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**THE INSECT PEST SURVEY  
BULLETIN**

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A periodical review of entomological conditions throughout the United States  
issued on the first of each month from March to December, inclusive.

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**Volume 11**

**Summary for 1931**

**Number 10**

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**BUREAU OF ENTOMOLOGY  
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# INSECT PEST SURVEY BULLETIN

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## INTRODUCTION

The outstanding features of the weather during 1931 were abnormally high temperatures nearly all year; a disastrously hot and dry growing season in the northern plains; and variable rainfall, somewhat scarce but sufficient for crop production, over most of the country.

The winter months early in 1931 were warmer than normal over practically the entire country. In the northern plains the excess in average temperature amounted to about 20 degrees, growing less southward and eastward. Rainfall was well below normal in most places.

The spring months were nearer normal, being warmer than usual west of the Rockies and in the extreme Northern States, and cooler over the rest of the country. Precipitation was quite variable and somewhat below normal in most places. The shortage was serious in the northern plains, but rainfall was sufficient for crops in most other sections.

The summer months averaged above normal all over the country. The excess in temperature was very unusual over a wide area in the northern plains and North Central States, especially in early summer. Many crops were injured by sudden and severe heat late in June in the Mississippi Valley. Summer rainfall was much like that of the spring, being variable, rather scanty in most places, sufficiently well-timed to allow normal crop production in much of the country, but injuriously short in the northern plains and near-by areas.

The features of the fall and early winter have been high temperatures throughout, and considerable precipitation late in the period. Uncomfortable heat persisted unusually late into the fall in the Central and Eastern States and moisture was scanty in many places. Snows in the Rocky Mountain region, and abundant or in places excessive rains over much of the country, with very little severe cold, featured late fall.



## GRASSHOPPERS

In late January and early February, reports of the appearance of grasshoppers were received from Missouri and South Dakota. These, however, were but the overwintering nymphs of economically unimportant species brought out by the very unseasonably warm weather. During the first week in May, grasshopper eggs began hatching in Montana and by the third week hatching was reported from the Great Plains. During the latter part of May, outbreaks were under way in the Klamath Lake and Antelope Valley districts of California and Oregon and the Salt River Valley of Arizona. During June, outbreaks in the Great Plains States, southward to northern Kansas, had developed to such an extent as to require drastic control measures. In the three northwestern counties of Kansas (Cheyenne, Thomas, and Sherman) grasshoppers were so numerous as to require the application of over a million pounds of poisoned bait for their control, and at this time the outbreak in Klamath and Lake Counties of Oregon was of such proportions that 25,000 pounds of bran mash was being distributed daily to hold the insects in check. In July the outbreak in the Great Plains reached such proportions that it was recognized as a regional calamity and was said to have been the most serious of any grasshopper outbreak since the early settlers were demoralized by the invasion of the Rocky Mountain locust in the decade between 1868 and 1878. During this month more or less serious trouble was reported from New York westward to Idaho, Nevada, and Arizona, and southward to Arkansas, Oklahoma, and Texas. The region of practically complete crop destruction extended from Sully and Stanley Counties in central South Dakota, southeastward to the Nebraska State line, extending into the northern part of Nebraska in Keyapaha and Boyd Counties. Very severe damage, although not so complete, surrounded this area, extending northward into North Dakota and the northwestern corner of Minnesota, westward to Montana and northeastern Wyoming, across Nebraska into the northeastern corner of Colorado, southward into northern Kansas and west-central Missouri, and eastward into central Iowa. Another very badly infested area was that in northern California and southern Oregon, centering around Klamath Lake. Species most seriously involved in the Plains region were Melanoplus bivittatus Say, M. differentialis Thos., M. mexicanus Sauss., M. femur-rubrum DeG., and Camnula pellucida Scudd. The trouble continued throughout most of August and September. Toward the end of the latter month egg laying started and the depredations were practically completed.

## CUTWORMS

The very warm weather of late January and early February resulted in the early appearance of cutworms (Noctuidae) in the lower Mississippi Valley and the Pacific Northwest. As the spring advanced reports of damage were received from practically all parts of the United States, the damage being particularly noticeable in the South Atlantic and Great Plains States. During June the variegated cutworm (Lycophotia margaritosa saucia Hbn.) became very destructive in the West Central States over an area extending from southern Nebraska, across Kansas, into Oklahoma and Arkansas. These outbreaks were followed in July by similar outbreaks in the North Central





GRASSHOPPERS 1931.

- Heaviest infestation.
- Severe "
- Moderate "





States. Other species involved in the cutworm troubles of this year were Agrotis ypsilon Rott., A. c-nigrum L., A. unicolor Walk., Barathra configurata Walk., Chorizagrotis auxiliaris Grote, Euxoa sp., Nephelodes emedonia Cran., Polia renigera Steph., Prodenia ornithogalli Guen., and Feltia gladiaria Morr. The outbreaks in the West Central States were particularly serious, as they immediately preceded the very serious grasshopper invasion in this general region.

