximately 35,000 of which were removed. Thinning was done on approximately 23,000 acres. Over 25,160,000 gypsy moth egg clusters were destroyed, and men patrolling burlap bands crushed approximately 48,500,000 caterpillars and pupae. The figures for egg clusters and gypsy moth larvae and pupae destroyed were obtained by actual counts in areas of light infestation and from estimates where the infestations were heavy. Slightly over 11,000 enrollees worked on the project.

PLANT DISEASE CONTROL

Plans for fall and winter work in Iowa.--D. R. Shepherd, in charge of barberry eradication in Iowa, in summarizing plans for fall and winter work says that survey will be continued in Allamakee, Cerro Gordo, Dubuque, Howard, Linn, Winneshiek, and Worth Counties and some work will be done in Jones, Shelby, and Guthrie Counties. The original plan of work for 1941 has been changed considerably in that laborers have not always been available in the counties where we originally planned to work. Other changes have been necessary because of the type of laborers available. It is particularly noticeable that the men available for the skilled jobs are not of the caliber of the foremen employed during the last few years.

This trouble will be overcome to a certain extent by keeping experienced crews on longer and working them in adjoining counties. Whenever possible, experienced foremen will be transferred to other counties. In counties where only enough men are available for one crew, the unit has been set up with an experienced foreman in charge. Several such units are placed under the direction of a supervisor. This is considered desirable, however, only when experienced foremen have charge of the individual units.

Survey work completed in Muskingum County, Ohio.--An intensive survey of Muskingum County just completed has brought to light many properties infested with barberry bushes which were not found some years ago, when a preliminary farm-to-farm inspection was made. The records show that more than 1,500 bushes have been destroyed on 30 properties. Four of these properties were in cities and towns and 26 were in the country. Eighteen of the 26 rural properties had wild bushes growing on them. The original farm-to-farm survey, made some years ago, resulted in the eradication of about 500 bushes on 44 properties, 280 of which were located in cities and towns. During the survey just completed these old properties were rechecked and 25 percent of the city locations and 33 percent of the rural locations had additional bushes. In commenting on the survey of this county, Harry Atwood, State leader, points out that many of the infested properties found as a result of the intensive survey were located at some distance from traveled highways, and that in many instances the bushes were found growing around abandoned farm buildings, with not even a lane leading to the site. Some of these locations were planted 50 to 60 years ago.

Germination of old Ribes seeds.--In the course of Ribes-seed germination work at Berkeley, Calif., C. R. Quick reports that a number of old seed samples acquired from herbarium specimens in the Spokane blister rust control office were tested for viability. Sixteen seed samples of various western Ribes species, which were 17 years old, were tested and seedlings were produced from 14 samples. The species showing germination were Ribes aureum, R. lobbii, R. niveum, R. odoratum, R. petiolare, R. setosum, R. viscosissimum, and R. watsonianum. One sample of R. cereum seed, collected in Nevada in 1912, and therefore 27 years old at the time of viability test, gave 4-percent germination (1 seedling from 24 seeds). So far as the writer is aware, this test extends by several years the known longevity of Ribes seeds in the laboratory.

Soils expert confers on blister rust ecological studies.--During a recent visit to the western white pine region, Robert Chandler, soils professor of Cornell University, inspected the Ribes ecology experimental work conducted by V. D. Moss. In company with Mr. Moss and Mr. Wellner of the Experiment Station, Professor Chandler spent considerable time examining Mr. Moss' extensive plot studies of the germination and development of Ribes and white pines under various conditions of exposure and soil treatment. Very helpful discussion and advice on many of the finer points regarding the soils, concerning which Professor Chandler is an authority, resulted from the trip.

Control work delayed by excessive rain.--Prolonged and unusually heavy rains from August 15 to September 15 in the western white pine region have greatly impeded the progress of control work. This wet weather, together with other extensive periods of rain this season, has resulted in an unusually large amount of nonwork time, difficulty in holding labor, and a severe cut in total production. In several instances the projected accomplishment for a camp will not be reached and small unworked areas will be left for completion next year. Careful planning of the work, however, has resulted in the location of many of these small units, so that they can be reached readily in connection with the working of new units in 1942.

Blister rust exhibit.--An interesting and attractive blister rust display at the Eastern States Exposition at West Springfield, Mass., was arranged by R. E. Wheeler, in charge of blister rust control in the Springfield district. The display consisted of a central panel with descriptive signs. In the center a concealed motorscope was used to show a series of lantern slides depicting the life cycle of the fungus. On each side of the central panel were placed in realistic fashion, a number of infected pines, ranging from small saplings showing young infection to pole-sized trees with typical stem cankers. Red arrows with the legend, "This Is a Blister Rust Canker," were affixed to the trees and directed toward the cankers involved. Among the trees were planted a representation of the Ribes native to the area, each labeled as to species. Skunk currants were featured along the edges of a miniature brook bottom. The entire exhibit was enclosed by a miniature stone wall and barway. The attendance at the exposition reached an all-time record during the first 2 days, with more than 81,000 on Sunday and more than 76,000 on Monday.

Western white pine may produce false internode and growth ring in 1941.--Evidence of the effect of an unusual amount of moisture during the 1941 growing season is to be found in the terminal buds of western white pine which have suddenly "taken off" on another growing spree. This was observed early in September on young pines ranging up to about 20 years in age, which had terminal bud growth up to 2.5 inches in length. The growth is very succulent and could, with favorable fall weather, continue until a definite false internode and growth ring are produced. There is also the possibility that a sudden hard freeze will not only nip the new growth but damage the buds sufficiently to cause delay and possible damage to the 1942 development.

No rust development found in Yellowstone and Grand Teton National Parks.--Scouting work late in July and early in August in Yellowstone and Grand Teton National Parks and on adjacent National Forest areas failed to disclose blister rust infection. It is now 4 years since a single Ribes infection was found about 19 miles northwest of Yellowstone Park and it now appears that the long-distance spread of 1937 was very insignificant in this locality and that no pine infection resulted. This supposition is based on failure to find the rust after a thorough examination of thousands of Ribes petiolare bushes and several hundred white-bark and limber pine in major drainages of the area. The results are interpreted to mean that this part of the northwestern region is still the invasion front and not an area where the initial rust intensification stage has been reached.

COTTON INSECT INVESTIGATIONS

Cutting cotton stalks for boll weevil control.--The early fall destruction of cotton stalks has been recommended by the Bureau for many years as one of the most effective measures for reducing boll weevil damage the following year. Weevils usually continue to feed and multiply until the cotton plants are killed by frost or are cut down. Extensive hibernation experiments have shown that the survival of weevils is much greater when food is available until late in the season than when food is removed early, causing them to go into hibernation in poor condition. In some instances more than 20 times as many weevils that had food until November 15 survived as when food was cut off October 15. Following the unusually severe weevil losses this year, the Bureau, in cooperation with the Extension Service and other Federal and State agencies, is sponsoring an intensive program of stalk destruction. The Director of Extension Work has requested extension workers in the Cotton States to take an active part in stimulating the adoption of recommended control measures and to make every reasonable effort to impress the growers with the importance of getting their stalks cut at the earliest possible date. M. P. Jones, extension entomologist, is visiting the various States to assist in any way he can and at the same time obtain information concerning methods that may be helpful in other States. Wide publicity has been given the program through the press and radio services of the Department and information furnished State officials for local use. Posters have been displayed at gins in North Carolina and county agents in several States have sent out one or more special letters. Dry weather has caused early maturity of the crop in States east of Texas and Oklahoma and permitted the crop to be picked and the stalks cut early. The cotton leaf worm has also helped in bringing about early maturity of the crop in many areas. It has reached all of the cotton-growing States except California, but for some unknown reason it has not become abundant enough in the Atlantic Coast States to cause extensive defoliation of cotton, as in the other States. Reports received to date indicate that good progress is being made in cutting stalks in some States. A survey by Bureau representatives during the first week of October in South Carolina, where weevil damage was extremely heavy this year, showed that more than 25 percent of the stalks had been cut on 657 farms in 9 counties. From 10 to 15 percent of the stalks were reported cut in the Mississippi Delta. In some States a shortage of cotton pickers and other farm work has delayed stalk cutting to some extent.

Insecticides for boll weevil and cotton aphid.--E. W. Dunnam, Stoneville, Miss., reports recent investigations with insecticides on cotton insects. In boll weevil and cotton aphid control experiments the aphid populations increased following the use of insecticides in the following order: (1) Calcium arsenate; (2) calcium arsenate-sulfur 1-1; (3) calcium arsenate-sulfur 1-1 and derris to make $\frac{1}{4}$ percent rotenone in the mixture; (4) calcium arsenate-derris ($\frac{1}{2}$ percent rotenone in the mixture); (5) talc-derris ($\frac{1}{2}$ percent rotenone in the mixture). The boll weevil infestation did not reach damaging proportions until the crop was set, and boll damage did not occur in plots dusted with arsenicals. The pH of cotton-leaf cell sap was considerably higher and the leaf drop was heavier

following dusting with insecticides containing arsenicals than in the untreated controls or when dusted with talc and derris. The results of another test to determine the effect on the aphid population of adding zinc and iron salts to calcium arsenate to reduce the pH were not very promising. Sufficient quantities of the dry salts were added to neutralize the calcium arsenate but the chemical reaction that occurred caused the alkalinity to increase before the materials were used. The pH of the materials used and the average seasonal number of aphids per square inch of leaf area were as follows: Untreated control, 5.6 aphids per square inch; calcium arsenate with low water-soluble arsenic and pH of 11.00, 15.5 aphids; calcium arsenate with intermediate water-soluble arsenic and pH of 12.15, 13.6 aphids; copper hydro-arsenate, pH of 7.96, 12.5 aphids; calcium arsenate with low water-soluble arsenic and zinc chloride, with pH of 7.75, 10.9 aphids; calcium arsenate with intermediate water-soluble arsenic and zinc sulfate, with pH of 8.20, 10.8 aphids; calcium arsenate with intermediate water-soluble arsenic and ferrous sulfate, with pH of 10.80, 9.5 aphids; a commercial brand of calcium arsenate in which a zinc salt was incorporated in the process of manufacture, with a pH of 9.60, 9.3 aphids. The addition of the zinc and iron salts to the arsenicals reduced the leaf shed and caused the plants to appear healthier. The boll weevil infestation in squares did not exceed 6 percent in any plot and was too light to determine the effect of the insecticides on this insect. The heaviest yield was from the control plot, but there was no significant difference between the yields from the treated plots and that from the control.

The effect of fertilizer on cotton leaf aphids --Observations during recent years have indicated that leaf aphids were more abundant on cotton following cover crops and where nitrogenous fertilizers were used than on unfertilized land. In a test conducted by R. L. McGarr at State College, Miss., this season, the average seasonal aphid populations on dusted and undusted cotton, fertilized with different percentages of nitrogen, were as follows: No fertilizer and no calcium arsenate, 0.91 aphid per square inch of leaf surface; no fertilizer and calcium arsenate dust, 6.05 aphids; 0:8:4 fertilizer and calcium arsenate dust, 6.75 aphids; 2:8:4 fertilizer and calcium arsenate dust, 8.34 aphids; 4:8:4 fertilizer and calcium arsenate dust, 8.88 aphids; 6:10:4 fertilizer and calcium arsenate dust, 9.76 aphids; 6:10:4 fertilizer and no calcium arsenate, 1.07 aphids. It appears from these results that the use of fertilizer caused no appreciable increase in the number of aphids when calcium arsenate was not used, but that aphids increased roughly in proportion to the amount of nitrogen in the fertilizer when calcium arsenate dust was applied to the plots.

Egg parasites of the conchuela and Say's stinkbug at Presidio, Tex. -- During 1941 the conchuela (Chlorochroa ligata Say) and Say's stinkbug (Chlorochroa sayi Stal) have been abundant and have caused noticeable damage to cotton and other crops in the vicinity of Presidio. On August 14 L. W. Noble and W. L. Lowry collected from grain sorghum 176 eggs of C. ligata and 123 eggs of C. sayi. These were placed in petri dishes and parasites emerged from 94.3 percent of the C. ligata eggs and from 94.9 percent of the C. sayi eggs. All of the parasites reared from C. ligata were determined by C. F. W. Muesebeck as Telenomus mesillae (Ckll.). Most of the

parasites reared from the eggs of C. savi were also determined by Mr. Muesebeck as T. mesillae, but 30 other parasites from these eggs were determined by A. B. Gahan as Ooencyrtus californicus Gir.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--One of the most important operations looking to the control and eradication of the pink bollworm throughout the United States, with which this Division is charged, is the annual inspection of gin trash, in order to obtain data on the status of infestation or spread of the insect into new areas. Inspection was continued during September in all regulated counties in south Texas. In Cameron County, in the lower Rio Grande Valley, where infestation was heaviest in that region last season, 8 additional pink bollworms were found, making a total of 23 so far this season. One larva was found in the Quemado Valley near Eagle Pass, in Maverick County. Reinfestation had previously been established this season not far from this point at El Indio, in the same county. Inspection in all other south Texas counties was negative during September. At the beginning of the last week in September inspection crews began operations in Tom Green and Concho Counties, in the Panhandle regulated area, but no specimens had been found at the close of the month. Outside of regulated counties in Texas, inspection was concentrated in central, northeastern, and southeastern cotton-growing areas, no infestation being found. Inspection of gin trash was begun in the Salt River Valley of Arizona on September 15, and during the period of inspection 58 pink bollworms were found, all of which originated in the same spot near Glendale, in Maricopa County, where a light infestation existed last season. This find was not unexpected, as a clean-up campaign undertaken for that area at the close of the 1940 crop was abandoned on account of excessive rainfall throughout that winter and early spring. Inspection of trash was conducted throughout September in Alabama, Florida, Georgia, and Mississippi; also, during the latter half of the month, in Louisiana and Oklahoma. At the end of September no pink bollworms had been found in any of these States. Gin-trash inspection in Mexico, in cooperation with Mexican inspectors, was completed at Anahuac and Monterrey, Nuevo Leon, and at Nuevo Laredo, Tamaulipas. Result of the season's work in that part of Mexico was the finding of 1 pink bollworm at Anahuac. Last season 37 larvae were found at Anahuac and 3 at Nuevo Laredo.

Stalk destruction.--In the program for combating the pink bollworm in the south Texas regulated area and adjacent cotton-growing areas of Mexico, an attempt is made to have all stalks destroyed as soon as the crop is picked out. Owing to unfavorable growing conditions throughout the present season, the cotton crop in south Texas was several weeks later than usual, and only a comparatively small acreage was available for cleaning at the beginning of September. Also, a serious shortage of cotton pickers has existed in that region, owing principally to the poor yield. These conditions, together with adverse weather throughout practically all of September, resulted in stalks being destroyed on only about half the acreage in the lower Rio Grande Valley counties by October 1, the deadline established by the State for completion of such work in that area. At the end of September approximately 200 extensions had been granted individual farmers in order to allow them to complete the harvesting of their crops. In the other

south Texas counties the deadline for completion of stalk destruction is October 15. It was estimated that from 75 to 90 percent of the cotton crop had been harvested in those counties at the end of September, and fairly good progress was being made in clean-up work, from 50 to 75 percent of the stalks being destroyed in some of the counties, and a good many additional farmers starting work toward the close of the month. On account of flood conditions in the Matamoros area of Mexico during the latter half of September, not a great deal of progress was made in the stalk-destruction work; however, it is believed that a vast acreage of stalks will be killed by existing conditions. In the Reynosa area, on higher ground, about 40 percent of the stalks had been cut at the end of the month, and about 50 percent in the Mier area. In the other cotton-growing areas of Mexico adjacent to south Texas not so much progress had been made on account of the lateness of the crop.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Control of iris thrips by sprays and dusts.--On July 2, L. G. Utter and Floyd F. Smith, the latter assigned to duty at the Beltsville, Md., laboratory, concluded field experiments for 1941 at Brooklyn and Farmingdale, N. Y., in which they compared 13 treatments against Bregmatothrips iridis Watson on plots containing several species of iris. (Although a number of iris species are attacked by this insect, greatest damage occurs on Japanese iris.) Eight applications were made during May and June, the period in which the plants rapidly develop vegetatively, and prior to flowering of the Japanese iris. An effective treatment will reduce the numbers of thrips and prevent their damage to foliage and flowers. In these experiments derris powders at rotenone contents of from 1-4,000 to 1-32,000 (with sodium oleyl sulfate resinous sticker 1-1,000) were highly effective, causing from 99 to 100-percent reduction in population. A commercial derris extract (rotenone content 1-21,052 to 1-42,104) and derris dust (1 percent rotenone) were almost equally effective, although breeding of larvae was not prevented. Nicotine sulfate (40 percent solution) diluted 1-400 to 1-3,200 gave complete control in these tests. The commercial DN dust (1.7 percent dinitro-o-cyclohexyl phenol) killed only 66 percent of the thrips and severely injured foliage of Japanese iris. When a spray was made by using the above dust at the rate of 3 pounds per 100 gallons, 85 percent of the thrips were killed and no foliage injury resulted. A commercially prepared product containing 97.1 percent mannitan monolaurate, killed only 80 percent of the thrips, while the same material, but containing 1.0 percent of rotenone, gave 100-percent control. These results conform with those of previous years' work and further emphasize that derris and nicotine are the most effective thripicides for this species. The percentage reduction in thrips population was higher during 1941 than in previous years, apparently because fewer rains followed closely the application of the sprays and dusts. Although the derris and nicotine sprays are extremely effective against the iris thrips and in some plots even attained the point of eradication, they cannot be depended on to do this in actual practice. Observations at Farmingdale, Long Island, N. Y., pointed to the importance of the need for a continued and regular spray program each year in order to check the damage by the iris thrips. Derris powder or nicotine sprays had been applied to a 2-acre planting in 1940, which was practically free of thrips, and little injury was evident on the vigorous growth at

the end of the season. The growth in 1941 on the same plants was stunted, being from one-half to two-thirds the height of the growth the year before. The iris thrips had again become abundant throughout the planting and their typical injury was severe and general. No sprays had been applied in 1941.

New method of using crude naphthalene against wireworms.--A new method of mixing crude naphthalene with the soil to kill wireworms gave excellent results in a practical test this season by M. C. Lane and R. S. Lehman, of the Walla Walla, Wash., laboratory. The wireworm species concerned in this test were principally the sugar beet wireworm (Limonius californicus Mann.) and the Pacific coast wireworm (L. canus Lec.). An acre of fine sandy loam soil was treated by evenly sprinkling 250 pounds of finely flaked crude naphthalene in front of a disk harrow before any plowing was done. This dosage of naphthalene was then plowed under before a second application of 250 pounds was sprinkled before the disk harrow. The quantity of crude naphthalene used totaled 500 pounds for the acre, but this method gave a better horizontal and a deeper vertical distribution of the material with the soil than has been obtained heretofore by placing 500 pounds per acre on the sides of the furrow at the time of plowing and attempting to mix it with soil by a subsequent disking. The results obtained by the new method this season showed 72 percent of undamaged tubers in the subsequent planting of potatoes, as compared to 37 percent of undamaged tubers for the plowed-in treatment (furrows 18 inches apart) and 31 percent of undamaged tubers with the no-treatment check. The farmer received \$82 per acre higher net profit where the double-disk method was used than with the no-treatment check, even after deducting \$15 per acre for the cost of naphthalene. Cost of labor and machinery did not exceed \$5 per acre additional for applying naphthalene by the double-disk method.

Zinc sulfate a possible safener for paris green on tobacco foliage.--As the result of recent experiments, F. S. Chamberlin, of the Quincy, Fla., laboratory, reports that, although paris green exerts a relatively high toxicity against hornworms, principally Protoparce sexta (Johan.), and is used extensively in the southern cigar-tobacco region, the outstanding limitation of this poison is the serious burning hazard which accompanies its use. This factor has become of increasing importance during the last several years, owing to the fact that both the shade and sun-grown tobaccos now produced are more susceptible to arsenical injury than were the varieties formerly grown. Although large quantities of paris green are still being used in the Florida-Georgia tobacco-growing area, the increased burning hazard is causing the growers to change to lead arsenate, which appears to be the only alternative. Paris green is applied to the crop in the undiluted form and in mixtures with hydrated lime. The mixture most commonly used consists of the poison and lime in the proportion of 1 to 6. The lime has a tendency to reduce, but fails to eliminate, the foliage burning caused by the arsenical. In an attempt to reduce the paris green-lime injury, a number of powdered materials were incorporated in lots of the mixture which were tested on tobacco foliage. The weight proportions of each test mixture were as follows: Paris green, 1 part; hydrated lime, 5 parts; and corrective, 1 part. The effect of the

mixtures was obtained by determining the percentages of burned leaves and the severity of the injury on the tobacco plots. The results showed that only one of the materials, zinc sulfate, exerted an appreciable reduction in the degree of burning caused by the paris green. In the case of the zinc sulfate the extent of burning was approximately one-half that sustained by the tobacco treated with the 1 to 6 paris green and lime mixture, indicating that this material has promise as a safener for the arsenical on tobacco foliage.

Early peak of beet leafhopper population on Russian-thistle in southern Idaho.--J. R. Douglass and his associates at Twin Falls, Idaho, laboratory, report that quantitative samples taken throughout the season on Russian-thistle (*Salsola pestifer* A. Nels.) plots showed that the highest populations of *Eutettix tenellus* (Bak.) recorded during the summer of 1941 were 11.1, 57.4, 42.6, 13.7, and 1.4 per square foot on June 27, July 22, August 8, September 5, and October 2, respectively. These data show a gradual decrease in the beet leafhopper populations since approximately the middle of July. This indicates a comparatively good reproduction of the first summer generation of the insect on Russian-thistle. From information at hand, it is not possible to determine the exact factors responsible for the poor reproduction of the second summer generation on Russian-thistle. The highest populations of beet leafhoppers recorded per month during the summer of 1940 on Russian-thistle were 10.4, 37.8, 42.6, 51.5, and 85.3 per square foot on June 28, July 16, August 13, September 13, and October 1, respectively. A comparison of the development of beet leafhopper populations on Russian-thistle in 1940 with 1941 shows that in 1940 there was a gradual increase in the population throughout the season, the peak being reached on October 1; whereas in 1941 the peak was reached on July 22, and subsequent to this there was a gradual decrease in population.

Two-spotted mite causing damage to lima beans.--R. E. Campbell, of the Alhambra, Calif., laboratory, reports that in Orange County, Calif., the infestation of *Tetranychus bimaculatus* Harv. on lima beans has been very severe. About 1,000 acres was so badly damaged that no beans were harvested. An additional 1,000 acres was sufficiently damaged to cause 25- to 50- percent reduction in the crop. The beans affected were the regular limas raised for dry beans. The infestation occurred in an area where lima beans have been grown for over 20 years; however, a few alfalfa fields have been started in the last few years to meet the needs of the dairy industry in Orange and Los Angeles Counties, which has expanded during recent years. The two-spotted mite develops on the alfalfa, but does not cause apparent damage to that crop. After the lima beans are planted, the mites migrate from the alfalfa to the beans, on which they develop and cause damage. According to reports received, every field of lima beans damaged by the two-spotted mite adjoins an alfalfa field.

INSECTS AFFECTING MAN AND ANIMALS

Fluorescent lights attractive to Clear Lake gnats.--A. W. Lindquist and C. C. Deonier report that daylight fluorescent lights attract up to nearly four times more gnats than do filament lamps of nearly equal lumen rating. When compared with filament lamps of three times greater lumen

output and four times greater wattage consumption, the catch is about equal. Four 40-watt daylights, producing 5,920 lumens, attracted 141.3 pounds of gnats with an average of 10.8 grams per lumen and 343.1 grams per watt, while filament lamps producing 17,400 lumens took 115.7 pounds with an average of 3.0 grams per lumen and 52.5 grams per watt. The initial cost of fluorescent equipment is high but the operating cost is 454 percent less than that of filament lamps.

Dog fly control operations yielding good results.--W. E. Dove reports that control operations for the dog fly (Stomoxys) on the west coast of Florida, carried on in cooperation with the United States Public Health Service, have given a high degree of relief from this pest to those engaged in National Defense activities at Tyndall and Eglin Fields, as well as to local residents and the livestock in the area. Most of the personnel, as well as spray rigs, tanks, and trucks for carrying on this operation, were made available to the project through the courtesy of the Division of Domestic Plant Quarantines. During September a total of 110,590 gallons of spray was applied on 159 lineal miles of windrows of bay grasses along the beaches, an average of 696.6 gallons per mile. During these operations opportunity was presented to make field tests on (a) light gas condensate and fuel oil, (b) light gas condensate and water, (c) undiluted light gas condensate, (d) creosote and fuel oil, and (e) creosote and water. The results show that both creosote and oil, and creosote and water are effective, and that light gas condensate is less satisfactory than either of the creosote mixtures. Large-scale tests have shown that bay water can be substituted for oil as a diluent for creosote, and this is considered the outstanding research development during the control operations. By the use of water instead of oil, large savings can be made in any subsequent control program.

Pyrethrum extract deterioration by aging --W. V. King and R. C. Bushland, of the Orlando, Fla., laboratory, report that in a comparison of two lots of pyrethrum extract concentrate, one obtained in 1934 and the other in 1941, the difference in mean mortality among mosquito larvae was only 12 percent in favor of the fresh sample, indicating much less deterioration than expected of the old stock. The difference, however, was highly significant statistically, whereas no appreciable difference was found in a chemical analysis of the two samples or in Peet-Grady tests on houseflies.

Susceptibility of mosquito larvae to pyrethrum larvicides.---Experiments conducted by W. V. King showed that larvae of Psorophora columbiae D. & K. were less susceptible than larvae of Culex quinquefasciatus Say to pyrethrum larvicides. Pupae of P. columbiae appeared to be nearly as susceptible as the larvae of the same species, in the tests with an emulsion of the 5-percent concentrate in fuel oil, but showed very little mortality from an emulsion of the straight concentrate.

Sod sampling methods not encouraging for determination of mosquito-breeding areas.---Studies by Mr. King and W. M. Wilson during the last season on egg infestations and natural breeding of species of Psorophora and Aedes in the vicinity of Orlando have been summarized. Flooding

records were obtained on a total of 2,471 sod samples and larvae were produced from 127, or 5.1 percent, of these. The average number of larvae per sample was 0.42, with an average of 8.2 per positive sod and a maximum of 73 from 1 sample. Inspections for larval breeding in the same stations were made at about weekly intervals and for the 3 months of June, July, and August the mean larval density for all collections in which breeding was found was 25.9 per square foot (10 dips). The comparable rate for egg infestations, based on the positive collections, was 17.0 per square foot (20 samples).

Medical entomology discussed before U. S. Army officers.--At the invitation of the Army Medical School, F. C. Bishopp gave an illustrated lecture before a group of about 50 medical officers who were taking a special course in Tropical Medicine. This course is now being repeated every 30 days for different groups of officers and Dr. Bishopp has been requested to participate in the course each month.

Ticks resistant to submergence.--Experiments reported on by C. N. Smith show that flat larvae and nymphs survived submergence in fresh or salt water for 1 day, adults for 5 days or more. Engorged larvae and nymphs survived for 5 days in fresh water, and for 1 to 3 days in salt water.

Parasites appear ineffective against American dog tick.--In an area on Martha's Vineyard, Mass., where many tick parasites (*Hunterellus hookeri* How.) were released a few years ago, Mr. Smith finds that larvae were more numerous than ever, and nymphal abundance was relatively high. Adults, though less numerous this season than in some years, were still abundant.

Effectiveness of dipping dogs for protection against dog tick.--The fourth season of dipping in derris wash of all dogs in an area on Martha's Vineyard produced the usually satisfactory control on the dogs, reports Mr. Smith. The number of adult American dog ticks in the area dropped to an extreme low, indicating that this method had finally effected a substantial reduction in tick abundance.

Effect of pasture burning on American dog tick.--Studies conducted by Mr. Smith, Moses M. Cole, and Harry K. Gouck show that the meadow mouse, the principal tick host in the area, was absent from the burned area until August, but during this period white-footed mice were utilized as larval hosts. Larvae and nymphs were not abundant at any time in either the burned or unburned portions. Many adult ticks were killed by the fire, as shown by the fact that throughout the season they were less numerous in the burned than in the unburned portion, and in collections from areas partly or entirely burned they were less than in 1940, whereas in collections from areas entirely unburned they were equally abundant in both years. Incomplete but immediate control may, therefore, be expected from burning.

Diking of marshes at Fort Pierce, Fla., continues to show good sand fly control.--J. B. Hull and S. E. Shields report that, from 260 soil samples

collected from the undiked marshes during the quarter, 5,818 sand fly larvae were isolated. This is an average of 22.33 sand fly larvae per 1-quart sample. From 260 samples collected the same dates from the diked marsh 1,142 sand fly larvae were isolated, an average of 4.39 larvae per 1-quart sample. An analysis of variance was calculated to determine whether the difference in the number of larvae found in diked and undiked marshes was significant. The F-value found was 13.46 and the F-value required was 3.86 for 5 percent and 6.70 for 1 percent; therefore, the difference in the breeding of sand flies in diked and undiked marshes was very highly significant during the last quarter.

Creosote oil useful in spraying ditches in sand fly control.--Mr. Hull, reporting on work conducted at Fort Pierce, says: "During May a ditch in the diked pickleweed marsh was sprayed with creosote oil No. 1. This material killed the pickleweed and thus far has kept it free of this growth, which normally clogs the ditch. The sand fly larvae population was greatly reduced also. Two waste products from a gas plant were tried as larvicides. One of these appears to be almost as good as creosote and is much cheaper."

Sleeping sickness (St. Louis and western equine strains) found in mosquitoes.--The temporary laboratory at Yakima, Wash., was closed on September 10 and the field work of the encephalitis survey in that area was discontinued. The survey, which was begun May 15, was a cooperative study of encephalitis in the Yakima Valley by the George Williams Hooper Foundation for Medical Research of San Francisco, the State of Washington, the City of Yakima Health Laboratory, Washington State College, and the Bureau of Entomology and Plant Quarantine. C. M. Gjullin, of the Portland, Oreg., laboratory represented the Bureau in these studies. Of the 7 men with headquarters at the temporary laboratory, 3 devoted their entire time to obtaining blood samples of wild and domesticated birds and mammals in the valley. These samples were shipped to San Francisco and tested for immunity to the disease. Two of the men using a specially constructed live trap and a New Jersey trap in which dry ice was used as an attractant captured 14,000 live insects which were separated to species, frozen, and shipped to San Francisco at weekly intervals for inoculation into mice. St. Louis virus was recovered from 1 lot of Culex tarsalis Coq. in 1 of these shipments, and from a later lot of the same species western equine virus was isolated. This is the first time the virus of these diseases has been recovered in mosquitoes in nature. A paper discussing these findings has been submitted to Science. Six New Jersey traps were operated in Yakima Valley and 2 traps in adjacent areas during the season. The 20 species of mosquitoes taken in the traps or by other methods of collecting include Aedes vexans (Meig.), A. lateralis (Meig.), A. dorsalis (Meig.), A. increpitus Dyar, A. campestris D. and K., A. cinereus Meig., A. nigromaculis (Ludl.), A. varipalpus (Coq.), A. flavescens (Muller), Theobaldia inornata (Will.), T. incidens (Thomson), T. morsitans (Theob.), T. impatiens (Walk.), Culex tarsalis, C. stigmatosoma Dyar, C. pipiens L., C. apicalis Adams, Anopheles punctipennis (Say), A. raculipennis (Meig.), and Mansonia perturbans Walk. Numerical data have not been compiled as yet; however, it is evident that Culex tarsalis is by far the most numerous species in the valley. Of 60 different mosquito breeding places inspected at random in the Yakima Valley, 35 percent contained C. tarsalis larvae and in 60 percent of these breeding places this species was the most numerous. During the summer 27 human cases diagnosed as encephalitis occurred

in the Yakima area and there were 4 deaths. The last case was reported on September 17. Between 40 and 50 cases of encephalitis occurred in unvaccinated horses in the valley during the season.

Distribution, abundance, and economic importance of mosquitoes at Portland.--C. F. Knipling and W. W. Yates report that the population of floodwater mosquitoes was probably the lowest on record for the Portland, Oreg., area. This was due to the low flood crest which reached a maximum of 9.6 feet this season, and to the control operations by the county and city. The mosquito population therefore continued to be low during this quarter. Of special interest, however, was the first recorded occurrence of Mansonia perturbans in Oregon. A high population of this species was found in the vicinity of Scappoose, in Columbia County, late in July. Some specimens of this species were also taken in the mosquito light trap at Lotus Island, in Multnomah County. As high as 59 mosquitoes were taken in a 10-minute collection at Scappoose. Of this number, 53 were M. perturbans. Light-trap collections showed a high of 310 Mansonia in 1 night. Because of such high population, this mosquito must be included among the species of economic importance in the Northwest. Anopheles mosquitoes appeared to be more numerous than usual in the Portland area. At Scappoose a maximum of 254 were taken in 1 night, by far the highest number of Anopheles taken in light traps in the Northwest. Larval collections in the Cedar Creek area indicated Anopheles to be much more numerous than in other years. A total of 36 cases of malaria were reported for the State of Oregon up to October 1, cases being reported from 10 counties. Theobaldia morsitans was taken near Scappoose in August, a new record for the State. Culex stigmatosoma was found to be rather common, being taken at several points.

FOREIGN PLANT QUARANTINES

Living fruitfly found on window.--E. Kostal, at Hoboken, reports that on July 14 J. M. R. Adams found a living adult of Anastrepha striata Schin. on one of the windows of the Inspection House after orchids from Venezuela had been inspected. This incident illustrates how an insect may be introduced on or in material other than its real host.

"Cancrosis B," or "false canker," on Argentine lemons.--Argentine lemons in ships' stores examined in New York on May 17 and on September 11 were found to be diseased. Some lesions looked very much like citrus canker. Anna E. Jenkins, of the Bureau of Plant Industry, has determined the disease as "Cancrosis B," or "false canker," a South American citrus disease with symptoms similar to those of citrus canker. Apparently the pathogen has not yet been named, but is said to be a bacterium.

Holly rust from new locality.--While inspecting holly trees shipped in from Mocksville, N. C., for landscape work in Washington, D. C., W. B. Wood found Chrysomyxa ilicina (E. & E.) Arth. on some of the leaves. This rare rust had not been reported to occur anywhere except in central West Virginia.

Lespedeza rust in Japan.--A rust has been intercepted on leaves and pods accompanying lespedeza seed from Japan (see News Letter v. IV, No. 3, p. 20, March 1, 1937) on several occasions. Although the Japanese rust is

assigned to the same species (*Uromyces lespedezae-procumbentis* (Schw.) Curt.) as the rust of American lespedezas, the oriental species of lespedeza are immune to the rust that occurs here. A paper by Naohide Hiratsuka, the leading uredinologist of Japan (Trans. Tottori Soc. Agr. Sci. 7:63-79, Dec. 1940) entitled, "Studies on *Uromyces lespedezae-procumbentis* in Japan," names 3 form species occurring there. A total of 21 hosts is listed but not all were included in inoculation tests, therefore it seems possible that other forms exist in Japan. The form species named are (1) *U. macrolespedezae* on *L. bicolor*, *L. bicolor* var. *japonica*, *L. buergeri*, *L. homoloba*, *L. nikkoensis*, and *L. thunbergii*; (2) *U. lespedezae-cuneatae* on *L. cuneata*; and (3) *U. lespedezae-pilosae* on *L. pilosa*. Aecia are said to occur early in the spring and were used in some of the inoculation tests. No 2 of the rust forms infected any of the hosts tested.

Entomological interceptions of interest.--Eight living larvae of the euribiid *Anastrepha fraterculus* (Wied.) were intercepted at Baltimore on July 24 in grapefruit in stores from Brazil. Two larvae of the Mexican fruitfly (*Anastrepha ludens* (Loew)) were found at Douglas, Ariz., on July 4 in mango in baggage from Mexico. Fifty-eight living and 33 dead larvae of the euribiid *Anastrepha serpentina* (Wied.) were found at Charleston on July 17 in mamey sapote in stores from Mexico. Five living larvae of the galleriid *Aganactesis indecora* Dyar were taken at New York in a pod of *Cassia fistula* in cargo from St. Lucia. Four living larvae of the galleriid *Aepheias conspirata* Hein. were found at Laredo on June 20 on pineapples in cargo from Mexico. A living adult of the curculionid *Cylas formicarius* var. *elegantulus* Summers was intercepted at New Orleans on July 8 in sweetpotatoes in stores from Cuba. Specimens of the whitefly *Dialeurodes kirkaldyi* (Kot.) were found at San Francisco on June 13 on *Tabernaemontana* sp. in baggage from Tahiti. A living adult of the elaterid *Drasterius livens* Lec. was found at El Paso on June 17 with beets in cargo from Mexico. One living adult of the anthribid *Eugonus subcylindricus* Fahr., 10 living adults of the platypodid *Platypus rugulosus* Chapuis, and 5 living adults of the scolytid *Xyleborus torquatus* Eichh. were intercepted at New York on June 17 in mahogany logs in cargo from Mexico. Living larva and pupa of the phycitid *Eumysia maculicula* (Dyar) were taken at San Ysidro on June 23 in the roots of a succulent in baggage from Mexico. Living adults of the mirid *Eurycipitia vestitus* Dist. were intercepted at Brownsville on June 27 with an orchid plant in baggage from Mexico. Living larvae of the West Indian sweetpotato weevil (*Euscepes postfasciatus* (Fairm.)) were taken at Mobile on June 8 in sweetpotatoes in stores from Trinidad. Living larvae of the phycitid *Hypsipyla grandella* (Zell.) were intercepted at New York on July 9 in mahogany log in cargo from Guatemala. One living adult of the curculionid *Metamasius callizona* Chev. was intercepted at Laredo on May 16 on pineapple in cargo from Mexico. Six living adults of the bostrichid *Micrapate scapularis* Gorb. were found at Nogales on June 21 in wooden crate for pottery from Mexico. A living larva of the curculionid *Metamasius* sp, probably *M. ritchiei* Marsh, was taken at Hidalgo on July 3 in pineapple in cargo from Mexico. Living larvae of the Philippine orange moth (*Prays citri* Mill.) (?) were found at San Francisco on July 21 in lime in stores from the Philippines.