#### WHITE GRUBS

The first adult June beetles (Phyllophaga spp.) reported by our collaborators were observed on April 14 in west-central Illinois. During the latter half of April reports of damage were received from South Dakota southward to Kansas and Missouri. On April 23 very heavy flights of the beetles were observed in Louisiana. Damage to pecan foliage by the feeding of the beetles was reported by the middle of the month from Mississippi. During the latter half of May many complaints of damage, particularly to sod and tobacco, were received from Connecticut and Massachusetts. During the last week of the month heavy flights of beetles were observed in Pennsylvania. Throughout the entire month the beetles were observed in the South Atlantic States in noticeable numbers. In the East Central States many complaints were received, and by the end of May these insects were attracting major attention by feeding on the leaves of fruit trees and ornamentals. In the West Central States the main brood of adults is due to appear in 1932. Despite this fact, very heavy flights were observed in 1931 from the middle of April on. It was estimated that as high as 40,000 adults per acre were present in pastures in the generally infested territory of southwestern Wisconsin. Heavy flights of beetles were reported from the East Central, West Central, and North Central States during June. The roots of azalea bushes at Mobile, Ala., were eaten away by the grubs during the summer. Damage to seedlings of pine was reported from nurseries at Sumter, S. C., and at the State nurseries in North Carolina.

#### WIREWORMS

The warm spell in February resulted in bringing wireworms into activity in Kansas. By mid-April the sand wireworm (Horistonotus uhleri Horn) was observed to be active in southwestern South Carolina, and by late May this insect was damaging cotton and corn in that region. In the New England and Middle Atlantic States, from Maine and Vermont southward through New York to Maryland, the wheat wireworm (Agriotes mancus Say) and another species, Pheletes agonus Say, were reported during late May and early June damaging potatoes, seedling melons, corn, and several other crops. During May reports of damage to recently set tobacco plants and seedling melons by the wireworm Monocrepidius vespertinus Say were received from North Carolina. Throughout late April, May, and early June reports of wireworm injury occasioned by several species of wireworms, among which might be mentioned Melanotus spp., Monocrepidius auritus Hbst., Aeolus dorsalis Say, and Agriotes mancus Say, were quite general over the East Central and North Central States, with scattered reports of wireworm damage from the Rocky Mountain, Great Basin, and Southern States.



"During the year 1931, the newly introduced wireworm Heteroderes laurentii Guer. has proven quite an economic pest in the trucking section of southern Alabama. The early Irish potato crop, particularly, suffered severe injury. A great percentage of this crop was loaded for market with shipping point certification by the Bureau of Markets. Their reports showed injury as high as 25 per cent to many cars of Irish potatoes. From 3 to 5 per cent was quite common during the main portion of the shipping season. Other crops were also damaged. Both larvae and adults were found very numerous in Mobile and Baldwin Counties, Ala. Many fields show a population of as many as 10 larvae to the square foot. During the year scouting has shown the distribution of the insect at this time as follows: Harrison, Jackson, George, and Green Counties, Miss.; Mobile, Baldwin, Washington, and Escambia Counties, Ala.; Escambia and Santa Rosa Counties, Fla. Larvae, tentatively identified as this species, have also been collected in Walton, Jackson, and Holmes Counties, Fla."


#### EUROPEAN CORN BORER

The European corn borer (Pyrausta nubilalis Hbn.) made but slight advance along its western border. Toward the southeast the advance was more pronounced. Practically all of southeastern New Jersey is now known to be infested, and infestations have been found on the Eastern Shore of Virginia. This insect was also found in a single township in Sheboygan County, Wis.

#### HESSIAN FLY 2

During the early spring months, reports of rather heavy infestations by the Hessian fly (Phytophaga destructor Say) were received from western and southeastern Iowa, while the insect was reported at this time as being comparatively scarce in the Atlantic States. As the spring advanced serious infestations were reported from western Illinois and parts of the Platte Valley in Nebraska. In Henderson County, Ill., considerable wheat areas were plowed out, since infestations in this region ran from 32 to 40 per cent of the tillers. The spring wheat in the Willamette Valley of Oregon was also reported as quite heavily infested this year. At harvest time it was observed that the insect was low in numbers in the East Central States, with serious infestations in western and southern Illinois, southern Indiana, and scattered localities in Nebraska and Kansas. The summer wheat-stubble surveys showed that in west-central and southern Illinois the infestations were decidedly heavy, running from 5 to 37 per cent. The State average, however, was lower than last year, being 9 per cent as compared with 13 per cent. Similar surveys in Kansas show infestations in the eastern two-thirds of the State of from 10 to 15 per cent of the plants.