Pathological interceptions of interest.---An avocado found on August 27 at Brownsville in baggage from Mexico bore the Dothiorella stage of Botryosphaeria ribis Gross. & Duggar. Leaf spots caused by Cercospora angraeci Feuille. & Roum. were intercepted at Laredo on January 8 on succulents from Mexico; at El Paso on May 30 on Oncidium sp. from Mexico; at Hoboken on May 21, June 10, and July 2 on Odontoglossum sp. from England. Banana leaf spot (Cercospora musae Zimm.) was intercepted at Brownsville on August 8 on banana leaves used as packing for orchid plants, illustrating a possible means of introduction of this disease into Gulf coast areas where bananas and relatives are much-used ornamentals. A leaf spot disease on calla lilies in baggage from Mexico, intercepted on June 24 at Brownsville, was found to be caused by C. richardiaecola Atk. A Cercospora, unlike species reported on orchids, was found on June 27 at Hoboken on Cymbidium sp. from England. A Diplodia on Philodendron sp. from the Canal Zone inspected on July 7 at San Francisco was determined as D. theobromae (Pat.) Nowell, from which D. philodendri Tassi reported from Italy is probably not distinct. A black rot of sweetpotatoes found at Philadelphia July 28 in stores from Sierra Leone was determined by L. L. Harter as D. tubericola (E. & E.) Taub., although the spores were extremely small for that species. A shipment of Colchicum bulbs from England inspected on September 9 and 10 at Hoboken was found to be infested with Ditylenchus dipsaci (Kuhn) Filip., the infested varieties being D. atro-rubrum, D. bornmuelleri, D. speciosum, and D. speciosum album. An undetermined Gloeosporium (no species reported on host genus) was intercepted on Brassia gireoudiana from Costa Rica and another on Earina autumnalis and E. mucronata from New Zealand, all at San Francisco on November 20, 1940. Another Gloeosporium, with spores too short for G. vanillae Cke., was found on June 9 at San Juan on vanilla leaves in air express from Mexico. Heterosporium ornithogali Klotzsch, which has been intercepted occasionally for several years on ornithogalum flower stems from South Africa, was found on June 20 at San Pedro on leeks or young onions in stores from Japan. What appears to be an undescribed species of Macrophoma was found on May 2 at Hoboken on Cattleya sp. from Venezuela. An undetermined species on Monochaetia, apparently different from the species previously intercepted from Japan on peony, was found on November 28, 1940, at San Francisco on Paeonia moutan. Penicillium gladioli Machacek was intercepted at Hoboken on June 19 on Watsonia sp. corms from South Africa. Phoma insidiosa F. Tassi was found on August 26 at New York on Paspalum compressum seed from Australia. Phoma mali Schultz & Sacc. was intercepted on July 30 at Brownsville on an apple in baggage from Mexico. An undetermined species of Phyllosticta with spores far smaller than those of P. gladioli E. & E. was found on January 20 at New York on gladiolus leaves in cut flowers from Brazil. A fungus cultured from an avocado found on August 19 at Brownsville in baggage from Mexico proved to be Ramularia sp. Stachybotrys, apparently an undescribed species, was found on July 1 at Hoboken on a Cattleya leaf from Brazil. Stachylidium bicolor Link was intercepted on July 1 at San Francisco on Cattleya var. "Harold" from England. Tritirachium dependens Limber was found on May 16 at New York on kudzu roots from China. A rust on unlabeled orchids from Guantanamo, Cuba, intercepted at Hoboken on September 25, was determined as Uredo epidendri Hennings, although it did not fit the description very well.

DOMESTIC PLANT QUARANTINES

Grasshopper egg survey under way.--The grasshopper adult survey having been completed late in August, district meetings were then held for the instruction of surveyors on the egg survey, which was begun about September 15. The adult survey had indicated the need for egg surveys in varying degrees, depending on adult and nymphal populations in the various States. It was determined that rather extensive egg surveys would be needed in Colorado, Kansas, Minnesota, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Texas, and Utah, with a special survey to be conducted later in southeastern Arizona, where second-generation Melanoplus mexicanus (Sauss.) reached a point of prominence during the summer. Egg surveys were also planned for limited areas in Arkansas, Idaho, southwestern Iowa, Michigan, Missouri, Wisconsin, and Wyoming. The egg survey in California will be conducted by State representatives. No survey is planned for the formerly infested States of Illinois, Nevada, New Mexico, Oregon, or Washington. Continued rains in extensive parts of the more heavily infested areas have seriously hampered the conduct of the egg survey and while some apprehension has been expressed as to the possibilities of thorough coverage, it is believed that sufficient information will be gained from the egg survey to furnish adequate information upon which to estimate the prospects for next year's grasshopper outbreak. Special consideration is being given, in cooperation with the Division of Cereal and Forage Insect Investigations, to surveys of the special-study areas throughout the Great Plains region.

Rapid development of second-generation M. mexicanus.--Development of the second generation of the lesser migratory hopper proceeded rapidly in the infested areas of western Kansas, the Panhandles of Oklahoma and Texas, contiguous portions of Colorado and Nebraska, and in southwestern Iowa. Hatching was completed early in September and at the close of the month approximately 85 percent of this generation was in the adult stage. In this area, a sharp increase in grasshopper damage occurred in the first part of September to fall-sown wheat. Most damage was confined to crop margins and especially to those plantings adjoining weedy stubble fields. In a few instances, entire fields were destroyed. Toward the close of the month, crop damage decreased materially, largely because of heavy rains occurring over a large part of the infested area. Some young injured wheat made new growth and farmers reseeded many field margins damaged by hoppers. The second generation of these hoppers was reported flying in various parts of the infested area throughout the latter part of September. Moderate to heavy flights were reported moving south over western Kansas and the Panhandles of Texas and Oklahoma, as far as Lubbock, Tex.

Late baiting increases sharply.--For the protection of fall-sown alfalfa, wheat, and rye, and alfalfa-seed crops, farmers materially increased baiting early in September. This activity slackened later because of poor baiting weather. A total of 3,335 tons of wet bait was used in Colorado, Kansas, Minnesota, Nebraska, and the Panhandles of Texas and Oklahoma during the month. The largest quantities--975 and 900 tons, respectively--were used in Kansas and Texas.

No phony peach in Virginia or West Virginia.--Reported cases suspected to be phony peach disease at Lovington, Va., and Huntington, W. Va., were recently investigated by Howard L. Bruer and W. F. Turner, representatives of the Bureau, accompanied by pest-control officials of the respective States. A careful check of the orchards involved and of surrounding properties, revealed that while the trees in question were abnormal, there was definitely no indication of the phony peach disease. This disease is not known to exist anywhere in either of these States.

September accomplishments on peach projects.--Following inspection of upwards of 2 3/4 million orchard trees, more than 300 laborers were employed during September throughout the phony peach and peach mosaic area in the removal of nearly 35,000 infected trees and more than 25,000 abandoned trees. In excess of 115,000 escaped trees were also removed. The various States cooperated by furnishing 19 supervisors and inspectors, and 1 office worker.

White-fringed beetle control activities.--Control activities for the white-fringed beetle were continued throughout September in several isolated areas where it was considered advisable to conduct such work throughout the period of beetle emergence to determine the effectiveness of control measures as a means of eradicating the pest. Inspections for species of Pantomorus are being conducted, cooperatively with the States, at the more important ports along the Atlantic coast from Charleston to southern Florida points and including the Gulf coast from Florida to Texas. No beetles have been found in localities remote from known infested areas. The inspection was intensified in such places as railroad grounds, docks, airports, and lumber yards. Delimiting inspections were also conducted around the areas where infestations were found for the first time in 1941.

White-fringed beetle administrative instructions modified.--Suggestions to nurserymen for the construction of plunging or growing beds and their maintenance in a status free from white-fringed beetles, were modified in a revision of Circular B. E. P. Q. 496, effective August 25, 1941, to provide specifications for barriers of a less expensive type. Several nurserymen in the regulated area are reported to be constructing such approved equipment. Instructions as to various methods of treatment of plants in pots, or in soil balls, and of potting soil, previously authorized in Circulars B. E. P. Q. 486, 489, and 503, were brought together in a revision of Circular 503, which became effective September 11, 1941. In addition, the instructions as to treatment of balled nursery stock by methyl bromide solution were somewhat modified in this revision of the circular.

Sweetpotato inspection resumed in Texas.--After suspension of Federal participation in sweetpotato weevil inspection in Texas since May, work was resumed in the areas where it is believed that sweetpotato weevils have been eradicated. The activities, consisting principally of inspection of crop remnants in the fields, and of culls after harvest, resulted in finding no weevils in the area. Work in Angelina and San Augustine Counties is being conducted by personnel furnished by the cooperating State agency, and the Federal inspectors are acting largely in an advisory capacity. Two infestations were found in the latter county.

Mole cricket control.--The control of mole crickets has been conducted throughout September in those sections of Florida where surveys have shown that emergency conditions exist. Mixed bait has been furnished to the Florida Mole Cricket Control Committee for distribution in the counties of Hillsborough, Manatee, Hardee, and Polk. Infestations of mole crickets in these counties have been particularly serious. Mixing stations have been in operation at Plant City and Wauchula and 658,000 pounds of bait was mixed and distributed to growers up to September 30, through local representatives of the Florida State Plant Board. H. T. Rainwater is the Bureau representative in charge of the control project, with headquarters at Plant City, Fla.

Transit inspection.--Transit inspection was resumed in September at Atlanta, Dallas, Kansas City, Omaha, and Pittsburgh. The inspectors assigned to these stations were temporarily employed during the summer on other projects of the Division. During the summer the inspectors assigned to Memphis and Houston were engaged in white-fringed beetle scouting in the vicinity of their stations, in conjunction with transit-inspection duties. These stations are now operating on full-time transit-inspection schedules. At New York City, 6 live Japanese beetle grubs were recovered from a soil sample consigned to an Ohio firm for analysis, and a live adult beetle was recovered from a shipment of cut flowers. Several other insects of economic importance were also found in shipments of plants and flowers moving in violation of the Japanese beetle quarantine.

Terminal inspection extended in Mississippi.--The State Plant Board of Mississippi has arranged through Federal channels for the enforcement through terminal-inspection provisions, of its quarantine relating to the intrastate movement of sweetpotato plants and the tubers, because of black rot, stem rot, nematodes, sweetpotato weevil, and other injurious pests of the sweetpotato. Under the quarantine (Rule 23 A, amended November 23, 1940) no shipments of sweetpotatoes, sweetpotato plants, or vines, may be accepted for mailing unless there is attached to each container a certificate tag and each bundle of 100 plants is tied with a valid certificate tape issued by the Mississippi State Plant Board showing compliance with the State plant-quarantine laws or regulations pertaining to injurious pests. The quarantine rule pertaining to interstate movement into Mississippi of hosts of the sweetpotato weevil from certain infested States (Rule 24 A) had previously been brought within the provisions of the terminal-inspection procedure, and this quarantine and procedure remain in effect.

CONTROL INVESTIGATIONS

Effectiveness of ethylene dichloride against confused flour beetle.

In tests on various chemicals as fumigants, H. H. Richardson and A. H. Casanges, of the Beltsville, Md., laboratory, have used ethylene dichloride as a standard of comparison. In 1939 ethylene dichloride showed very high toxicity. Further tests in 1941 have again indicated that ethylene dichloride is more toxic to the confused flour beetle than has been reported in the past. Apparently this is due to a latent toxic action that does not kill some of the insects until 10 to 20 days after fumigation at 77° F. (5-hour exposures). Judged by the effects after 20 days, ethylene dichloride was more toxic than ethylene oxide and not far from the toxicity of methyl bromide. If this latent toxic effect occurs against other insects, it helps to explain the wide practical use of this fumigant. Ethyl bromide--a compound closely related to methyl bromide--was found

much less effective. Approximately 15 times as much ethyl bromide as methyl bromide was required to kill this beetle in 5-hour exposures at 77° F.

INSECTICIDE INVESTIGATIONS

Improved method of preparing pure geraniol.--During the last 3 years it has been necessary to prepare comparatively large quantities of pure geraniol for use in Japanese beetle baits. The method of preparation given in the literature, involving direct mixture of the source material with calcium chloride, was unsatisfactory from several standpoints. In the course of this work it has been found by Howard A. Jones and John W. Wood that treatment of a hexane solution of the geraniol-containing oil with calcium chloride, together with certain other changes in the technique, effects a marked improvement in ease of handling, as well as the purity and yield of the product. The procedure has been prepared for publication in the Journal of the American Chemical Society.

Study of nicotine silicotungstates.--A paper entitled "Nicotine Silicotungstates" has been prepared by L. N. Markwood for presentation at the annual meeting of the Association of Official Agricultural Chemists in October. This association has an interest in the subject of nicotine silicotungstates, as its official method for determining nicotine in tobacco and in nicotine preparations involves precipitation of the alkaloid with silicotungstic acid. Of the several kinds of silicotungstic acid known when the matter was originally studied the acid of composition $4H_2O.SiO_2.12WO_3.22H_2O$ was selected as official; it forms a highly insoluble precipitate with nicotine, lamellar in character. Recently a new silicotungstic acid of composition $4H_2O.SiO_2.12WO_3.4H_2O$ was described. It also forms a precipitate with nicotine which is granular in character and might therefore offer an advantage in filtration. The composition of each precipitate is the same, viz, $2H_2O.2 \text{ nicotine}.SiO_2.12WO_3.5H_2O$, and the assumption might be made that the new acid could serve equally well for the nicotine determination. It was found, however, that the new acid does not quite precipitate the nicotine to the same degree as the other acid and hence must be rejected as a quantitative precipitant for nicotine. The unprecipitated nicotine occurring in each case was readily determined by the very sensitive color test with cyanogen bromide and beta-naphthylamine.

BEE CULTURE

Honeybees resistant to Nosema disease at brood-nest temperature.--Nosema disease of honeybees, caused by the protozoan parasite Nosema apis, kills or weakens colonies of bees late in winter and spring, but during the rest of the year losses are usually unimportant. Infection subsides rapidly in spring after settled warm weather arrives and in summer infected bees may be difficult to find. A moderate increase in infection may occur in autumn. This seasonal variation in Nosema infection is commonly recognized but an explanation for it seems not to have been offered. C. E. Burnside, Beltsville, Md., reports that, when bees in cages were inoculated with Nosema spores by mixing the spores with honey or sugar sirup given the bees for food

(about 25,000 spores per cc.), very heavy infection developed in practically all the bees kept at the temperature of the room (70° to 85° F.), as well as in bees that were chilled at about 50° in a refrigerator for 5 hours on 3 consecutive days and then allowed to remain in the room. Epithelial cells containing mature spores were found in the bees after 7 days and after 10 days cells containing spores, as well as free spores, were extremely numerous. On the other hand, bees that were kept in an incubator at brood-nest temperature, about 95°, and inoculated by feeding with fractions of the same inoculum given bees kept in the room appeared to escape infection completely. Spores in epithelial cells were not seen in any of these bees, although the experiment was continued for 22 days. Bees that were similarly inoculated and kept in the incubator for 10 days also appeared to remain free from infection after they were taken out, given food free from *Nosema* spores, and kept at the temperature of the room for 12 days. These results are in line with recent work in Europe in which *Nosema* disease was found to develop more rapidly at 86° than at 68°. Higher temperatures were not tried by the European workers. It seems probable that temperature may be an important factor in the seasonal variation of *Nosema* disease. In the latter part of the winter and early in the spring, when colonies are rearing but little brood, or in colonies not strong enough to maintain full brood-rearing temperature, most of the bees are subjected to temperatures within the range where infection was obtained. As the colonies become stronger and the weather warmer an ever-increasing number of bees are exposed to temperatures near 95°. The nurse bees and queen, which remain in the brood nest at about 95°, are usually free from *Nosema* disease, even when a large percentage of the field bees are diseased.

Nosema disease of honeybees not controlled by phenothiazine. -- Since phenothiazine is highly effective for controlling some animal parasites of domestic animals and is practically nonpoisonous for honeybees (Jour. Econ. Ent. 34(1):24-33) it was thought it might also be effective for controlling *Nosema* disease of honeybees caused by the protozoan parasite *Nosema apis*. Mr. Burnside reports negative results in experiments to determine whether phenothiazine is effective for controlling this disease. About 100 worker bees were placed in each of a number of cages. Some of the cages of bees were inoculated by mixing *Nosema apis* spores (approximately 25,000 per cc.) with the honey or sugar sirup given the bees for food. Other cages of bees were similarly inoculated, but phenothiazine in the proportion of 1 gram per liter in some instances and 2 grams per liter in others was also mixed with the food. Each cage of 100 bees consumed between 20 and 25 cc. of this food. Other cages of bees were fed with honey or sugar sirup alone, or with honey or sugar sirup containing phenothiazine in the proportions named and kept as checks. The bees were kept at the temperature of the room in the laboratory (70° to 85° F.). Inoculated bees that received phenothiazine were infected by *Nosema apis* as quickly and in practically the same degree as were those that did not receive phenothiazine. Microscopical examination of stomachs of bees showed numerous particles of phenothiazine in contact with infected epithelial cells. The check bees remained free from *Nosema* disease but bees that received phenothiazine had a somewhat higher death rate than those which did not. While the experimental work on this problem was limited the results in every instance indicated that phenothiazine was without value for controlling infection of honeybees by *Nosema apis*.