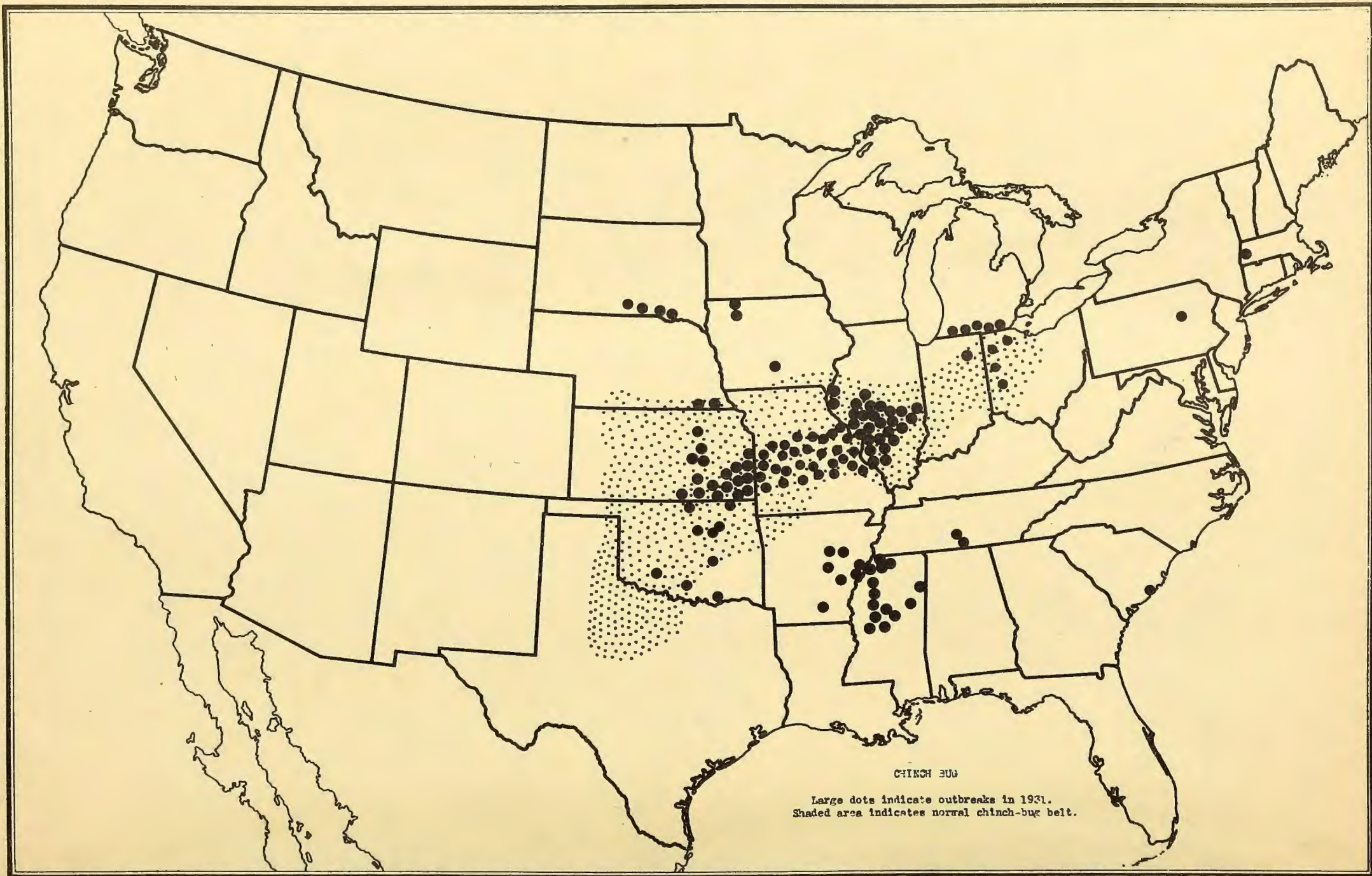




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During September considerable emergence of the fly occurred in the East Central States. In most places, however, this emergence was too early to infest the sown wheat, but volunteer wheat in this region was heavily infested and became an important source of flies infesting sown wheat in early October. Owing to unusually favorable fall weather, oviposition continued later than usual in Illinois and Indiana. Heavy fall infestations developed in many of the earlier sowings in these States. In Ohio the fly appeared to be somewhat more generally present in significant numbers than a year ago, though the infestation averaged low. It was also light in southern Michigan. Drought during September and October in Kentucky and Tennessee curtailed fall fly activity and early wheat sowing. As a result of late fall rains and persistently mild weather, however, light infestations developed successfully during November in some Kentucky and Tennessee fields. Fall infestations were reported heavy in the earlier sowings in central and southeastern Missouri and southeastern Nebraska, and moderately heavy in north-central and northeastern Kansas, and in western Iowa, particularly in Monona County. In the remainder of the West Central States the fly was less abundant.

#### CHINCH BUG

Early spring observations in the East Central States indicated that the winter mortality of the chinch bug (Blissus leucopterus Say) had been very low and presaged possible trouble from eastern Kansas to northwestern Ohio. During the middle of April the bug started migrating into small grain in Illinois, Missouri, and Kansas, with indications of possible serious damage in southeastern Kansas. By the middle of May the insect was appearing in threatening numbers in south-central Illinois, western Missouri, southeastern Kansas, and northeastern Oklahoma, with rather large numbers appearing in scattered localities in Mississippi. By the end of June young bugs were appearing in western Ohio, central and southern Illinois, and central and western Missouri. During July damage to corn was reported from several western and northern counties in Ohio, from south-central and central Illinois, and from one locality in northeastern Indiana. During the early part of July these insects were observed to be maintaining large populations in Iowa, southern South Dakota, and southwestern Nebraska. The damage on the whole, however, was not so serious as was anticipated. During the latter part of the summer the chinch bug populations survived in such numbers as to indicate the possibility of damaging infestations next year over the normal chinch-bug belt, which extends diagonally from the eastern one-third of Kansas across central Missouri, south-central Illinois, and central Indiana, and into northeastern Ohio. Sporadic outbreaks occurred this year in Massachusetts, where this insect was very numerous over a small area in Berkshire County; considerable injury was caused in Lincoln and Marshall Counties, Tenn., and in many localities scattered throughout Mississippi; in Charleston, S. C., where there was quite a little damage to St. Augustine grass; and Columbia County in east-central Pennsylvania, where the damage was to Sudan grass, corn, and oats. Specimens were received from Glen Cove, Long Island, N. Y., where they were damaging lawns.