Impaternate females common in the Italian and Caucasian races of honeybees.--The honeybee, in common with other members of the order Hymenoptera, regularly produces females from fertilized eggs and males from unfertilized eggs. The production of females from unfertilized eggs (impaternate females), however, has been reported in the honeybee native to the Cape region of South Africa. In the Cape bee, laying worker bees are very common and the eggs usually produce female offspring, either workers or queens, but some drones are also produced. Impaternate females have been reported in other races of honeybees but many of these were not produced under circumstances that made their origin from unfertilized females certain. Most of these cases have been explained as egg stealing. Some data obtained by Otto Mackensen, Baton Rouge, La., indicate that impaternate females may occur more frequently in our common races of bees than has been commonly believed. During last season a great many virgin queens were forced to begin laying without fertilization, by clipping their wings and confining them to nuclei behind queen excluders. In the drone brood of many of these queens a few worker pupae were found. Of 13 queens of the Caucasian race, 3 produced a few workers, and in 2 Italian strains 1 out of 11 and 17 out of 30 queens, respectively, produced impaternate females. The highest number produced by any 1 queen would probably not exceed 1.0 percent, if an accurate count had been made. In most cases either the workers or the queen in the hive at the time could have produced these impaternate females; however, in a few cases representing both the Italian and Caucasian races it was proved that queens produced them. To obtain this proof Italian and Caucasian queens were maintained in nuclei stocked with bees of the other race so that any workers produced by the queens could be easily distinguished. Under these conditions 2 generations of impaternate queens were produced. One such queen artificially inseminated and another permitted to mate naturally were lost before any eggs were produced. Of 710 larvae transferred from the brood of 1 virgin laying queen 6, or 0.85 percent, developed into impaternate queens.

The mechanism of colony resistance to American foulbrood.--Colony resistance to American foulbrood is reported by A. W. Woodrow and E. C. Holst, Laramie, Wyo., to consist of the removal of diseased brood from the comb before Bacillus larvae White, the causative organism, has reached the infectious, spore stage within the larvae. This was demonstrated by the contrasting behavior of a resistant and a susceptible colony when they were given equal numbers of inoculated sister larvae for rearing. The bees of the resistant colony removed 138 inoculated larvae within 11 days after inoculation and no spores were found in any larvae being removed, although 23 of the 25 examined contained rods. All infected larvae had been removed at the end of this period. The bees of the susceptible colony also removed diseased larvae, but more slowly. Less than 60 percent of the infected larvae were removed within 11 days after inoculation, and 30 percent of them had not yet been removed at emergence time. B. larvae spores were found in inoculated larvae being removed in this colony as early as the ninth day after inoculation and each day thereafter. Thus the spread of disease is halted in the resistant colony by the removal of all infected larvae while they contain only rods of B. larvae which were found to be noninfectious, whereas in the susceptible colony the contact of the bees with infected larvae containing the highly infectious spores is certain to spread the disease to other larvae.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Staphylinids causing painful skin rash.--Specimens of a staphylinid beetle were recently received from C. H. Ballou, chief of the department of entomology, Venezuela Ministry of Agriculture, with the report that when crushed against the body the insects produced a severe burn. The species was identified by R. E. Blackwelder as Paederus columbinus Lap. Upon receiving the determination, Mr. Ballou wrote further concerning this species, stating that a boy had been observed "whose body from the waist down was covered with ulcers caused by crushing these insects." He added that in a mining district in Venezuela "there were over two hundred men with these ulcers and some were so badly affected that they could not work." Various species of the genus Paederus have, from time to time, been recorded as causing dermatitis and in 1926 Chapin (Arch. f. Schiff's. u. Tropenhyg. 30:369-372) summarized the literature dealing with such cases but, as this summary and most of the reports it covered appeared in journals not widely consulted by entomologists, the association of Paederus with dermatitis has largely escaped notice in our field.

A new pest of "mimosa" in the District of Columbia.--In August 1940, injury to "mimosa" (Albizzia sp.) in the District of Columbia was brought to the attention of L. G. Baumhofer, of the Division of Forest Insect Investigations. He reared a series of Lepidoptera from the infestation and later submitted the specimens for identification. The moths represent a species heretofore unrecorded from North America. It is probable that they belong to the Australian genus Homadaula, family Glyphipterygidae, but definite assignment to this genus must await comparison with determined material requested from Australia. During the last summer more extensive observations were made, but the biology is as yet not fully known. Apparently the life cycle is short, indicating that there is more than one generation a year. Trees which are heavily infested become undesirable as ornamentals. The larvae, while feeding, spin webs which hold the dead blossoms and leaves on the tree in unsightly brown masses. Pupation takes place in cracks and crevices. To date the injury has been noted only in the District of Columbia and immediate vicinity. It is possible, however, that it occurs farther south but has not yet attracted attention.

Notes on the Brazilian fire ant.--The Brazilian fire ant (Solenopsis saevissima var. ritchieri Forel) was first recorded in this country by W. S. Creighton (Amer. Acad. Arts and Sci. Proc. 66: 88, 1930). He saw specimens in the collection of H. P. Löding who had collected them at Mobile, Ala. Mr. Löding was of the opinion that the ant became established near Mobile about 1919. Since that time it has spread considerably and now is rather abundant in Jackson County, Miss., and Mobile and Baldwin Counties, Ala. D. E. Read, of Foley, Ala., from whose remarks these notes are drawn up, believes it also occurs in Washington County, Ala., although he has not collected it there. The ants build numerous mounds which average nearly 2 feet in height in cultivated fields around shallow depressions where water stands, except during dry spells. This ant is of little if any importance as a household pest, but it is believed by farmers that it is more injurious to agriculture than any other ant in the area. Losses in Irish potato production are charged to this species because of attacks on the tender leaves and branches during early growth. Difficulty is frequently experienced in obtaining or retaining labor for potato

harvest because of the aggressive nature and irritating sting of the ant. The attacks are more disagreeable than those of our native fire ants.

New record for Lysiognatha --Recently received for identification were several larvae of the sawfly genus Xyela, submitted by H. H. Keifer, of the California State Department of Agriculture. The Xyela larvae were found dropping from lodgepole pine (Pinus murrawana) on July 6, 1941, at Lyons Creek, El Dorado County, Calif. Three of the larvae bore on their heads eggs of the ichneumonid genus Lysiognatha. Identification of the eggs was possible because of their distinctive shape and method of attachment to the host. Cushman (Wash. Acad. Sci. Jour. 27 (10): 439, 1937) reports that the egg of Lysiognatha "is attached to the host (Xyela larva) by a short pedicel thrust through the skin of the host. Embedded in the foot of the stalk is a black heavily sclerotized body that apparently serves as an anchor." The record is particularly interesting because it constitutes the first record of the genus Lysiognatha from the Pacific coast.

The National Collection of Thysanoptera. --In March 1938 a thysanopterist was appointed in the Division of Insect Identification. Prior to that time it had been necessary to rely on unpaid outside collaborators for thrips identifications. Under those conditions the reference collection of Thysanoptera, a large section of which was comprised of material assembled by A. C. Morgan, remained almost static. It contained named representatives of only 265 species in March 1938. Since the appointment of a thysanopterist there has been rapid and steady expansion of the collection, which now has in excess of 480 determined species. Its value for reference purposes in connection with thrips identifications has been correspondingly increased. However, many of the species are represented by only a slide or two from the type series or by old, rather poorly prepared slides; and the collection even now contains specimens of only about half the described species occurring in America north of Mexico and slides of less than 10 percent of the described exotic species. Well-preserved series of specimens are, therefore, much desired by the Division of Insect Identification, particularly if accompanied by accurate records giving host, locality, and date of collection. The best preparations of thrips can be made from material that has been collected in a solution consisting of 9 parts of 70-percent alcohol, 1 part of glacial acetic acid, and 1 part of glycerine, although specimens submitted in 70-percent alcohol are satisfactory.

Collembola found 26 to 28 feet underground. --An interesting report of subterranean Collembola was submitted with specimens, late in September, by A. I. Bourne, of Massachusetts State College. The insects involved were determined by Grace E. Glance as Achorutes armatus (Nicolet). This species is known to feed upon fungi in soil and in manure, and has been reported as a major pest in mushroom beds. The specimens sent by Professor Bourne were collected, however, in very fine white sand through which workmen were digging to make a well. At a depth of 26 feet the men observed the Collembola to occur in some numbers, and at 28 feet, where a good vein of water having a temperature of 46° F. was encountered, the insects were found to be even more abundant in the buckets of moist sand as these were pulled up out of the shaft to be emptied. It was reported that no organic matter was present in the sand at these depths.



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DEPARTMENT OF AGRICULTURE



BUREAU OF
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NEWS LETTER

VOLUME VIII

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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

B U S I N E S S M E M B E R

FOR OCTOBER 1941

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December 1, 1941

ADMINISTRATION

Bishopp and Spencer Appointed Assistant Chiefs

On November 9, 1941, Fred C. Bishopp and Frank H. Spencer were appointed assistant chiefs of the Bureau, Dr. Bishopp to be in charge of the Bureau's research work and Mr. Spencer to be in charge of business administration.

Dr. Bishopp has been with the Bureau since 1910, when he began investigations on the cotton boll weevil. The following 2 years he worked on tick investigations. He spent the next 5 years studying insects that affect the health of animals. In 1917 he was made chief of the Division of Insects Affecting Man and Animals and continued in that position until his recent appointment. Prior to entering the Bureau he was assistant professor of entomology and assistant State entomologist in Maryland.

Mr. Spencer entered Government service in 1917 as personnel clerk in the Bureau of Animal Industry. From 1919 to 1921 he served in the Bureau of Markets and in the Division of Publications of the Department. He was secretary to the Director of War Finance Corporation in 1921-22. From 1922 to 1931 he was administrative assistant and secretary to the Secretary of Agriculture. From 1931 to his recent appointment he has been business manager of the Bureau.

Dr. P. N. Annand, Chief of the Bureau, has announced that it is planned ultimately to abolish the position of business manager, vacated by Mr. Spencer, and to create two divisions dealing with business operations; i. e., a Division of Finance and Business Services and a Division of Personnel. In the meantime B. Connor, as acting business manager, is in immediate charge of the work relating to the business operations of the Bureau.

Cushing Appointed Chief of Division

Emory C. Cushing has been appointed to succeed F. C. Bishopp as chief of the Division of Insects Affecting Man and Animals. Mr. Cushing entered the Bureau in 1923, after serving on the staff of the Texas Agricultural Experiment Station. His work with the Bureau has been largely devoted to investigations of insects affecting man and animals and for several years he was assistant Division leader. It was due to his efforts that the true screwworm was identified, revolutionizing the control of this very important pest of livestock.

OBITUARIES

John N. Summers Dies

John Nicholas Summers, administrative officer of the Division of Gypsy Moth and Brown-tail Moth Control, died suddenly of an acute heart attack at Greenfield, Mass., on the evening of October 13. He was born at Brockton, Mass., on January 25, 1884, attended the Brockton public schools, and graduated from the Massachusetts State College in 1907 with the degree of Bachelor of Science, majoring in entomology. He received the degree of Doctor of Philosophy from the same institution in 1911.

Mr. Summers was appointed to the Bureau of Entomology on June 16, 1911, as a scientific assistant and later as entomologist. In 1914 he spent several months in Europe collecting and shipping parasites of the gypsy moth to this country. During the World War he enlisted in the U. S. Army Tank Corps and served from May 1918 to August 1919, after which he returned to the Bureau. In 1922 he spent 6 months in Japan and returned to that country for a similar period in 1923, where he collected and shipped parasites of the gypsy moth to the United States. He was in charge of the quarantine and inspection work of the Plant Quarantine and Control Administration's Gypsy Moth Project from January 1927 to January 1934. Since 1934 he carried on work for the Division of Gypsy Moth and Brown-tail Moth Control. He was active in church, the American Legion, and civic organizations, as well as national and local entomological societies, and was highly respected by all who knew him.

Mr. Summers is survived by his wife and a son, John N., Jr.

Edwin W. Cook Dies

After a brief illness, Edwin W. Cook, of the Division of Fruit Insect Investigations, died on October 27 at Vincennes, Ind. He was born on October 28, 1904, and was reared on a farm near Bentonville, Ark. In 1924 he was employed as a field assistant to the late A. J. Ackerman at the Bentonville, Ark., laboratory. He worked there practically every summer until 1933, when the laboratory was discontinued. The following year

he was assigned to duty at St. Joseph, Mo., where he served during the active season each year until 1941, when he was transferred to Vincennes because of suspension of the work at St. Joseph. During the winter of 1939-40 he was also employed on citrus canker work in the Division of Domestic Plant Quarantines. Mr. Cook was a quiet, unassuming, reliable worker of a group which plays an important part in the accomplishments of the Bureau.

BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO
SPECIAL NATIONAL DEFENSE ASSIGNMENTS

Bruce, W. G., Assoc. Ent., Insects Affecting Man and Animals, to serve as liaison officer. Mr. Bruce has been selected to serve as the contact representative for cooperation between the Bureau and Defense agencies in making field surveys on which to base control operations to be used in military reservations and adjacent areas against a wide variety of insects inimical to the welfare of military personnel. His headquarters will be located at some convenient point in the Southeastern States.

Cassell, Thomas L., Asst. Clk.-Stenog., Insects Affecting Man and Animals, inducted, Select. Serv., August 16, 1941.

Dorick, Stanley J., Asst. Clk., Pl. Dis. Control, inducted, Select. Serv., November 14, 1941.

King, W. V., Sr. Ent., Insects Affecting Man and Animals, Major, Sanit. Corps Resv., called to active duty November 12, 1941, Fourth Corps Area Laboratory, Fort McPherson, Ga.

Smith, James N., Asst. Pl. Quar. Insp., For. Pl. Quar., U. S. A. Resv., ordered to active duty October 6, 1941.

FRUIT INSECT INVESTIGATIONS

Flight habits of grape leaf folder.--Use of a rotary net in a vineyard during the night of August 15-16, when the third brood of adults of Desmia funeralis (Hbn.) were numerous, supplied data about the activity of both sexes. Sunset was at 6:51 p. m.; sunrise at 5:11 a. m. There was little activity until darkness in the evening, and flight practically ceased at dawn. The following table shows the flush of flight of the females in the evening and the long-continued activity of the males. Collections were made at intervals of 15 minutes. The work was done by Dwight F. Barnes and Oscar G. Bacon, of the Fresno, Calif., Laboratory.

Time Interval	Temperature range	Males	Females
P. M.	F.	Number	Number
6:30 - 6:45	85 - 89	0	3
7:00 - 7:45	82 - 85	15	21
8:00 - 8:15	80 - 82	35	120
8:30 - 9:15	79 - 80	54	43
9:30 - 10:45	80 - 81	73	17
11:00 - 11:45	79 - 82	57	21
a. m.			
12:00 - 12:45	79 - 80	78	8
1:00 - 1:45	75 - 78	72	9
2:00 - 2:45	73 - 76	60	11
3:00 - 3:45	75 - 76	57	11
4:00 - 4:45	74 - 76	52	13
5:00 - 5:30	71 - 73	1	1

Rearing Oriental fruit moth parasites.--In a previous issue of the News Letter (v. VIII, No. 9, p. 2, Sept. 1, 1941) success in breeding Macrocentrus ancyliivorus Roh. under field cages over strawberry was reported. H. W. Allen, of the Moorestown, N. J., laboratory, now reports further details. These parasites can be bred at the rate of 400,000 to 525,000 per acre in a section where it is unusual to obtain more than 35,000 per acre from a natural population. In breeding these parasites 3 types of field cages are being used, each of which is suitable to a particular combination of conditions. These may be briefly described as: (1) Large rectangular cages on frames of posts and wire; (2) large hoop cages covering 2 rows; and (3) small hoop cages covering 1 row. The initial cost of materials required to cover 1,000 square feet of strawberry is \$15.51 for the large rectangular cages, \$20.09 for the small hoop cages, and \$27.13 for the large hoop cages. Much of the material can be used for several seasons, therefore the cost per year on a 5-year basis is much less, being \$3.73 for the large rectangular cages, \$10.88 for the small hoop cages, and \$9.54 for the large hoop cages. It was found that 14,500 M. ancyliivorus adults can be produced in a year from each 1,000 square feet of caged strawberry.

MEXICAN FRUITFLY CONTROL

No fruitflies found in Texas.--The 1941-42 harvesting season for citrus fruit produced in the area regulated under Quarantine No. 34 opened on October 1. By the close of the month shipments exceeding 2,900 equivalent carlots had been certified for movement. Normally, a few fruitflies are trapped and some larvae have been found in the month of October, but this season no adults or larvae of the Mexican fruitfly were found in Texas. A few flies and some larvae, however, were collected in the border towns in Mexico. Weather conditions were favorable for fruit development, as well as the development of citrus rust mites. Rust mites were active enough throughout October to necessitate dustings in every district. No other citrus pest was reported as being unusually active.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Parasitization of sugarcane borer in Florida---J. W. Ingram and E. K. Bynum, of the Houma, La., laboratory, made examinations for borer parasitization in southern Florida during the latter part of September. At Fellsmere, in 1-hour examinations in each of nine representative fields the following average percentages of parasitization were found: Lixophaga diatraeae (Townsend), 47.1; Bassus stigmaterus (Cress.), 4.7; and Metagonistrium minense Townsend, 1.3; or a total parasitization of 53.1 percent. These percentages included both emerged and unemerged stages and for unemerged stages alone, or present parasitization, the percentage was 38. The first two parasites are known to overwinter at Fellsmere, and M. minense, undoubtedly, also overwinters there. The overwintering parasites have been supplemented by the breeding and release of large numbers of Lixophaga and of some M. minense during the spring months by L. C. Scaramuzza and W. B. Douglas. These men are employed for that purpose by a sugarcane cooperative which controls about 3,000 acres of sugarcane near Fellsmere. Six fields in the vicinity of Lake Okeechobee were examined but borer parasites were found in only two. In one field parasitization by Bassus was 4.5 percent; in the other parasitization by Bassus was 38.5 percent and by M. minense 7.7 percent, making a total parasitization of 46.2 percent in that field.

Amazon fly breeding work---By means of artificial inoculations in 1941 up to the end of September, T. E. Holloway and Ralph Mathes reared 3,845 adult Amazon fly parasites of the sugarcane borer. A total of 2,088 of these flies were released in 1 sugarcane area near Houma to determine whether mass releases of this parasite will give some degree of borer control during the same season released. During May and June a shipment of 21 mated females was sent to L. C. Scaramuzza at Fellsmere, Fla., and 50 mated females to J. W. Wilson at Belle Glade, Fla. From this material they bred and released large numbers of Amazon flies in Florida sugarcane fields.

Vector of chlorotic streak disease of sugarcane found---J. W. Ingram, W. E. Haley, and L. J. Charpentier, of the Houma, La., laboratory, in cooperation with the Sugar Plant Division of the U. S. Bureau of Plant Industry, exposed the following numbers of healthy sugarcane plants to the following species of insects which had fed on sugarcane plants infected with chlorotic streak disease: Draeculacephala portola Ball, 568; Sipha flava (Forbes), 153; Hysterononeura setariae (Thos.), 124; Aphis maidis Fitch, 45; and Toxoptera graminum, 5. By the end of September 26 of the plants exposed to D. portola had developed chlorotic streak disease. None of the plants exposed to the other species of insects have developed the disease and all untreated check plants have remained healthy. Chlorotic streak disease, which was only recently found in Louisiana, occurs in a number of foreign countries. D. portola is the first known vector of this disease.