## GRAIN APHIDS

Only a single report on the green bug (Toxoptera graminum Rond.) was received during the year, this coming from Holt County, Nebr., about the middle of May. Several reports of damage by the English grain aphid (Macrosiphum granarium Kby.), however, were received from the East Central States, particularly from Indiana and Michigan.

## CORN EAR WORM

The first report on the corn ear worm (Heliothis obsoleta Fab.) for this year was received on February 10 when eggs were observed in Galveston County, Tex. On March 2 two larvae were found at the same place. Last year the first eggs were observed March 27 at College Station, Tex., indicating a difference of five weeks in the advance of this season over last. By the last week in May larvae were observed injuring buds and tassels of corn in South Carolina. Toward the end of the month damage was becoming conspicuous on tomatoes and corn throughout the Gulf region. During the first week in June this insect became seriously abundant in the sweet corn growing section around Foley, Ala., injury running as high as 5 per cent of the ears infested. Similar reports of damage about this time were received from Mississippi and Louisiana. Adult moths, eggs, and newly hatched larvae were starting to appear as far north as Maryland and Nebraska by the middle of June. Early in July damage to early tomatoes and sweet corn plants were received from Ohio, Illinois, westward to South Dakota and Nebraska, and southward to the Gulf. Owing to the early appearance of this insect in the upper part of its range, ears had not yet formed on corn plants and the damage was very conspicuous in the cornstalks. This occasioned considerable alarm in the region west of that known to be infested by the European corn borer, the corn ear worms being mistaken for the introduced pest. An unusual type of injury was observed in Kansas, where the larvae originally infesting a cover crop of hairy vetch attacked the fruit in an apple orchard as high as 6 or 8 feet above the ground, much of the fruit being entirely eaten out, leaving the empty skins hanging to the tree. The damage was particularly severe in low-headed trees where branches touched the vetch. As the summer advanced it became apparent that in the Middle Atlantic, East Central, North Central, and West Central States, damage was decidedly severe, although probably not unprecedented. During the fall months reports of injury throughout New England indicated that this insect was more prevalent in that section than it had been in the preceding ten years.

## FALL ARMYWORM

During July the fall armyworm (Laphygma frugiperda S. & A.) developed a typical outbreak in the Everglades district of Florida, extending as far northward as Pinellas and Polk Counties. Light infestations about Baton Rouge Parish in Louisiana were reported in July; these, however, undoubtedly had been under way during late June, as the larvae were mature and many had entered the ground at the time of observation, July 17. During July



very severe damage to sweet corn in the Tia Juana Valley of California was reported, and similar reports were received from parts of Los Angeles County. Here late sweet corn was almost entirely ruined and the tonnage of field corn was severely reduced. By early fall this insect was troublesome as far north as Monterey County, Calif., attacking lettuce and tomatoes. As a whole, however, the year was not one of phenomenal damage by this insect.

#### ARMYWORM

During April moths of the armyworm (Cirphis unipuncta Haw.) were collected in large numbers in bait pans in New Mexico. About the middle of May an outbreak developed in 11 counties in north-central Texas and similar outbreaks developed in several Delta counties in Mississippi. Much smaller and localized outbreaks were also reported during the month from Arkansas, Virginia, and West Virginia. During June areas of serious damage were reported from the East Central States westward to Nebraska and southward to Kentucky and Tennessee, Arkansas, and Mississippi. This insect also appeared in destructive numbers in northern Utah. Several local outbreaks occurred in eastern North Carolina. Throughout the South Atlantic and East Central States the first generation was very highly parasitized and little trouble was experienced with the second brood. During July the insect appeared throughout the greater part of Michigan, although it occasioned no serious damage.

#### SOD WEBWORMS

During June we began to receive reports of very unusual damage by sod webworms (Crambus spp.) to sod lands, corn, and tobacco in the East Central States extending from Ohio to Iowa and southward to Kentucky. Between June 2 and June 10 a heavy flight of the moths of Crambus trisectus Walk. was observed in western Illinois. A somewhat heavy flight of Crambus spp. was observed at Lexington, Ky., during late June. Heavy flights were also observed in Ohio between June 10 and 29, and again between August 15 and " . 22; the species in this case were C. trisectus Walk. and C. teterrellus Zinck. The moths were so numerous that they covered the radiators, headlights, and windshields of automobiles, making driving difficult. Almost every golf course in the City of Columbus showed large brown patches due to the feeding of the webworms. The damage continued well through July. Similar damage to golf courses, particularly putting greens, was reported from Indiana. In Kentucky it was estimated that about one-half of the lawns in the bluegrass section were ruined by the feeding of these insects during June, the damage being particularly noticeable in the immediate vicinity of electric lights to which the moths were attracted and near which they laid eggs. Considerable damage to lawns was also reported from Iowa and Missouri. In one 60-acre cornfield in Tennessee 30 acres were practically destroyed, there being from 3 to 5 larvae per hill. At Windsor, Conn., a tobacco plantation was very severely infested, this being the first record of damage to the tobacco crop that has been observed in that State.



## SUGARCANE BORER 1

The infestation in 1931 by the sugarcane moth borer (Diatraea saccharalis Fab.) was rather unusual. After the mild winter of 1930-31, this pest showed every sign of a rapid development and a heavy infestation. A cool spring, however, delayed the development, and for a while it seemed that the infestation would be very slight. The cool spring was followed by a hot summer, and the infestation increased rapidly. The final status was determined as usual during the "grinding season," in the fall, and it was then found that the infestation was very spotted, ranging from practically nothing in some fields (1 per cent of the stalks bored) to every stalk bored in other fields. Ninety-one fields, fairly well distributed over the "sugar parishes" of Louisiana, were inspected, and the average stalk infestation was found to be 55.6 per cent. The joint infestation varied, accordingly, from practically no damage to serious damage. A noteworthy finding was the scarcity of the egg parasite Trichogramma minutum Riley. Even during the "grinding season," when practically all the eggs are usually parasitized, many heavily infested fields seemed to have none of these parasites.

## TIGER MOTHS

An unusual and very severe attack of one of the tiger moths (Anantesis phyllira Drury) was reported during April and May from south-central Tennessee. In Lincoln County alone it was estimated that 500 acres of corn were destroyed and many pastures completely stripped of vegetation. The last adults of this brood were seen in the field on June 5. On June 23, what appeared to be second-brood larvae were observed in this region. By July 15 most of the larvae had pupated and moths appeared from July 7 to 27. Second-brood larvae did very considerable damage in Christian and Todd Counties, Ky., and Montgomery and Robertson Counties, Tenn. During August third-brood larvae appeared and the first pupae of this brood were taken in the field August 28 in Marshall County, Tenn. On September 24, what appeared to be fourth-brood larvae were observed in the vicinity of Clarksville in northern Tennessee. S. A. Forbes gave the distribution of A. phyllira as extending from Canada and Michigan on the north, westward to Colorado and Texas, and apparently southward to the Gulf, and stated that it is but two-brooded, the broods appearing in May and July. In the Survey files we have records of this insect in past years attacking tobacco in Florida and cotton in Mississippi, and collection records of the insect from Connecticut and New Jersey. A. rectilinea French was also involved in the outbreak, this species also being reported abundant in eastern Tennessee. We have no records on the further distribution of A. rectilinea.

## VELVETBEAN CATERPILLAR

The velvetbean caterpillar (Anticarsia gemmatilis Hbn.) appeared in the Everglades of Florida on June 10, about two weeks earlier than it did



in 1930. Associated with this outbreak was a very marked increase of percentage of parasitism compared with last year. During September there was some stripping of soybeans in southern Louisiana and slight feeding on this crop in parts of Oklahoma. As a whole, the season was one of comparatively slight damage by this insect.

#### A BRUCHID

During June Mr. L. J. Bottiner, of the entomological section of the Food and Drug Administration, collected a large number of specimens of Bruchus brachialis Fahraeus from a patch of vetch at Haddon Heights, N. J. This species has also been found in infested vetch pods at Moorestown, Vincentown, Four Mile, and Newtonville, N. J.; Kent County, Del.; and Wicomico County, Md. This bruchid is one of the important bean weevils known to attack vetch in Europe. It is apparently the first of these to become established in the United States.

#### CODLING MOTH

During the very early spring reports were received of low winter mortality of the codling moth (Carpocapsa pomonella L.) from the New England, Middle Atlantic, South Atlantic, and southern part of the East Central States. Throughout the Middle Atlantic and South Atlantic States this insect appeared to be normally abundant. The first observation of pupation was reported March 30 from South Carolina, April 3 from Missouri, April 15 from Georgia, April 12 from southern Illinois, April 14 from central Illinois, April 13 from Nebraska, and April 21 from Pennsylvania and Maryland. In the Rocky Mountain States the insect was reported as quite generally abundant and eggs sustained but slight winter mortality. During the latter half of May adults began emerging in the Middle Atlantic States; in the southern part of this section the emergence was considerably later than last year. In the East Central States emergence occurred at about the same time as it did last year. In the Pacific Northwest emergence occurred during the first week in May, while in California the peak of emergence in the Antelope Valley was reached on April 10. The first side-worm injury was reported from Massachusetts on June 16. About this time eggs were reported hatching in the Hudson River Valley in New York, and by the third week of June they were hatching in numbers in western New York. Side-worm injury had started in southern New Jersey by June 9; and by the end of June unusually heavy infestations were being reported from the Hudson River Valley of New York southward to Georgia, with similar heavy infestations over the greater part of the East Central States westward to Nebraska and Kansas. Band counts made in western Illinois during July indicated that the population was ten times as great as it was at the same time last year, and in eastern Illinois about 25 times as great. In the Pacific Northwest the situation was more serious than it has been for several years.



## ORIENTAL FRUIT MOTH

Early in March adults of the oriental fruit moth (*Laspeyresia molesta* Busck) were emerging in outdoor cages in South Carolina, and by the end of that month approximately 7 per cent of the overwintering larvae had pupated at Thomaston, Ga. From Virginia northward no pupation had taken place during March. In the lower part of the Middle Atlantic States it appeared that this insect passed the winter in slightly more than normal numbers. In New Jersey, however, mortality seems to have been heavy, particularly in the Moorestown area. Early in April moths commenced to appear in the bait traps about Cornelia, Ga., by the middle of the month emergence was taking place in southern Virginia, and by the 18th adults were emerging in Delaware. Early in May eggs were found on trees as far north as New Haven, Conn. Injury became noticeable in the South Atlantic States and the lower part of the East Central States during May; and early in June twig injury was observed in Massachusetts, Indiana, and Illinois. On the whole, however, the infestation during the spring of 1931 was decidedly less than during 1930, and as the season advanced this condition seemed to be quite general throughout the range of this insect. In the Georgia peach belt the infestation of fruit ran from 1 to 3 per cent; in southern Illinois there seemed to be a slight increase in infestation, in a few cases from 6 to 10 per cent of the fruit on unsprayed trees being wormy. During late August a heavy infestation was reported from Bent County, Ark., and but for a single record in Dallas County, Tex., this is the westernmost record we have for the distribution of this insect. Very late varieties of peaches were severely damaged in northern Ohio, the Lemon Free being about 50 per cent infested, and such varieties were also damaged in Delaware. As a whole, however, this insect was decidedly less troublesome than it had been in previous years.