Rice and corn in adjacent fields show increased borer infestation---W. A. Douglas, of the Crowley, La., laboratory, reports that during 1941 the average percentage of cornstalks infested by sugarcane borers in 10 fields adjacent to rice stubble was 50 percent, whereas the average for the same

number of cornfields located at least 1 mile from rice was 20 percent. In 10 fields of growing rice adjacent to corn the average percentage of culms infested was 3.6, whereas in 10 rice fields located at least 1 mile from corn the percentage of rice culms infested was 1.3.

Field status of European corn borer parasites in Lake States area.—W. G. Bradley, Toledo, Ohio, reports that surveys conducted at the close of the 1940 season showed four exotic parasites to be present in the Lake States area. Indella stabulans var. grisescens R.-D. was recovered at all points in the vicinity of marshland near the Lake Erie shore, the abundance of the parasite being dependent on the distance of the point from marshland. An increase in parasitization by this tachinid was shown in the immediate vicinity of the release points at Perkins Township, Erie County, Ohio, and Erie Township, Monroe County, Mich. At the former point parasitization by this species averaged 48.5 percent, and 85.1 percent of the borers in one collection were parasitized by this species. Eulophus viridulus Thoms. was found to be widely dispersed in counties in Ohio south of Toledo. This chalcid was not abundant at any point. Inareolata punctoria Roman appeared in collections of host material from the Cattaraugus Indian Reservation, N. Y., in encouraging concentrations. It was not recovered at any other point in the area. Macropentis giftensis Ashm. was recovered in collections from the Adams Township, Lucas County, Ohio, release point, showing initial establishment following a release at this locality during the current season.

JAPANESE BEETLE CONTROL

Drought delays shipments of nursery stock.—Movement of nursery stock from most of the Japanese beetle regulated area was limited to the shipment of bare-rooted stock, as digging of stock with soil balls was almost impossible, owing to the prolonged dry spell. Calls were received from purchasers who had received balled stock for replacements. Stock in plots that were treated with arsenate of lead prior to July 1 was still awaiting digging at the end of the month. The nurseries did not wish to take the risk of digging balled and burlapped stock under the dry conditions. Notwithstanding the drought, nurseries in the Westminster, Md., area had a busy month. Express and freight shipments were heavy. A number of planting jobs were canceled because of the water shortage. Several attempts to collect beetle grubs for use in testing by the treating section of the Division were made in Maryland, but the ground was so hard that it was practically impossible to dig with forks. The few grubs collected were found about 10 inches below the surface. On the Eastern Shore of Maryland and Virginia, during the dry weather prior to the rain of October 27 and 28, the first in 58 days, the carbon disulfide treatment was frequently used. By the use of this treatment, which required 4½ gallons of water to an 18-inch collar, the nurserymen were able to dig evergreens balled and burlapped, because the water caused the soil to adhere to the roots. Reports from New Jersey indicate that the unusually dry conditions have seriously handicapped the nursery business, greatly increasing the cost of digging. Some nurseries used picks to loosen the soil. One nurseryman even tried an air hammer in his

digging. Nurserymen tried to have customers agree to spring delivery of stock.

Japanese beetle prevention in Canada.---The Canadian Division of Entomology News Letter for August-September 1941 contains the following account of beetle-control activities in that country: "At Halifax, Yarmouth, Saint John, and Montreal work on this project was completed and the traps were collected and stored by the end of the second week of September. At Niagara Falls and Windsor scouting and trap attendance was continued throughout the month. At Niagara 4 beetles were collected in traps and 5 by scouting. At Halifax 4 beetles were taken from boats entering the harbour. At Windsor 42 properties were found to be infested in the newly infested area. In this area a total of 170 beetles has been taken, 65 in traps and 105 by scouting. Between August 8 and 14 a total of 97 traps were taken from other sites and placed in this area and other plans were made for controlling the infestation. By the end of September 278 live and 255 dead beetles had been found in all districts concerned." During October L. L. Reed, of the Plant Protection Division, Canadian Department of Agriculture, visited the arsenate of lead treating operations at Newark, N. Y., for the purpose of familiarizing himself with the methods and procedures followed by this Division in Japanese beetle control. Mr. Reed also spent some time at the Bloomfield divisional headquarters, and conferred with the treating section at Trenton. He visited the research laboratory of the Bureau at Moorestown, N. J., and spent some time at the Division's suboffice and the Port Inspector's office in New York City. While in Bloomfield he also looked over some of the Dutch elm disease eradication operations.

Fall treatments of soil for Japanese beetle control.---Over 400 acres were treated with arsenate of lead for control of isolated Japanese beetle infestations in October. Work started in Chicago and Highland Park in August and September was completed during the month. Treating was also completed in Elkhart and Hammond, Ind., but was still in progress at Terra Haute at the end of the month. A few acres were treated in Birmingham, Mich., with operations continuing in Detroit into November. A small amount of treating was completed at the St. Louis, Mo., Airport in October. Operations were carried to completion at Newark, N. Y., where a total of 59.4 acres were covered. Treating work got under way in High Point and Winston Salem, N. C., with work at these points and at Greensboro, where the operations started in September, continuing into November. Crews in Conneaut and East Conneaut, Ohio, completed 75 acres of the area to be treated in these localities. Lead arsenate treating is scheduled for all infestations of importance in North Carolina, except at Asheville, and at all 10 localities in which beetles were trapped outside the regulated area in Ohio. Fall soil treatments, started in August and extending through October, have thus far been applied to 580 acres.

Many trees in timber stand infested with Dutch elm disease carriers.---An unusually large number of infested elms and trees subject to infestation are being found in a dense stand of timber in Montgomery County, Pa., about 1,000 feet south of Swamp Creek and 2 miles southwest of Zieglerville, Pa. S. multistriatus has attacked these elms very heavily. It appears that during the spring and summer a number of these elm trees were cut down by a farmer for lumber and allowed to season. Over 200 trees in this area have been tagged for removal and pruning.

Heavy infestation of smaller European elm bark beetle in elm logs.---A heavy infestation of Scolytus multistriatus Marsh was located in Conyngham Township, Luzerne County, Pa., among elm logs cut for mine props. In this wood lot a large amount of elm has been cut for this use, the more recently cut wood being too green for beetle attack at present. In all logs that had been cut for some time and dried out somewhat beetle attack had been very heavy and many pupae and larvae were found. All of the logs were slippery elm, and no American elms were observed either cut or growing in the vicinity. The owner of the logs could not be located, but men working in the lot stated that the mine props were shipped to mines in the vicinity of Hazleton, as ordered. Immediate permission was sought for destroying this infestation before there was any possibility of emergence. Although this infestation is within the regular Dutch elm disease work area and is only about 2 miles east of the Susquehanna River, it is well removed from any infected area, the nearest confirmed tree being approximately 10 miles north in Hunlock Township.

Largest diseased elm of year removed in Wilkes Barre, Pa., area.---One of the confirmed elms eradicated in the Wilkes Barre, Pa., area was the largest diseased elm found in the district this year, measuring 05 inches at breast height. The dying limbs of this large elm were infested with S. multistriatus in the larval stage, but there had been no emergence. Only 1941 discoloration was found, and this was located only in parts of the crown and leaders. For an elm of that size and located as it was in an open field, the beetle feeding had been surprisingly light. All feeding scars found were closed, but apparently some of them had been made in the spring of 1941 and the tree's vigorous growth this year had closed them.

Largest elm pruned.---The largest multiple elm that has been seen or reported in the State of Pennsylvania was recently pruned in Bucks County. The tree is 160 inches d.b.h. It is composed of 6 trunks--2 small, each 9 inches d.b.h., and 4 very large trunks, the largest 55 inches d.b.h. The main crotch is located at ground level. A 10-inch branch was removed.

Scouting and sanitation completed on islands in Delaware River.---Owing to drought and the resulting low water level, crews in the Easton district of Pennsylvania have been able to wade to islands in the Delaware River. Taking advantage of this condition, the islands were scouted for both Dutch elm disease and beetle material, and the necessary sanitation work completed. Two confirmations have been obtained as a result of this work--one on Keiffers Island, in Lower Mount Bethel Township, Northampton County, about 7 miles above Easton, and the other about the same distance below Easton in Bridgeton Township, Bucks County. As these islands were in the outer disease zone they had not been previously scouted this season because preference was given the border-zone area. Very few beetle-infested elms were found on the islands this year, reflecting the close sanitation work they received in 1939, when several hundred elms were removed and as many pruned. Nearly all infested trees this season had either been uprooted by ice and flood or injured by storm.

Difficult elm eradications in New Jersey.--The most difficult eradication of the year was begun the latter part of the month in Mansfield Township, Burlington County, N. J. The tree is an infected elm 33 inches in d.b.h. Three loads of wood and brush have been removed from the top and the tree is only a little more than half topped. It will have to be topped down to about 25 feet to clear buildings, trees, and fences. Near the Masonic Home in Burlington County, a 45-inch and a 54-inch elm were eradicated, and in addition the butts of a 44-inch and a 33-inch elm were hauled to a burning site, as were several smaller trees and much pruned wood. Because the wood was so large, it was decided to start the fire at midnight. After burning for 16 hours, there were only about 4 pieces left, only 1 of them being of any size. The power-saw unit working in Sussex County removed 3 trees totaling 180 inches d.b.h. Two of these trees were difficult removals because they were multiple trees and leaned over wires and the highway. To fell them with ordinary hand crews would have required a great deal of topping. The cable and winch on the tractor proved very useful, making it possible to pull over the entire trees without any topping. Considerable difficulty was encountered in eradicating a 37-inch tree in Mercer County, which was partially submerged and had to be pulled up an 8-foot bank by hand. A large infected tree cut by a power saw in Warren County had to be hauled from the woods to a burning pile. A diseased tree in Verona, Essex County, approximately 34-inches d.b.h. and 60 feet high, was situated on the edge of a flower garden, surrounded by a summer house, a swing, and rhododendrons. Neither the limbs nor the trunk could be dropped. It was necessary to lower each piece individually, and approximately 14 cuts had to be taken on the trunk, owing to limited space.

Cooperation by Albany, N. Y., Park Department.--Arrangements were made to burn all recently tagged material, which was being removed in the city of Albany, at a city dump where there was no fire hazard. Extra time was involved, as all of it had to be hauled to the burning site and all trees removed had to be topped. The city Park Department cooperated in the removal of this material by pulling large butts over and hauling large wood to the dump. Their crews worked behind Federal crews removing the stumps of the felled trees.

Public hearing on Dutch elm disease quarantine held in Connecticut.--The Connecticut Agricultural Experiment Station held a public hearing in New Haven on October 21 for the purpose of revising the State Dutch elm disease quarantine to coincide with the new Federal quarantine regulations. No one appeared at the hearing in opposition to such a revision; therefore it was recommended that the State quarantine regulations be revised.

Fire hazard continues.--The drought which prevailed last month was temporarily alleviated by 1 or 2 days of rain, but before the end of the month extreme dryness again existed in the woodlands and burning operations were greatly restricted.

Bough-lot inspection reveals high mortality of gypsy moth larvae.--At Weston, Mass., where a heavy infestation of gypsy moth occurred last summer, with heavy feeding and complete defoliation, it is now

impossible to find enough egg masses for collecting. The same condition prevails at a heavy infestation in the Massachusetts State Reservation at Walden Pond Park in the towns of Lincoln and Concord. Absence of fresh egg clusters was also noted during the scouting of woodland in the border towns on or near the Massachusetts-Vermont State line, in connection with the inspection and certification of evergreen boughs. Here there was considerable kill of young gypsy moth larvae by the heavy frosts that occurred in this section during the last hatching season. Most of the infestations found in these bough lots showed a greater percentage of old egg clusters than new. Practically all of the old egg clusters found showed a very good hatch last spring. The unusual weather conditions of last spring are held responsible for keeping the infestation at last year's level, if not reducing it. The district inspector at Keene, N. H., reports that the inspector examining bough lots there has found old egg clusters which had hatched, but there were no new clusters in these same locations.

Taking no chances.--D. J. Frazier, district gypsy moth inspector at Bangor, Maine, reports that "with the trees bare of leaves, pulp-lot inspection has been improved; also the chances of being taken for a deer while performing this work during the hunting season have been lessened. While checking one lot, I encountered four different hunters on the same tract. They don't generally stay long, as I make it a rule to make plenty of noise while making an inspection of this nature." In commenting on further activities in his district, Inspector Frazier states: "The first snow of the season to cover the ground fell early on October 30 in the Harmony, Maine, area. Christmas-tree operators are at work harvesting the season's cut, and the outlook is that about as many trees will be cut as last season. I noted the first full carload of boughs being cut and loaded in the Greenfield area late in the month. Movement of this type of material in greater volume than in previous years is indicated."

Christmas-tree inspections under way.--Larger orders and scarcity of help resulted in an earlier start in the cutting of evergreen boughs and the collection of laurel for Christmas greenery. Most of the operators cannot get the help they need to fill orders on hand. These orders are also reported as running much larger than in 1940. A florist supply company in Springfield, Mass., reported receiving an order for 3,500 yards of laurel and spruce roping, one of the largest orders they have ever received. This must be ready to ship to Florida by the middle of November. Several truckloads of spruce boughs were examined and three laurel lots were surveyed for gypsy moth infestation in connection with the filling of this order. All material inspected was found free from infestation.

Increase in personnel in New England.--Fifteen temporary inspectors were employed on gypsy moth inspection work during October. Of these, 8 were in Connecticut, 1 in Rhode Island, and 1 in Maine, on nursery inspection work; 1 in Vermont on lumber inspection; and 4 in Vermont on evergreen-bough and Christmas-tree inspection. One inspector, paid by the State of Massachusetts, was employed in Boston for the inspection of products requiring

certification for the European corn borer. Egg clusters removed from shipments inspected and certified numbered 250. The bulk of the infestation was removed from 8 carloads of lumber, from which infestations ranging from 10 to 46 egg clusters were removed. In addition, 864 egg masses were found on materials inspected prior to their manufacture for later shipment to points outside the gypsy moth area.

Winter storage of nursery stock gets early start.---Shortage of labor in the nursery center at Manchester, Conn., has resulted in the establishments starting their digging of nursery stock for winter storage a week in advance of the usual date. Laborers who are working for one nursery this season reside in Hartford. A truck from the nursery picks up the men in the morning and returns them at night. Inspectors are on hand to examine this stock to assure that it is bare-rooted before it is placed in storage houses. It is then eligible for joint Japanese beetle and gypsy moth certification as soon as the nursery is ready to ship the stock in the spring.

Christmas-tree inspection.---Reports from various district gypsy moth inspectors indicate that the 1941 Christmas-tree-shipping season promises to exceed that of all previous years, judging by the calls from numerous shippers. Some shippers had their men in the woods cutting trees and greens by the middle of October. The greatest problem appeared to be the lack of help, as most of the young men previously employed in this type of work are now engaged on National Defense projects or have been called for Army service. The size of this year's cut will largely depend on the amount of local labor available.

Inspected lumber accompanies shipments of explosives. A Massachusetts manufacturer of munitions is shipping to various ports of embarkation from 4 to 20 carloads of explosives daily. Each of these cars requires about 500 board feet of lumber. This is used to keep the containers from shifting during transit. This lumber moves under gypsy moth certification.

FOREST INSECT INVESTIGATIONS

Eastern spruce bark beetle infestation decreases.---T. J. Parr, of the New Haven, Conn., laboratory, reports that a survey of spruce areas on the White Mountain National Forest in New Hampshire and the Green Mountain National Forest in Vermont indicated a decrease in incidence of attack by Dendroctonus piceaperda Hopk. This was particularly true on two areas in New Hampshire where control was practiced during the winter of 1940-41. On these areas over 400 infested trees were removed or cut and burned on about 600 acres of virgin timber. Examination of all spruce trees on a permanent sample strip 3 chains wide and 180 chains long in the Middlebury district of the Green Mountain National Forest in Vermont showed an infestation of 0.111 tree per acre in October 1941, as compared to 0.203 tree per acre in 1940--a decrease of 0.092 infested tree per acre.

Wet summer in eastern Oregon reflected by tree growth. --Abnormally heavy precipitation of the past growing season in eastern Oregon is reflected by outstandingly large tree-ring growth for 1941. This was observed by W. J. Buckhorn, Portland, Oreg., from an examination of a series of cross sections of ponderosa pine taken in connection with a study of Ips oregoni (Rich.) on the Ochoco National Forest. It is considered likely that this vigorous tree growth will cause increased host resistance and a consequent reduction of bark beetle damage. Each month during the period from May through September practically all weather stations in eastern Oregon reported rainfall above normal. In August, for example, the average rainfall for this entire area was nearly five times the normal. Usually late spring and summer are the dry season of the year. The extent to which this year was out of line is illustrated by records taken at Ochoco ranger station. From May through September, 11.16 inches of precipitation was recorded, which is 65 percent of the average annual precipitation of 17.30 inches for this station.

Mountain pine beetle still epidemic in northern Utah. --The fall survey of 1941 showed an appreciable decrease of infestation in most of the lodgepole pine stands on the Wasatch National Forest, but the infestation is still of epidemic proportions, according to R. L. Furniss, of the Portland, Oreg., laboratory. It is estimated that somewhat more than 40,000 infested trees are present on approximately 130,000 acres. Some 10 percent of the current pine beetle population is hold-over brood in trees that were attacked in 1940. The survey of the northern part of the forest, where all units were fully treated during the 1940-41 season, showed a 90-percent reduction in the number of infested trees. Less success was achieved on treated units in the Provo-Duchesne area, apparently because of infiltration of beetles from untreated units. Plans have been made by the Forest Service to treat a large part of the remaining infestation, but funds are not available for complete coverage. Control operations were initiated on September 22 and will run until closed down by winter weather, often severe on the control area, much of which is approximately 10,000 feet in elevation. The project will be resumed next spring as soon as practical.