## PEACH BORER

In the South Atlantic States the peach borer (*Aegeria exitiosa* Say) was not abnormally abundant, although considerable damage was done where treatment had been neglected. Reports from Ohio indicate that in that region this insect attracted considerable attention and seemed to be more prevalent than it had been for a number of years. The insect not only damaged peach, but also cherry and plum. In the East Central States the first adult emergence was observed June 11 in Tennessee, 10 days earlier than emergence at the same place in 1930. In Georgia the first pupation this year was observed at Fort Valley on July 14, and the first adults emerged on August 6, which is later than usual, as the first adult in 1930 emerged July 22. Despite the advance in the date of first emergence, the peak of emergence this year in Tennessee was not reached until August 28, while in 1930 this peak was reached on August 13. In the Fort Valley section of Georgia the peak of emergence was reached on September 11. An unusual observation on the life history was made by Mr. O. I. Snapp, at Fort Valley, Ga., where eggs under field conditions were laid as late as November 8 and hatched as late as December 1. The larvae which hatched that day were as healthy as any reared during the season and they readily entered the peach trees.



## PLUM CURCULIO

Adults of the plum curculio (Conotrachelus nenuphar Hbst.) emerged from hibernation in the South Atlantic States much later than usual as compared with the stage of fruit development. Cool weather prevailed from the time of blooming from March 1 up to the third week in that month, holding the insect in hibernation. The first overwintering adult to be observed in the field was collected at Thomaston, Ga., on March 25. This is about a week later than the first curculio was collected at this place in 1930. By March 25, 1930, approximately 1,000 adults had been collected by jarring from the same orchard from which the single individual was taken this year. By the first week of April adults were observed in North Carolina, by the second week they were observed in Virginia, and by the third week in central New Jersey. In the Fort Valley section of Georgia oviposition started later than it did in 1930. This year the first eggs were found on April 11, while last year they were found April 20; the latter date is decidedly later than normal. During May the insect was being reported from New England and the Middle Atlantic States as abnormally abundant. On the other hand, in Georgia the infestation was the lightest that had been observed in 13 years. In the Hudson River Valley and central New Jersey damage became quite severe during July. Throughout the East Central States the infestations as a whole were low, but little damage being done. As the season advanced some late damage was reported from the States immediately west of the Alleghenies, but on the whole the only region suffering serious damage from this insect was that extending from central New Jersey up the Hudson River Valley and into New England.

## SHOT-HOLE BORER

As was to be expected, following the very severe drought which occurred over a very large part of the country during the summer of 1930, an unusually large number of reports of damage by the shot-hole borer (Scolytus rugulosus Ratz.) were received this year from regions extending from New York and Michigan down the Ohio River Valley and along the western Appalachians through Kentucky to Alabama and Mississippi. Associated with a very dry season, this insect has been more destructive than usual in California, damage being particularly severe on prunes.

## FRUIT APHIDS

Observations made during the late winter of 1930-31 indicated that eggs of the rosy apple aphid (Anuraphis roseus Baker) were abnormally scarce through the New England, Middle Atlantic, South Atlantic, and East Central States. However, in Pennsylvania there seemed to be enough eggs to occasion some apprehension. The apple aphid (Aphis pomi DeG.) was quite generally reported as scarce, as was also the apple grain aphid (Rhopalosiphum prunifoliae Fitch). The lower Mississippi Valley reports of deciduous fruit aphids indicated that these insects were unusually abundant. By the middle of April both species became very abundant in central New York. During May the situation changed but slightly; both increased toward the end of the month. Early in June the rosy apple aphid suddenly developed to serious proportions in southern New England and the



Southern States extending westward to Arkansas, and very heavy infestations were also reported that month from the Pacific Northwest. By the middle of the month, however, the outbreak subsided. The apple aphid increased to destructive proportions during July in the Hudson River Valley of New York and northern New Jersey westward to central Pennsylvania. During July the woolly apple aphid (Eriosoma lanigera Hausm.) rapidly increased to destructive abundance in the Wenatchee Valley of Washington, and by August 1 had developed to the most serious outbreak that they had experienced in that region in the last decade. This insect persisted in the orchards of western Washington throughout the summer.

#### LEAFHOPPERS

Early in the season leafhoppers (Cicadellidae) became very abundant in the New England and East Central States and as far west as Missouri. By the middle of May much mottling of foliage was observed through New England and the Hudson River Valley of New York, southward to North Carolina. This condition persisted throughout the summer with a rapid increase in numbers and destructiveness during September, reports of damage extending from the New England States southward to Georgia and westward to Oklahoma. These insects were so prevalent at harvest time over much of this territory that, in addition to the damage done to the fruit, they were decidedly a nuisance to the pickers.

#### SAN JOSE SCALE

Early spring observations indicated that the San Jose scale (Aspidiotus perniciosus Comst.) was on the increase along the Atlantic seaboard from Pennsylvania to Georgia and westward over the Gulf region. A very high winter survival was reported from central Illinois, the number of scales surviving running from 60 to 71 per cent of the total population, while the normal survival in this district is from 25 to 30 per cent. Similar reports of low winter mortality came from the Great Basin region. While this insect has been confined to less than a dozen counties in Wisconsin it has not until recently been found in farm orchards; it has been spreading rapidly and a dozen new localities have been added to the known infested area during the past year. A very late observation by O. I. Snapp at Fort Valley, Ga., indicates that the percentage of live scale on peach trees is unusually high for this time (December 18) running from 85 to 95 per cent.

#### FRUIT MITES

The European red mite (Paratetranychus pilosus Can. & Fanz.) was generally reported as unusually abundant throughout the New England States and very scarce throughout the Middle Atlantic States. Eggs were reported as hatching in Vermont and New York during the third week in April, and during the first week in May in the Middle Atlantic States. A heavy outbreak of the six-spotted mite (Tetranychus sexmaculatus Riley) occurred over the entire citrus belt of Florida during April. This outbreak suddenly subsided in May. The pest was believed to have been controlled by



a fungus disease. The Pacific red spider (Tetranychus pacificus McG.) did damage to certain varieties of grapes in the San Joaquin Valley of California, being one of the outstanding pests in that section this year. A European species of mite (Phyllocoptes fockeui Nal. & Tr.) was discovered this spring attacking the leaves of prune trees in southern Idaho. These mites produced a decided russeting of the foliage. The insect was quite abundant and is apparently the cause of a type of injury which has been very severe in recent years. As far as we can ascertain, this species has not been previously recorded from the United States, but was collected on plums in the vineyard district of Ontario in 1928 (Can. Ins. Pest Review, Vol. 6, No. 5, October 5, 1928). Although a gall mite, this species does not appear to produce galls or blisters.

#### CITROPHILUS MEALYBUG

Control of the citrophilus mealybug (Pseudococcus gahani Green) by the coccinellid Cryptolaemus montrouzieri Muls. and the hymenopterous parasite Coccophagus guencyi Comp. in Los Angeles County, Calif., has been extremely gratifying. Over 99 per cent of the 20,000 acres of citrus in this county recorded as having been infested with this mealybug are so slightly infested this year that no damage could possibly be done to the crop. In 1931, 97 per cent was in this condition, while the average for the preceding six years was but 83 per cent controlled. Thirty-three per cent of the previously infested acreage was found to be non-infested this year. Last year this reduction in infested acreage was but 26 per cent. It is believed that the new hymenopterous parasite has played an important part in reducing the infestation.

#### MEXICAN FRUIT WORM 1

The outstanding development in the Mexican fruit worm (Anastrepha ludens Loew) situation was the finding of an infestation, after an interval of approximately 17 months, on the United States side of the Rio Grande. This infestation was discovered on April 22 in fruit held in storage in Mission, Tex. Previous to this oranges produced in a patio in Matamoros were found infested on April 9. On both April 15 and 16 an adult caught in traps located at a distance of 11 and 5 blocks from this patio. During July 30 flies were taken on 13 different premises in the city of Matamoros; 23 adults were taken during August in traps in Matamoros and 2 specimens, (Anastrepha pallens Coq.), were collected, one in a grove near Mission and the other in a grove near Brownsville, Tex. This species was first described from specimens taken at Brownsville in 1904. Nothing is known of the food plants of this species.

1 Plant Quarantine and Control Administration, U. S. D. A.



### COLORADO POTATO BEETLE

The first adults of the Colorado potato beetle (Leptinotarsa decemlineata Say) were observed at Lucedale, Miss., on February 19. During the last week in March the insect was observed in Texas. During April the beetles became unusually abundant in the Chadbourne district of North Carolina and in the Norfolk district of Virginia. Another heavy infestation occurred during this month in northern Florida. During May the beetle became very troublesome along the Atlantic seaboard as far north as southern New Jersey, and it was also reported as very numerous in the Lewiston district of Idaho. During the late spring and early summer it was quite generally reported as abnormally abundant from the New England States and the Middle Atlantic States westward to the Great Plains, with a very severe outbreak in northwestern Iowa. Late in June it appeared in the city of Ogden, Utah, but by the end of July the isolated colony had apparently been eradicated. In Idaho this insect is now moderately abundant in Grant and Baker Counties.

### POTATO TUBER WORM

During the early spring, reports of heavy infestations of potatoes by the potato tuber worm (Gnorimoschema operculella Zell.) were received from Los Angeles County, Calif. Between April 15 and May 1 more than 1,200 lugs of new potatoes were rejected in the Los Angeles wholesale markets on account of this insect. During the third week of June larvae were found attacking tobacco at several places in Kentucky. A slight infestation of tobacco in Georgia and Tennessee was also reported during June. Late in July reports were received from Osceola and Palm Beach Counties, Fla., that this insect was doing considerable damage to potatoes in storage. It was also found early in the year in potatoes in storage in Delaware. For the first time in many years this insect was observed during August damaging tobacco in Wisconsin.

### TOMATO PIN WORM

In the late summer and early fall reports were received from southeastern Pennsylvania that the larvae of the tomato pin worm (Gnorimoschema lycopersicella Busck) were making large blotch mines and destroying the buds of tomatoes, both under glass and in the field. Late in November adults emerged and were identified by Mr. A. Busck as this species, which heretofore has been recorded only from the Pacific Coast, where it has been known for a number of years as a pest of tomatoes, particularly in the State of Sinaloa in Mexico and in southern California. Here it is a pest of considerable importance. In 1930 it occasioned a 40 per cent loss to the tomato crop in San Diego County, Calif.