Late treating effective against Black Hills beetle in southern Utah -- This year treating of ponderosa pine infested with the Black Hills beetle was seriously hampered on the Powell National Forest by a late spring. As a result, approximately 1,000 marked trees remained untreated at the end of June, when the woods had become too dry to continue felling and burning. An examination made on June 29 by R. L. Furniss showed that numerous new adults, some fully colored, were present in these trees. Sample strips of bark were removed from several trees and laid inner side up, on the ground. Almost immediately ants of the genus Formica began carrying away the exposed bark-beetle brood, and within a short time disposed of all except the fully hardened beetles. The abundance and effectiveness of these ants was such that it was decided to treat the remaining marked trees by the felling and peeling method. This was done and the project was extended until July 15. The fall survey of the area covered by this late treating revealed practically no reinfestation.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Forest conditions ideal for gypsy moth work.--Timely rains, which saturated the forest floor and eliminated the fire hazard, and the removal of much of the foliage from the trees by high winds provided ideal conditions for gypsy moth work during October. The rains were not of sufficient intensity to raise the water level and the scouting of swamps, which had been dried up by the prolonged dry period,

proceeded rapidly. Scouting in general was speeded up, as the lack of foliage permitted a more rapid examination of the tree growth, and large quantities of accumulated brush and other waste-wood could be burned on the days immediately following heavy rains. This was the first period since last March during which brush could be safely burned.

Defoliation by gypsy moth kills many trees in New Hampshire.--Early in October S. S. Crossman and C. E. Hood, of the Federal gypsy moth office, examined the tree growth in several areas north of Lake Winnepesaukee in and near Moultonboro, N. H., where severe gypsy moth defoliation occurred in the last year or more. The latest defoliation in these areas took place during the summers of 1940 and 1941, when many of the oaks were from 50-to 100-percent defoliated. Many of these oaks are already dead and others are dying. A trail was followed for approximately 1 3/4 miles to the top of a hill having an elevation of over 2,000 feet. The oaks along much of this trail have suffered severely, with 25-to 50-percent mortality in some spots and pockets where the mortality is complete. These trees have been dying for several years. Many old and new gypsy moth egg clusters are now scattered from the base to the top of this hill.

Former employee donates specimens of New England wood.--A former gypsy moth employee donated to the Bureau samples of the wood, twigs, and buds of a large number of trees native to northern New England. These specimens will aid in instructing new gypsy moth employees, who are to be engaged in selective thinning work, in the identification of forest-tree growth. This collection is not complete, but forms a good nucleus for future expansion. The value of the collection for instructional purposes would be greatly increased by the addition of samples of foliage, nuts, cones, and sections of tree trunks, properly prepared.

Gypsy moth workers return from harvesting apples in Vermont.--All W. P. A. workers who had been taken from gypsy moth work to assist in harvesting the apple crop in Vermont were instructed to return to their former employment early in October, after the completion of the harvest. A few additional men were also obtained in Bristol Township, Addison County. Recent increases in W. P. A. scouting crews operating in northern Vermont were offset somewhat by the resignation of approximately one-third of the personnel, most of whom were referred by the Vermont State Employment Service to private employment on road construction, which must be completed before the advent of cold weather.

Exterminative measures eliminate four gypsy moth infestations.--The examination of the locality where a single-egg-cluster gypsy moth infestation was found last year in Eden Township, and three similar sites in

Lowell Township, Orleans County, Vt., failed to disclose any evidence of living infestations. Burlap bands placed around trees in the vicinity of the four colonies also gave negative results. This confirms the belief that the infestations were isolated results of the wind spread of small caterpillars. One of the infestations in Lowell was located on relatively open pasture land, whereas the other two were found some distance apart in dense woodland. A small crew of agents detailed to checking work in Salisbury Township, Addison County, discovered a gypsy moth infestation in woodland bordering a heavily traveled highway. Intensive scouting will be necessary to determine definitely the extent and size of this infestation before proceeding with exterminative measures.

Progress of gypsy moth work in Massachusetts.--A gypsy moth infestation covering approximately 30 acres was found in Richmond Township, Berkshire County, Mass., where a large percentage of the egg clusters were deposited on deadwood, rocks, and small underbrush. The most intensive form of scouting has been necessary throughout this area in order to find and creosote the hidden egg clusters. The ratio of old egg clusters has been rather large in this and at other nearby infestations, indicating that the larval mortality was high this year, owing to unseasonable weather late in May and early in June, when freezing temperatures were reported on several dates. Treatment work, including thinning, has proceeded satisfactorily at another infestation covering approximately 100 acres in Richmond Township, where the tree growth is particularly favorable for gypsy moth development. Several small crews of laborers scattered throughout Massachusetts barrier-zone towns found to be infested late in the fiscal year 1941 continued to cut down worthless apple trees and destroy egg clusters hidden in the cavities. The trees will be burned as soon as ground conditions are suitable.

Spruce-bough areas examined in advance of choppers.--Large quantities of spruce boughs are being cut in southern Vermont and throughout the greater part of Berkshire County, Mass., although the operators are having difficulty in obtaining choppers. Enough areas where the spruce boughs will be cut have been examined by gypsy moth scouting crews and found free from infestation to permit the choppers to proceed without interruption. The volume of boughs cut will increase as colder weather approaches, and it will be necessary to shift the scouting crews about rapidly to keep ahead of the operators. No cutting is permitted at locations where gypsy moth egg clusters are found and creosoted.

Brush-disposal machines active during October.--The two brush-disposal machines operated continuously during October--one in Berkshire County, Mass., and the other in Litchfield County, Conn. They reduced large quantities of brush and other wastewood to sawdust and broadcast it thinly over the forest floor by means of the built-in blowers. These machines are especially valuable during long periods of dry weather, when the brush cannot be burned, and also at locations where burning is inadvisable because of local conditions. The machines are portable and are towed from spot to spot by tractors. The

caterpillar type tractor is best suited for work in the woods, as it is easily maneuvered and can be driven over soft ground, rough terrain, and steep pitches. The wheel-type tractor can be used in comparatively level areas, but cannot be operated satisfactorily over stumps and boulder-strewn surfaces.

Little progress in gypsy moth work in Connecticut.--Because of the lack of available men, very little progress was made on gypsy moth work in Connecticut during October. Of the few men obtainable, practically all were inexperienced in gypsy moth work and required training before being assigned to regular field work, and many were unfit for the work because of age or physical handicaps. Because of the lack of man power, only a small percentage of the work planned for Connecticut is being accomplished. A crew undergoing instruction in scouting methods under close supervision found several small infestations in Southbury Township, New Haven County. The creosoting of egg clusters and the removal of dead and worthless trees is progressing slowly at these infestations.

Labor turnover high in Pennsylvania.--The number of W. P. A. gypsy moth workers employed in Pennsylvania increased from about 470 to slightly less than 600 during October, but most of the men assigned to this work had had no previous experience and many soon resigned to enter private employment. The organization of crews has been delayed considerably by the lack of experienced men to act as crew foremen. The shifting of personnel is illustrated by the fact that requisitions have been placed for approximately 1,400 men since the beginning of the present fiscal year. Of this number about 770 reported and were assigned to work, and less than 600 are now on the gypsy moth pay roll. There is some prospect of increasing the number of N. Y. A. enrollees assigned to this project as additional men qualified to supervise crews become available.

Two gypsy moth infestations found in scouting river banks.--The scouting of tree growth and debris along the banks of the Susquehanna and Lackawanna Rivers was completed before the end of October. The work was done at a time when the streams were at their lowest levels for many years, and the men were able to walk from one bank to the other at several points without wetting their feet. An infestation consisting of eight gypsy moth egg clusters was found in Plains Township, and a single-egg-cluster infestation was located in Wilkes-Barre.

Progress of work at Pennsylvania gypsy moth infestations.--The gypsy moth extermination work in progress at an infestation in South Canaan, Wayne County, entailed the tearing down of numerous stone walls where egg clusters were found. The walls are rebuilt as fast as the egg clusters are creosoted. Scouting was started near the end of October in Salem and Paupack Townships, Wayne County, by crews transferred from their training grounds in Spring Brook Township. A little work was done by regular supervisory employees at assembling-cage sites where male gypsy moths were recovered last summer in Canaan and Cherry Ridge Townships. Although the results of these examinations have been negative to date, they are not entirely conclusive, as only the tree growth in the immediate vicinity of the cage sites has so far been examined.

PLANT DISEASE CONTROL

Berberis canadensis found in Pennsylvania.---While scouting an abandoned farm site at the foot of a mountain near Calvin, in Huntingdon County, Pa., the crew leader found some barberry bushes unlike any previously found in that State. Specimens were sent to L. M. Ames, at the Arnold Arboretum, for identification. They were identified as Berberis canadensis. This species of barberry is found over extensive areas in Virginia and West Virginia, and in isolated places in a few other States. A large patch of these bushes was found growing in very stony ground at the edge of a woods about 100 yards from an unoccupied log farmhouse. The bushes appear to have been there for many years and their habit of growth was identical with those found growing in Virginia and West Virginia. A careful check of past owners of the property was made to find out whether any of them had come from Southern States and might have carried the plants into the State. It was found that since the year 1700 only one former owner had not always been a resident of Huntingdon County and that one had come from the adjacent county of Bedford.

Extensive area of escaped bushes found in Polk County, Wis.---In September a survey of Farmington Township, Polk County, was started where the largest spread of bushes existed in the area. A total of 434 bushes and 3,055 seedlings were destroyed on about 30 acres of timberland on 1 property. Of this number, 131 were fruiting bushes. The apparent source of these escaped bushes was a neglected hedge of 8 large fruiting bushes on an adjoining property. Rust damage in this area during the past season was considerable. The crews have continued the survey and have now destroyed 542 bushes on 11 properties but, owing to the heavy timber and thick underbrush, the work has been extremely difficult.

Growing of white pine resulting from natural seed germination.---In the fall of 1939, under pure stands of white pine planted early in 1900, there was a carpet of current-year white-pine seedlings coming up through the dead pine needles at Sinnissippi Farm, Oregon, Ill. The roots of these seedlings were scarcely in contact with the soil. Each root consisted almost solely of a thin single taproot, with hardly any feeder roots. The seedlings were growing in practically 100-percent shade under the parent pines and their length of life under such conditions was almost entirely limited to less than a year, or until the food material in the seed and the moisture in the needle duff had been exhausted. H. N. Putnam, in charge of blister rust control in the North Central States, suggested to the owner, who is greatly interested in his extensive white-pine plantations, that he try the experiment of lifting, by means of a silage fork or some such tool, a portion of the pine-seedling carpet and planting it in the open in contact with sandy soil. Last summer Mr. Putnam saw the results of this experiment. There are two coldframes in the owner's garden that contain a dense growth of white pine 2 years old and about 1 foot high, produced in the manner described above. Apparently, a very high percentage of the small seedlings so transferred and transplanted survived. This rather easy method of producing white-pine planting stock could be performed by farmers having white-pine shelterbelts and by others who have white-pine plantations.

White pine areas needing control work in Grand Teton National Park.--A survey of white pine areas in Grand Teton National Park was carried out in August to obtain data on the amount of control work needed to protect selected stands from blister rust damage. The results of this survey have been submitted to the National Park Service for consideration in their control program. The control-work requirements cover 10 small units of pine that appear to have a high aesthetic value to the park. Six of these are considered major areas, as each is cut by trails which provide the only means of travel in the park. The other 4 are important as desirable slope timber cover visible from the Jackson Hole Highway, but because of their relative inaccessibility may not be considered for control. The 6 major units consist of 3,450 acres requiring 3,800 man-days of Ribes-eradication work for the initial coverage. The secondary areas total 2,350 acres requiring 2,700 man-days of work. The principal Ribes species are Ribes montigenum, R. lacustre, and R. viscosissimum, with some restricted areas containing R. inerme. Special control methods advised include the use of Diesel oil on intact R. montigenum and dry borax-salt mixture on the rock-bound roots of R. lacustre and R. viscosissimum.

Beavers obstruct blister rust control work.--L. E. Newman, State leader in New Hampshire, expresses his interest in the short item in the October 1, 1941, News Letter (v. VIII, No. 10, p. 11) on the effect upon gypsy moth scouting work of flooding an area by beavers. A similar experience was encountered in connection with blister rust control in New Hampshire last year and two areas were left unworked because of beaver activities. In one instance land totaling about 70 acres had been flooded; in the other the area amounted to about 10 acres. These beaver dams were destroyed by the local fish and game warden but a short time later it was noted that they had been rebuilt.

Blister rust infection found in North Carolina and Tennessee. R. G. Pierce, in charge of blister rust control work in the Southern Appalachian States, reports that blister rust on Ribes has been discovered for the first time in four counties in North Carolina, namely, Ashe, Avery, Watauga, and McDowell, and two counties in Tennessee, Carter and Johnson. In Avery County, N. C., infections were found on R. rotundifolium in three places and on R. cmosbati in four places, the elevations ranging from 3,250 to 5,000 feet. No infection could be found on white pines. Agent H. A. Whitman, Jr., is credited with finding the first infection in North Carolina on October 1. The first infection in Tennessee was found on October 10 in Johnson County by J. Curtis Ball and J. Wilburn Lane. In addition, the fall scouting work resulted in the finding of blister rust for the first time on Ribes in Mercer, Monroe, Raleigh, and Summers Counties, W. Va., and in Bland, Pulaski, Wythe, Grayson, and Smyth Counties, Va. In North Carolina all infections found to date are in nonpine areas or within the vicinity of scattered white pine classified as not worthy of protection. Bushes found, however, in the immediate vicinity of the Blue Ridge Parkway will be eradicated. In Tennessee the one infected area in Johnson County was very close to an eradication area, but

practically all the white pine was recently burned and no further work will be done on this area. In Virginia the Grayson County infection was well within the control zone of a good white pine area, and in Smyth County the infected bushes were approximately 0.4 mile from the nearest white pine area.

Three-man crew in Vermont.---The three-man eradication crew as used during the present season by District Leader F. H. Rose was in part the result of a shortage of labor caused by National Defense employment, and in part an effort to find a more economical unit for the eradication of Ribes under certain conditions which existed in the southern part of Windham County. The Ribes found there are fewer than the average number for the district. The most important factor in the three-man unit is the foreman, who must be experienced in handling eradication crews, intelligent, and interested in obtaining a high degree of efficiency at the lowest possible cost. In using this unit the foreman works in the middle of the line and slightly in the rear of the crew men, and in this position is able both to check the crew men and cover his own strip as well. The men were spaced from 15 to 16 feet apart, a total width of 30 to 36 feet, but the spacing naturally varies with the density of the undergrowth. There is less loss of time in this unit during the grubbing of Ribes; also, crew alinement is more easily maintained and less time is lost at the beginning and the end of the strips. The work as shown in the following table was conducted under the regular program, the pine owners paying all the costs, with the exception of the foreman's lost time on account of rain, which was paid by the State. The crew men received 40 cents an hour and the foreman 55 cents. Five areas were worked, as shown below, and the combined areas represent typical conditions found in the southern part of Windham County, where the Ribes are below the average for the district. In the following table the work done by the three-man unit as described above, is summarized. Both initial and reeradication work are included.

Area	Area eradicat- ed:	Ribes per acre	Cost per acre	Total cost
	Acres	Number	Dollars	Dollars
I-----	32	5.7	0.356	11.40
II-----	223	3.3	.726	165.80
III-----	910	1.2	.234	213.70
IV-----	108	5.0	.744	80.40
V-----	90	3.7	.537	48.40
Total---	1,368	--	--	499.10
Average--	--	3.9	0.362	--

The results obtained with the three-man eradication crew indicate that it has a place in eradication procedure in Vermont; however, it is impossible to draw conclusions as to the relative efficiency of the six- and three-man crew units unless similar areas are covered by both units. The results obtained by the three-man crew indicate

that it has a place in eradication procedure in Vermont; however, it is impossible to draw conclusions as to the relative efficiency of the six- and three-man crew units unless similar areas are covered by both units. The results obtained by the three-man crew indicate that under certain conditions, where the Ribes are 10 per acre or less, it will prove to be a more economical unit than the six-man crew.

COTTON INSECT INVESTIGATIONS

Effect of moisture on hibernating pink bollworms.---The results of the 1940 experiments by S. L. Calhoun on the effect that irrigations have on the development of hibernating pink bollworm larvae in the field at Presidio, Tex., were in line with his previous results. It has been found that, under tropical conditions, a reduction in the moisture content of the food tends to induce development of the diapause in the pink bollworm, and the theory has been advanced that continued irrigation until late in the season would be of practical value in reducing or eliminating the hibernating larvae in the Big Bend area of Texas. College Acala cotton, a slowly maturing western variety, was again used in tests designed to determine the effects of water-stressed, normal, and excessive irrigations on the production of hibernating larvae. Irrigation was discontinued in the plots in series I on August 7, in series II on August 27, and in series III on October 10. Because of climatic conditions favorable to the conservation of moisture, the cotton in series I was not water stressed to the point of wilting, as was planned, although it was reduced somewhat in growth and fruiting. However, there were in the plots where irrigations were continued later in the season, decided increases in the percentage of bolls infested, the number of larvae per boll, the number of bolls per plant, and the total larval populations, as well as delay in the time of boll opening. At the time of the last examination, on October 24, 68 percent of the bolls were infested and 22,688 larvae per acre were found in series I; 74-percent infestation and 59,663 larvae in series II; and 92-percent infestation and 258,992 larvae in series III. By October 17, 76 percent of the crop was harvested in series I, 65 percent in series II, and 52 percent in series III. The total yields from the 3 series were 1,975, 2,156, and 1,901 pounds of seed cotton per acre, respectively. Although the yields in all plots were reduced by the late infestation of bollworms and pink bollworms, and by boll rot and frost, the losses from all of these factors were greater in the cotton irrigated later in the season. The numbers of hibernating larvae remaining in the soil and surface trash after the field clean-up were 18,392, 29,040, and 50,336, respectively, in series I, II, and III. The results from 2 years' tests show that the later cotton is irrigated the greater the number of hibernating pink bollworm larvae produced, and there was no indication that an abundance of moisture will prevent the development of long-cycle larvae. Under conditions prevailing at Presidio the lowering of temperature as the season progresses seems to be the main factor, although not the only one, inducing diapause, and late-maturing cotton permits the build-up of a heavier carry-over of pink bollworms.

Recovery of boll weevil parasite.---R. C. Gaines and A. L. Scales report that a specimen of Triaspis vestitica Vier. was recovered from a field-collected infested square on October 9 at Tallulah, La. Determination was made by C. F. W. Muesebeck. This species is a parasite of the Peruvian square weevil which was forwarded from Peru by P. A. Berry and liberated in a heavily infested plot of cotton on September 12 and 16. No Triaspis parasites emerged from 464 squares collected from this plot on September 18 and only 1 specimen was taken from 216 squares collected on September 26. This is the first field recovery and probably the first record of this species from the boll weevil. Very little is known about the life history and habits of this parasite, and efforts are being made by T. R. Gardner to rear it on the bean weevil at the Hoboken, N. J., parasite laboratory.

Boll weevils abundant in cottonfields.---Reports from some sections indicate that fewer boll weevils were present in the cottonfields late this fall than in 1940, despite the fact that more damage was caused this season than at any time during the last 12 or 15 years, and that large numbers of weevils were caught on flight screens. Reports from Tallulah, La., and Florence, S. C., state that weevils were much more difficult to collect for the hibernation experiments than they were last year. Reports were received from Stoneville and other places in Mississippi that weevils were scarce in the fields during October; however, they were reported as abundant in fields where green cotton was present in the vicinity of Waco, Tex., as late as November 1. In southern Georgia and Florida weevils were probably more abundant in the fields than for several years. Several factors were responsible for this apparently anomalous situation. Cotton matured and opened early in South Carolina, Mississippi, and Louisiana, owing to the heavy weevil infestation, stripping by leaf worms, and high temperatures during September and October. These factors and the early fall destruction of cotton stalks reduced the weevil's food supply and curtailed breeding after the middle of September. The stalks in one of the fields where a flight screen is located at Tallulah were cut on October 16 and almost half of the total weevils caught on three screens during the entire month were taken on the next examination of this screen. The high temperatures and shortage of food during September and October undoubtedly stimulated weevil movement between fields in search of better feeding conditions and also probably caused a heavy mortality of weevils. On the other hand, weevils may have found protection in cool, damp places and survived. It is hoped that later examinations of woods trash and Spanish moss will yield more data on the numbers of weevils in hibernation this fall.

Species of leaf aphids on cotton.---There has been considerable confusion in making determinations in the field of the leaf aphids found on cotton because of the variations in Aphis gossypii. The first aphids appearing on cotton in the spring are large, dark-colored, winged forms. The first generation that develops on cotton consists mostly of large wingless forms, ranging in color from pale to dark yellow, or from pale-to-bluish green to almost black. Around the first week in July the large forms and the green forms disappear and are replaced by very small yellow

forms. Development of the small yellow forms continues through generation after generation until the first cool nights of fall, when the large yellow and greenish forms again appear. A large series of aphids consisting of these various forms, collected by E. W. Dunnam and S. L. Calhoun on cotton in the vicinity of Stoneville, Miss., were determined by P. W. Mason as A. gossypii Glov. However, there were also some specimens of the potato aphid (Macrosiphum solanifolii (Ashm.)) among the large light- and dark-colored aphids, and of the green peach aphid (Myzus persicae (Sulz.)) among the large light-colored aphids.

Flight of cotton leaf worm adults in Greenfield, Mass.---During the evening of October 7 a flight of adults of Alabama argillacea (Hbn.) was observed in Greenfield, when thousands of the insects swarmed around street lights and lighted store windows. So far as is known, this was the heaviest flight of the cotton worm seen in this locality for several years.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.---In southern Texas inspection of gin trash to determine the status of the pink bollworm was continued in Cameron and Nueces Counties during the first week in October. Results for the season in Nueces County were negative. Three additional pink bollworms were found in Cameron County, where infestation has consistently been heaviest since the insect was found in that area, bringing the total specimens for the season to 28 through the examination of 1,614 bushels of trash. Last season 5,130 specimens were taken from 1,216 bushels of trash. In Hidalgo County only 3 pink bollworms were found during the season's inspection of 2,284 bushels of trash, as compared with 829 larvae from 3,043 bushels in 1940. Inspection in Tom Green and Concho Counties, in the Panhandle regulated area, was brought to a close in November, with negative results. A light infestation was found in these 2 counties in 1939, and 1 specimen of the pink bollworm was found in Tom Green County in 1940, but results in Concho County were negative for that year. A considerable quantity of trash was examined from other counties in the southern part of the Panhandle regulated area and adjacent counties outside; also, from nonregulated areas in the central and eastern parts of the State, with negative results. Inspection was brought to a close in the El Paso Valley at the end of October, samples having been run from Hudspeth and El Paso Counties, Tex., and from Dona Ana County, N. Mex. This inspection yielded 143 pink bollworms from Dona Ana County, 1,596 from Hudspeth, and 4,243 from El Paso. Inspection was also completed in the Pecos Valley of Texas at the end of the month, with only 3 pink bollworms taken this year, as compared with 88 from approximately the same quantity of trash in 1940. In Maricopa County, in the Salt River Valley of Arizona, additional pink bollworms were found in the vicinity of Glendale, bringing the total found in that rather small spot to 437. Last season only 135 pink bollworms were taken from a larger quantity of trash. Inspection carried on during the month in other parts of the Salt River Valley gave negative results. The annual inspection in the Safford Valley of Arizona resulted in 23 pink

bollworms being taken from 708 bushels of trash, 8 of these coming from Greenlee County and 15 from Graham. Last year 24 pink bollworms were taken from 520 bushels of trash. Inspection in the Juarez Valley of Mexico, adjacent to the El Paso Valley, showed a considerable number of worms from Vado de Cedillos and El Cuervo. Inspection of trash from 1 bale of cotton ginned at Vado de Cedillos yielded 1,044 pink bollworms. Last season a bale grown on the same land and ginned on the same date yielded 10,000 larvae. Inspection was begun in the Fuerte River Valley of Sinaloa, Mexico, about October 15, with samples of trash from cotton grown locally and at Verdura and Culiacan, Sinaloa, and from Navajoa, Cajeme, and Santa Ana, Sonora. At the end of the month no pink bollworms had been found. The season's inspection in Alabama and Georgia, and in the Delta sections of Mississippi, Tennessee, and Arkansas was brought to a close in October, with negative results in all States.

Stalk destruction.--The principal measure for the control of the pink bollworm in south Texas is the destruction of all living cotton plants following the harvesting of the cotton crop. October 1 was the date fixed by the State for completion of this work in the lower Rio Grande Valley counties of Cameron, Hidalgo, Starr, and Willacy, and October 15 for the remaining southern Texas counties. Adverse weather and a serious shortage of labor made it necessary to grant individual extensions to several hundred farmers in the lower Rio Grande Valley counties in order that they might complete the harvesting of their crops, and a general extension until October 31 was granted by proclamation for all other southern Texas counties. Rainfall was more or less continuous over much of the area during October, which prevented completion of stalk destruction. Good progress was made, however, despite these adverse conditions, many farmers going into fields that were not dry enough to work effectively in an effort to get the stalks out. Of the 233,100 acres of cotton planted in 1941 in the lower Rio Grande Valley counties, only 8,890 acres of stalks remained standing at the close of October, and stalks on approximately 66,350 of the 206,700 acres of 1941 cotton in other southern Texas counties were yet standing. In the cotton-growing areas of adjacent Mexico, flood waters from the Rio Grande hampered the stalk-destruction work in the Matamoros area, reaching as far west as the town of Rio Rico, which was completely inundated. Approximately 35,000 acres of lowlands were flooded. Also, rainfall interfered considerably with field clean-up in higher areas; nevertheless some progress was made, especially in sections where adverse conditions did not prevail.

Wild-cotton eradication.--As in past seasons, this Division, in cooperation with the Florida State Plant Board, was successful in making arrangements with Works Progress Administration officials for the assignment of a number of W. P. A. workers to assist in wild-cotton eradication. This work is discontinued during the summer months on account of unfavorable working conditions. The first workers for the current season were assigned on October 9 and at the close of the month 65 men had been assigned to this project. During the month 1,226 acres was covered and 45,886 seedling plants were destroyed, but only 8 mature plants were found. Limited numbers of squares, blooms, and bolls were taken from wild cotton plants and inspected, but no pink bollworms were found.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Methyl bromide effective against narcissus bulb fly -- Methyl bromide appears to be one of the most effective treatments of narcissus bulbs for the control of Merodon equestris (F.), as reported by F. S. Blanton, of the Babylon, N. Y., laboratory. In tests conducted during the storage season of 1940, it was found that 2½ and 3 pounds of methyl bromide per 1,000 cubic feet, at a duration of 4 hours, gave a complete kill of the larvae infesting narcissus bulbs. Uninfested bulbs of the variety King Alfred were treated on 3 different occasions and these, with the untreated checks, were divided into 15 samples of 20 bulbs each and planted in a completely randomized plot. There was no significant difference in either the quality or quantity of flowers produced in these plots. A total of 83.7 percent of the untreated bulbs flowered, as did 90.7 percent of those treated with a 2½-pound dosage and 89.3 percent of those treated with a 3-pound dosage. There was no difference in the yields of the resultant bulbs, expressed in terms of weight. The total increase in weight of bulbs for the untreated check was 96.6 percent, for the 2½-pound dosage it was 92.9 percent, and for the 3-pound dosage 93.3 percent. Judging from the results obtained in these studies, apparently this fumigant will be very satisfactory for use in combating this pest. The cost of the material will be negligible and, with proper fumigation equipment, it will constitute a rapid method of treating bulbs.

Newly developed organic compounds prove effective against hornworms on tobacco.-- C. F. Stahl and his associates at the Oxford, N. C., laboratory, report that in the course of tests the newly developed organic insecticides 2-fluorylamine and diazoamino benzene proved to be more toxic to the larvae of Protoparce sexta (Johan.) than did other insecticides of this group, including phthalonitrile, 1,4 diphenyl semicarbazide, or p-aminobenzene hydrochloride, all of which showed some degree of toxicity. The detailed results are shown in the following tabulation, a difference of 14 percent being of mathematical significance.

<u>Treatment or material tested</u>	<u>Percentage of mortality</u>
2-fluorylamine-----	70
Diazoamino benzene-----	58
Phthalonitrile-----	43
1,4 diphenyl semicarbazide-----	41
p-aminobenzene hydrochloride-----	41
Check (no insecticide)-----	2

Cryolite samples having pH values of 3.7 and 8.1 were tested about the same time but not simultaneously with the organic materials. The resulting percentages of mortality were 92 and 89 for the two samples, respectively, indicating that none of the organic materials included in these tests were as effective as cryolite. These organic materials were diluted with equal parts, by weight, of a commercially prepared, finely ground diatomaceous earth and were dusted onto potted sucker plants of tobacco within a settling dust chamber. Cryolite was diluted, with the same material as the organic insecticides, to contain 50 percent of sodium

aluminum fluoride. In conducting these tests a dosage of 150 milligrams of dust mixture was blown into a special type of settling dust chamber and allowed to settle for 2 minutes. After the application of the dust mixture, 10 second-instar larvae were placed on each sucker plant and observed for a period of 4 days. Three sucker plants and 30 larvae were used for each of 8 time replicates, making a total of 240 larvae per treatment. All of the organic materials used in these tests, with the exception of phthalonitrile, were very repellent to hornworm larvae, as evidenced by their lack of feeding and their tendency to leave the treated foliage. The 2-fluorylamine was probably the most repellent material tested.

Newly described mite damages tomatoes.--E. W. Davis, of the Modesto, Calif., laboratory, reports that a mite, Phyllocoptes destructor Keifer, described in 1940 by H. H. Keifer, of the California State Department of Agriculture, as a new species and known locally as the "silver mite" or "tomato russet mite," has spread over the tomato-producing districts of the San Joaquin Valley and caused severe damage. In some fields the losses are estimated at 50 percent of the crop. The presence of this mite on tomatoes often passes unnoticed because of the superficial resemblance of early mite injury to that caused by nematodes. The injury by this mite first begins to appear in June but does not become serious enough to be noted until late in July or in August. Starting on the stem near the ground the mite infestation works up the plant causing the leaves to dry up; thus, during hot weather defoliation of the plant is very rapid and the fruit is exposed to sunburn. Preliminary tests in the greenhouse by Mr. Davis revealed a pronounced difference in various varieties of tomatoes in their degree of susceptibility to mite damage. Plants of Bonny Best, Pritchard, and Essar seem to be less susceptible to the mite than any of the other varieties, while Ponderosa and Santa Clara represent the most susceptible varieties. In general, pear-shaped tomatoes appear to be much more resistant to the mite than any of the stone or other round varieties. R. E. Campbell, of the Alhambra, Calif., laboratory, also reports destructive numbers of this mite on tomatoes.

Effectiveness of derris-pyrethrum-sulfonated castor oil or derris white oil emulsion sprays against red spider. In a series of tests conducted recently by C. A. Weigel, G. V. Johnson, and J. D. DeCoursey, of the Beltsville, Md., laboratory, the effectiveness of the standard spray containing derris (0.005 percent rotenone), pyrethrum (0.01 percent pyrethrins), and sulfonated castor oil (diluted 1 to 300 parts by volume), which has given consistently good control of red spider (Tetranychus bimaculatus Harv.) on greenhouse-grown cucumber, tomato, and other crops, was compared with one containing derris (0.005 percent rotenone) and a white oil emulsion (0.5 percent), and another spray containing only white oil emulsion (1.0 percent). The sprays were applied on a weekly and biweekly schedule on cucumber and tomato plants grown under conditions simulating commercial practice. On cucumbers the results, based upon 3 separate mortality counts taken shortly after each weekly spray application and on 1 population count of living red spiders remaining on the plants after 3 weekly and 3 biweekly

applications, indicated that a weekly application of either of the first 2 sprays gave a very high kill of red spiders and was equally efficient. Biweekly applications of the derris-oil emulsion, however, proved less effective. The spray containing oil emulsion alone, applied either on a weekly or biweekly basis, gave unsatisfactory control. Tolerance studies based on 12 weekly and 6 biweekly applications showed that the foliage of derris-oil emulsion-treated cucumber plants had a more uniform color than those receiving other treatments, and that the leaves showed less pitting from the spray. The plants receiving weekly applications of a derris-oil spray appeared to produce more Grade No. 1 cucumbers and more poundage than those receiving any other treatment. The untreated plants yielded the lowest number and weight of cucumbers. With respect to the tests on tomato, essentially the same as those on cucumber except that applications were made with hand sprayers, the final mortality counts indicated that all of the treatments (except the oil emulsion spray alone, which when applied biweekly produced only 71.3 percent kill) were equal in effectiveness and gave a kill of red spiders ranging from 95.5 to 99.5 percent. The checks showed a natural mortality of 38 percent. The final population counts of living spiders showed no difference between treatments, the spray applications having markedly reduced the population on all plants. All treatments caused staining and pitting of the fruit. On the basis of earlier observations, the staining on fruits can be readily washed off by syringing with water within 48 hours after application. The fruit and foliage of the plants receiving the oil emulsion spray alone had extensive red spider feeding injury due to lack of control. The fruit on the untreated plants was not oil-stained, but both the fruit and foliage showed considerable feeding injury.

INSECTS AFFECTING MAN AND ANIMALS

Cooperative salt-marsh survey in extra-cantonment areas in the Southeast.--G. H. Bradley, of the New Smyrna Beach, Fla., laboratory, has been selected to supervise a group of specialists employed by the United States Public Health Service to make salt-marsh surveys in extra-cantonment areas in the Southeastern States. Mr. Bradley's assistants will include S. E. Shields, of the St. Lucie, Fla., sand fly laboratory, Travis E. McWeel, of the Division of Domestic Plant Quarantines, located at Gulfport, Miss., and Henry S. Chubb, of the New Smyrna Beach Laboratory, all of whom are being transferred temporarily to the Public Health Service. It is expected that three additional technicians will be appointed at an early date.

Resistance of mosquito larvae to pyrethrum larvicides.--According to tests recently made by R. C. Bushland and W. V. King, of the Orlando, Fla., laboratory, larvae of Aedes taeniorhynchus (Wied) are much more resistant to pyrethrum larvicides than are those of Culex pilosus (Dyar and Knab).

Dog fly control terminated in northwestern Florida.--W. E. Dove, of the Panama City, Fla., laboratory, reports that actual spraying for dog fly control ceased on October 20. A total of 208,350 gallons of

material was used on 286 miles of grass deposits along a meandering shore line of 701 miles. About 40 percent of the shore line, Mr. Dove reports, contained deposits of grass sufficiently heavy for spraying, and averaging about 35 inches in width and 7.7 inches in depth. The average rate of application was 728 gallons of material per mile of grass treated.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.—A living adult of the tingitid Acalypta mera Drake was intercepted at Seattle on July 29 on Sempervivum sp. leaf in baggage from Canada. Four living adults of the bruchid Acanthoscelides ceratioborus (Philippi) were intercepted at Chicago on July 31 in the seeds of Prosopis chilensis in mail from Peru. Living adults, larvae, and pupae of the bruchid A. flexicaulis (Schaeff.) were taken at Brownsville on September 14 in ebony beans in baggage from Mexico. Twenty-one living larvae and 3 living pupae of the euribiid Anastrepha fraterculus (Wied.) were taken at Boston on September 22 from 7 grapefruits in stores from Argentina. One living larva of A. mombinpraeoptans Sein was found at Mobile on July 25 in mango in quarters from Puerto Rico. A living adult of the bruchid Carvedon fuscus (F.) was found at San Francisco on September 17 on paper wrapping of bean pods in baggage from Hawaii. Living and dead larvae of the Mediterranean fruitfly (Ceratitis capitata (Wied.)) were intercepted at San Francisco on September 17 in Coffea arabica in baggage and on August 30 in avocado in baggage from Hawaii. Living larvae of the curculionid Ceutorhynchus quadridens Panz. were found at Baltimore on August 5 in the stems of cabbage leaves in stores from England. Specimens of the coccid Chionaspis diosmae Brain were taken at New York on March 23, 1940, on Barosma betulina and B. crenulata in cargo from the Union of South Africa. A living adult of the lygaeid Clerada apicicornis Sign. was taken at Hoboken on August 16 with Cattleya sp. in cargo from Colombia. Living larvae of the curculionid Heilipus trifasciatus F. were found at Galveston on August 13 in an avocado seed in stores from Costa Rica. A living larva of the phycitid Hypsipyra grandella (Zell.) was found at New York on August 8 in mahogany log in cargo from Guatemala. Living larvae and adults of the scolytid Leperisinus fraxini Panz. were intercepted at New York on July 30 and August 6 and at Philadelphia on August 4 in ash wood crating from England. Living larvae of the curculionid Palaeopus costicollis (Marsh.) were taken at Mobile on September 30 in sweetpotato in stores from Trinidad and at New York on September 20 in yam in baggage from Honduras. A living adult of the lygaeid Peritrechus fraternus Uhl was intercepted at Calexico on July 15 on Brassica alba in baggage from Mexico. Living adults of the bruchid Phelonus aberrans Sharp were intercepted at Hoboken on March 28 in Cassia moschata seed in mail from the Canal Zone. Four living adults of the bruchid Speculibruchus erythrinae Bridwell were taken at New York on July 14 in seeds of Erythrina caffra in mail from the Union of South Africa. Specimens of the coffee berry borer (Stephanoderes hampei Ferr.) were intercepted at St. Paul, Minn., on September 13 in coffee beans in mail from Canada. Three living larvae of the olethreutid Talponia batesi Hein. were intercepted at Laredo on September 24 in cherimoya in baggage from Mexico.

Pathological interceptions of interest.--A sample of nematode-infested narcissus bulbs from Ontario, Canada, collected at Hoboken on October 2, was examined by G. Steiner, who reports finding Acrobeloides sp. new (?), Acrobeloides sp. new, and Aphelenchoides sp. new. A Mexican pine cone taken from baggage at El Paso on August 29 was referred by the Bureau of Plant Industry to H. S. Jackson, who reports: "Immature, but certainly Aleurodiscus, related to A. roseus group and a very pretty thing." It is hoped he will determine the species as he goes on with a monograph he is preparing. Ascochyta imperfecta Pk. was found on alfalfa leaves and stems from New Zealand which were being used for animal food on the deck of a ship inspected on October 27 at New York. Coleosporium dahliae Arth. was intercepted on dahlias from Mexico on September 18 at Hidalgo and on October 1 at Brownsville. Apparently this rust does not occur in the United States. Colletotrichum orchidearum Allesch. was intercepted on July 29 on Cypripedium philippinense from Thailand at San Francisco, on August 16 on Epidendrum vitalenium from Mexico at Laredo, on June 5 on Masdevallia sp. from Costa Rica at Seattle, and on August 1 on Vanda coerulea from Burma at San Francisco. A cotton stalk from Mexico in a car trunk inspected at Brownsville on October 18 was infected with what appeared to be Diplodia gossypina Cke. D. henriquensiana Trav. & Spessa was intercepted at Hoboken on September 23 on a Cattleya pseudobulb in mail from the Canal Zone. D. paraphysaria Sacc. was intercepted on July 14 at San Francisco on Vanda coerulea from Thailand and on August 11 at San Juan on orchids from Venezuela. Gloeosporium aleuriticum Sacc. was intercepted on September 10 at San Francisco on Aleurites moluccana nut husk from Hawaii. G. cattleyae Sacc. & D. Sacc. was intercepted on August 4 at San Francisco on Cattleya mendelii. Lophodermium juniperinum (Fr.) de Not. was found on October 17 at New York on one juniper berry in a large shipment from Hungary. Mycosphaerella sp. (no species reported on host) was intercepted on August 18 at Hoboken on a Sobralia leaf from Guatemala. Phyllosticta stanhopea Allesch. was intercepted on September 24 at Hoboken on Stanhopea sp. from Peru. Physalospora cattleyae Maubl. & Lasn. was intercepted on September 10 at San Francisco on Cattleya seedlings from England, and on July 15 at Brownsville on Batemanina sp. from Colombia. Sclerotinia bulborum (Wakk.) Rehm was found on October 7 at New York on one bulb in a crate of hyacinth bulbs from England. Sclerotinia rolfsii Sacc. was found on July 26 at Hoboken on a wild Cattleya from Brazil. Sporonema camelliae Earle was intercepted on April 24 at Hoboken on camellias from England. Vermicularia geayana Del. was intercepted on July 14 at San Francisco on Cattleya dowiana from Costa Rica. Verticilliodochium tubercularioides (Speg.) Bubak was found on August 11 at Seattle on an orchid pseudobulb from Costa Rica.

DOMESTIC PLANT QUARANTINES

Peach nurseries certified for shipping.--A summing up of the Federal-State inspection work in the environs of the nurseries throughout the States infected with the phony peach or the peach mosaic disease shows that of the 394 peach nurseries inspected in the phony-infected area, 4 nurseries failed to meet certification requirements of the State quarantines. Of the 161 nurseries inspected in the mosaic area, only 9 growing less than 1,100 trees are ineligible for certification. These figures do

not include, however, inspected nurseries in the infected area of California, as that State prohibits the shipping of host nursery stock from the infected area. In the various infected States, all diseased trees within a radius of 1 mile of the certified nurseries or of the certified sources of budwood were removed, as provided by the quarantines. The results of inspections in the fall, prior to defoliation, necessitated no change in the status of nurseries in the mosaic area as determined by the inspections earlier in the season. The completion of inspection for the phony peach disease in Georgia, on October 15, terminated the season's inspection activities throughout the infected States. The work is now confined to the removal of trees found diseased during the inspection season and of abandoned and escaped peach trees. The States' activity on the projects was represented by the services during October of 5 field supervisory employees and 1 office worker.

Peach mosaic survey in Mexico.---Owing to the fact that peach mosaic has been known to occur for the last 6 years in the El Paso Valley district, a comparatively narrow strip of tillable land along the American side of the Rio Grande, it was thought advisable to make a survey of similar area across the river in Mexico. Through the cooperation of the Mexican Department of Agriculture, the growers, and others, a survey was made from August 1-18 of the Juarez Valley, of the vicinities of the cities of Chihuahua and Camargo, and of 7 small villages in the State of Chihuahua. Peach mosaic was found to occur in all of the areas visited. In the Juarez Valley, mosaic trees were found on nearly three-fourths of the properties inspected. It is believed that the disease may have been present there for several years. The trees in these various localities were largely of the home-orchard type. Both seedlings and budded trees were found at many of the points visited. The sampling method was used. A total of 117 properties was inspected, and of these the mosaic disease was found on 85. The survey was conducted by R. L. McClain, assistant pathologist, and Armando Cedillos, junior quarantine aide, both of this Bureau, with the assistance of Ing. Manuel Alcazar, delegado fitosanitaria, of the Mexican Department of Agriculture.

White-fringed beetle control work.---A 6-week period of inspection at various points in western Florida by two State inspectors, brought to a close on October 6, resulted in no new infestations of the white-fringed beetle being found. Regulatory activities throughout the infested areas of the various States were increased considerably in October with the harvesting of farm products, the fall movement of nursery stock, and the inspection of equipment of several circuses operating in the infested area. A few beetles continued to be taken in the emergence cages in the New Orleans area until about the middle of October. Larval diggings during the latter part of October failed to reveal the presence of pupae or unemerged adults. In the Gulfport, Miss., area a few scattering adults were taken in the emergence cages, one as late as October 23. Soil diggings near the close of the month continued to show a small number of pupae. No emergence was reported from other areas and live adults were very scarce; however, in the newly infested area at Bolton, Miss., live adult beetles could still be found near the end of the month.

Mole cricket control goes forward.---During October, over 835,000 pounds of bait was mixed and distributed to growers in 11 counties in

Florida for the control of mole crickets, making a total of nearly 1,500,000 pounds furnished to growers since the beginning of this season's program on September 9. This bait has been furnished principally for the protection of young plants in seedbeds or those newly transplanted to the fields when mole cricket activity is most damaging. This work is conducted in cooperation with the State, the Florida State Plant Board under the direction of the State Mole Cricket Control Committee making distribution of the bait to growers. Counties furnish transportation for the bait from the mixing stations. The station located at Wauchula was discontinued during the month, after which all bait was supplied from Plant City. The State is also furnishing technical assistance on research work to learn more of the characteristics of the several species of crickets and to determine improved methods of combating them.

Chinch bug survey.--At the request of the State leaders of Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, and Oklahoma for assistance in making a survey to determine the numbers of chinch bugs in hibernation, arrangements have been completed for the assignment of scouts to conduct this work. The figures obtained by such surveys are used as an index of probable chinch bug abundance the following spring. The above-named States are those in which chinch bug populations reached damaging proportions during the last 2 years and to which the Bureau furnished creosote for their control.

Work on citrus canker stepped up.--Inspection for citrus canker went forward in 7 Texas counties in October, including the Navasota area where particular emphasis was placed on the reinspection and removal of old citrus hedges and the reworking of the 6 properties where citrus canker was found earlier in the year. Fifteen Federal field men worked on the project in October, in addition to 103 W. P. A. laborers. No citrus canker was found during the month.

Truck lines surveyed for quarantine enforcement.--The magnitude of transportation problems in relation to transit inspection is illustrated by the results of a recent survey of interstate trucking at Chicago, which showed that 119 long-distance carriers operate from Chicago to 21,000 other cities and towns, and that there are also 413 long-distance carriers which are not members of the Chicago Association of Commerce. At Omaha a survey of commercial truck lines has been completed and arrangements have been made for inspection of quarantined materials moving by this means of transportation.

Transit inspection in October.--Transit inspection was resumed in October at Birmingham and Detroit. A collaborator assigned by the Michigan Department of Agriculture is conducting the work at the latter city. The State of Georgia has assigned an inspector to assist part time at Atlanta. The Northeastern States region reports a decline in nursery-stock shipments, because of exceedingly dry weather. The Central States region reports a like decline, because of excessive rain.

Misuse of certificates detected.--The flagrant misuse of Japanese beetle certificates was recently discovered on three shipments found by

a New York transit inspector. By careful checking of the shipments it was found that two were used for unauthorized materials and a third had apparently been borrowed from another shipper and altered. There was also intercepted at New York and returned another shipment of plants in violation of the Japanese beetle quarantine bearing a rubber stamp with a notation to the effect that it was "OK on Quarantine No. 48." These violations were reported to the project leader on Japanese beetle control.

CONTROL INVESTIGATIONS

Stabilization of a naphthalene aerosol.--W. N. Sullivan and J. H. Fales, in cooperation with L. D. Goodhue, of the Division of Insecticide Investigations, have completed a study on the stabilization of a naphthalene aerosol with the use of smoke. The results of this work are published in the Journal of Economic Entomology (v. 34, No. 5: 650-653, October 1941).

INSECTICIDE INVESTIGATIONS

Apparatus for measuring coarseness of powders.--On November 4 the United States Patent Office granted E. L. Gooden, of this Division, Patent No. 2,261,802. This is assigned to the Secretary of Agriculture and to his successors in office. This patent fully describes an air-permeation apparatus for determining the average fineness of powdered insecticides and other powdered materials. The permeability of a bed of powder to a fluid is known to be a function of (1) the porosity of the bed, as expressed, for example, in percentage of voids; and (2) the specific surface of the powder from which the bed is formed. To determine the surface mean diameter, or average particle diameter, of a powder, it is possible to measure separately, by suitable means, the porosity and the permeability of the sample, and from the relationships mentioned above and through the use of technically known constants, to calculate the average particle diameter of the powder.

New synthetics patented as insecticides.--On November 4, 1941, the United States Patent Office granted S. I. Gertler and H. L. J. Haller, of this Division, Patent No. 2,261,735, which is assigned to the Secretary of Agriculture and to his successors in office. This patent covers the use as insecticides of certain semicarbazones, especially those of crotonaldehyde, 2-furaldehyde, and salicylaldehyde. Crotonaldehyde semicarbazone tested against newly hatched screwworm larvae by the "jar test" method was toxic at a concentration of 0.05 percent; 2-furaldehyde semicarbazone tested against newly hatched screwworm larvae by the above method also was toxic at a concentration of 0.05 percent. This compound when used as a dust was also more toxic than derris, after a 48-hour period, to the melon worm, the imported cabbage worm, and to Hawaiian beet webworm larvae. Salicylaldehyde semicarbazone dusted on Swiss chard leaves when fed to the Hawaiian beet webworm of the fifth instar showed a higher mortality after 48 hours than did derris.

Determining alkaloid content of uncured tobacco.--The United States Patent Office on October 28 granted L. N. Markwood, of this Division,

Patent No. 2,260,677. This is assigned to the Secretary of Agriculture and to his successors in office. The process described in this patent comprises digesting the tobacco with sulfuric acid, recovering the resulting extracts, reacting lead oxide with said extract in an amount sufficient to precipitate the proteins from the extract and to neutralize the mother liquor, and separating and recovering the mother liquor from the precipitate.

Soft glass affects melting point of rotenone.--H. A. Jones has shown that when the melting point of pure rotenone is determined in soft-glass tubing the melting point is depressed several degrees. This finding is of practical value because some chemists determine the melting point of rotenone as a measure of its purity. It is important that the melting point of rotenone be determined in a hard-glass capillary tubing, such as pyrex glass. An account of this work is published in *Industrial and Engineering Chemistry* (Analyt. ed., v. 13, No. 11, p. 819, Nov. 15, 1941).

Use of fatty acids in insecticidal aerosols.--W. N. Sullivan and J. H. Fales, of the Division of Control Investigations, and L. D. Goodhue, of this Division, published (*Science*, n. s., v. 94, No. 2445, pp. 444-445, Nov. 7, 1941) an account of tests against houseflies with orthodichlorobenzene alone and mixed with oleic and lauric acid when dispersed in aerosol form. In tests against the roach and the bedbug, a 100-percent mortality was obtained by using $1\frac{1}{2}$ pounds of orthodichlorobenzene containing 5 percent of lauric acid per 1,000 cubic feet. The apparatus used in this work consisted of a small nasal-type atomizer mounted 4 inches above the center of an electric hot plate held at 375° C. A small electric compressor was used to maintain the air pressure that operated the atomizer. The lauric or oleic acid alone killed only 1 percent of the houseflies after 2 days, and orthodichlorobenzene alone killed only 2 percent in the same time, whereas the mixture of acid and orthodichlorobenzene killed from 55 to 60 percent.

Average particle diameters of commercial insecticidal sulfurs.--E. L. Gooden, of the Division of Insecticide Investigations, published (*Indus. and Engin. Chem.* v. 33, No. 11, pp. 1452-1453, Nov. 1941) the results of a survey of commercial insecticidal powdered sulfurs with regard to average diameters (surface mean diameters). In the 54 samples tested the average diameters ranged from 5 to 25 microns. These determinations were made by means of the self-calculating air-permeation apparatus described in United States Patent No. 2,261,802.

BEE CULTURE

New variety of Italian bee.--W. J. Nolan, Beltsville, Md., reports progress in isolating, through selective breeding, a pure strain of the Italian bee with color markings distinct from those of strains of this race now in use in this country. The new strain is further characterized by the fact that the chitinous color patterns of queen, drone, and worker

bear a closer resemblance to each other than do patterns in other Italian strains. On the thorax the black in the chitin of common strains is replaced by cordovan, on the abdomen by cinnamon, and on head and legs by yellow or deep tan. The scutellum is yellow. Abdomens of workers appear banded cinnamon and yellow instead of black and yellow since all typical Italian yellow coloration appears to have been retained. In the drone the cinnamon coloration is confined to the last two abdominal segments, the others being yellow except for a narrow cinnamon band. This is apparently the only variety, of the European honeybee at least, in which the abdominal tip of all three castes--worker, drone, and queen--bears no black. While the abdomen of the three castes is densely covered with whitish hairs, these hairs are so dense on the third, fourth, and fifth abdominal segments of the worker as to form a prominent white band on each. In the drone long white hairs form a conspicuous band on each of the last two abdominal segments. The head of each individual bears an abundance of yellow hairs. The stock is being isolated from the progeny of an imported Italian queen of unknown parentage or mating. She bears a cordovan thorax but produces only 16 percent of worker offspring with cinnamon coloration on their abdomens, whereas matings have been obtained at Beltsville this summer that have resulted in all progeny showing this character. Her drones bear the type coloration, however. Yellow face coloration was found at the laboratory in other stock several years earlier, and some drones with cinnamon abdomens were also observed previously; the cordovan-thorax character has apparently not been reported before.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Bathyplectes tristis (Grav.) recovered for third time. - On October 28, 1941, at Seven Fountains, Shenandoah County, Va., J. F. G. Clarke captured a female specimen of Bathyplectes tristis, an ichneumonid parasite of the clover leaf weevil (Hypera punctata (F.)). In 1912, 580 cocoons of B. tristis and approximately 6,100 cocoons of H. punctata, some of which may have yielded parasites, were received from Italy, a part of the lot being kept in Washington, D. C., and the remainder sent to the Salt Lake City laboratory. The notes on the Washington lot record the rearing of a considerable number of adults but do not mention the release of specimens, although the host species was notably abundant in Potomac Park the same year. The species was not released from the Utah laboratory; however, on March 30, 1932, L. D. Anderson took 2 specimens at Norfolk, Va., and in 1935 the species was reared in considerable numbers at Arlington Farm, Va., by F. F. Dicke. The collection of the specimen by Mr. Clarke is the third record of its recovery.

Central and South American Diptera added to National Collection.--Henry W. Kumm, of the International Health Division of the Rockefeller Foundation, recently presented to the National Museum 118 mosquitoes from Costa Rica, El Salvador, and British Honduras

Fifty-nine species in 15 genera were represented. Although only 1 species was new to the collection, a number of the others had previously been represented by only a few specimens. During the past year John Lane, of the Instituto de Higienede Sao Paulo, Brazil, determined our unnamed specimens of the genera Dixa, Chaoborus, and Corethrella and, in exchange for certain paratypes retained, sent paratypes of other species from his collection. The returned material consisted of 151 specimens of 30 species, 25 of which were new to the National Collection. Seven holotypes, 3 allotypes, and 33 paratypes were included, making this a noteworthy addition.

A litter of pigs killed by ants.--A series of specimens of the native ant Formica truncicola integra Nylander was sent in recently by B. B. Fulton, of the University of North Carolina. He reported them as very abundant on a farm near Mount Olive, in the coastal-plain area of North Carolina. They were nesting in wood and had built nests at the bases of trees, stumps, and posts, covering the nests with small twigs, pine needles, and other debris. The ants are vicious, and it is reported by the farmer on whose land the colonies were found that a litter of pigs was killed by them. Another authentic report on this species concerns a small child, at Bells, Tenn. The child was almost completely blinded by the ant, which attacked especially the eyes.

Web-spinning psocid found in Florida.--Specimens of Archipsocus nomas Gurney were submitted in July by W. V. King, who found the species abundant at Orlando, Fla. Mr. King reported that the trunk and lower limbs of an oak tree, up to a distance of 20 or 25 feet above the ground, were almost completely covered with the webbing formed by the psocids. This species was described in 1939 (Wash. Acad. Sci. Jour., v. 29, No. 11) from material collected at New Orleans by T. E. Snyder. The latter reported that the psocids made unsightly webs on trees in various parks and streets of New Orleans and along the Gulf coast of Mississippi. A. nomas is apparently widely distributed in the Southeastern States, and in favorable seasons the webs may be expected to attract considerable attention. The genus Archipsocus occurs principally in Central America and South America, but at least one species is known from Ceylon and Singapore. The web-spinning habit has been reported for several of the species.

Solubea pugnax (F.) damaging sorghum.--D. E. Howell, of the Oklahoma Agricultural College, Stillwater, submitted some pentatomids for determination, with the statement that these bugs seem to be doing considerable damage to sorghum at Lawton, Okla. The specimens were identified by H. G. Barber as the rice bug (Solubea pugnax (F.)).

150TH ANNIVERSARY OF THE BILL OF RIGHTS

DECEMBER 15, 1941

Freedom of speech

Freedom of press

Freedom of religion

Freedom of assembly

Equal justice to all

A NOBLE HERITAGE AND A SACRED TRUST

The American Bill of Rights was ratified on December 15, 1791. The Sesquicentennial Anniversary is celebrated throughout the Nation in accordance with a Joint Resolution of Congress and a Proclamation of the President.