### VEGETABLE WEEVIL

The vegetable weevil (Listroderes obliquus Gyll.) was first observed during the last week in January 1931 at Vicksburg, Miss. During late winter and early spring it did severe injury in many localities, in some cases entirely destroying turnip fields and cabbages in hot beds. It continued





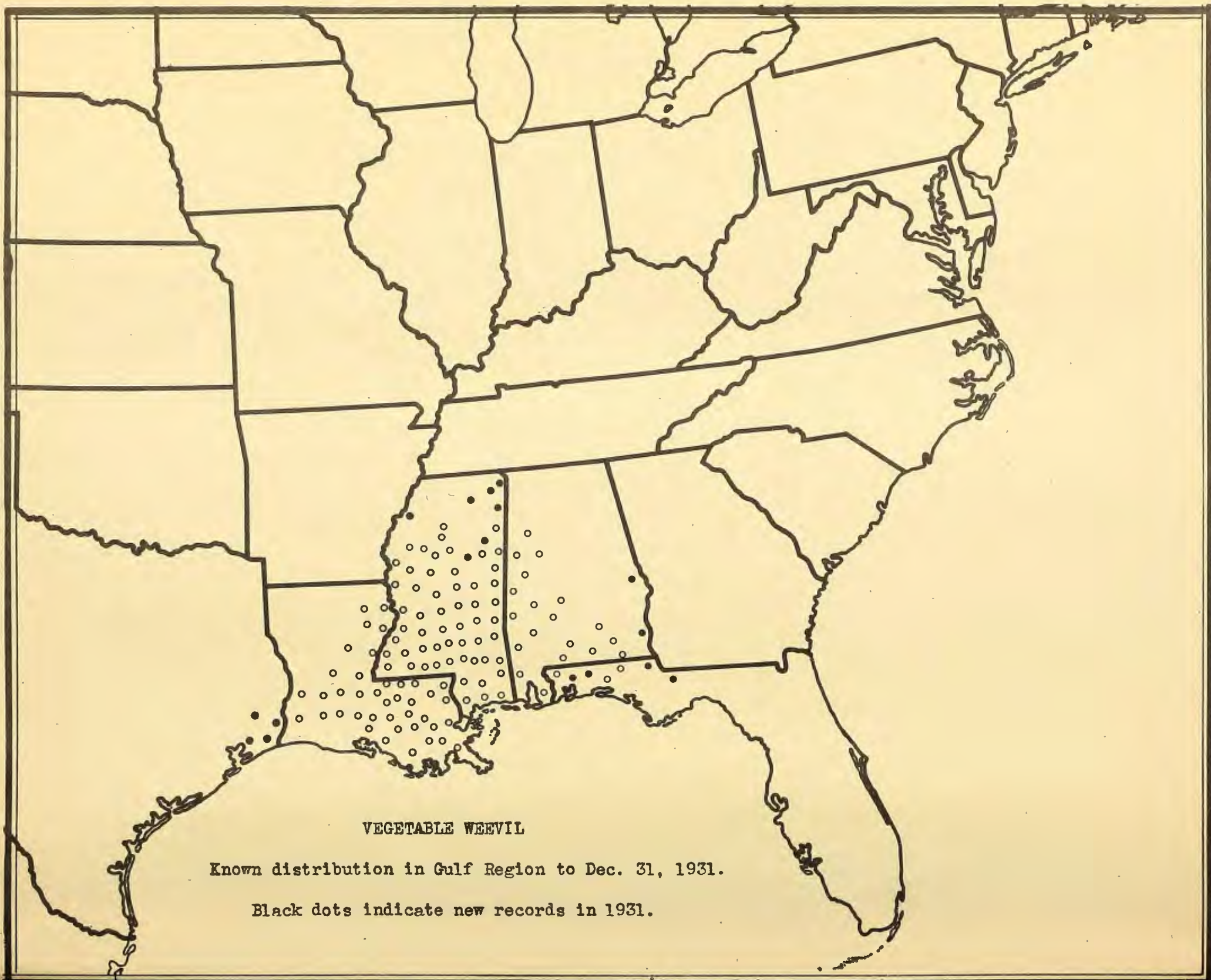












VEGETABLE WEEVIL

Known distribution in Gulf Region to Dec. 31, 1931.

Black dots indicate new records in 1931.



its work throughout the greater part of April and during early May turned its attention to the early vegetables such as tomatoes. It practically disappeared during June and was not seen again in destructive numbers until late October. During December complaints of severe damage were received from the southern part of the infested territory. In California this insect was decidedly less abundant this year. This is believed to be due to successful control measures. The spread of this insect in the Gulf region includes four counties in western Florida, two counties in eastern Alabama, seven counties in northern Mississippi, and four counties in eastern Texas.

#### SWEET-POTATO WEEVIL 1

"Damage by the sweet-potato weevil (Cylas formicarius Fab.) has been almost normal in Mississippi and Alabama during 1931. There has been a slight increase in the number of infested properties, but the total acreage of infestation has not materially increased, nor has the infested territory been extended. The infestations found during the year have been in very thickly settled communities, where little farming, other than small garden patches, is done. The heaviest concentration of infested properties is located in and around Logtown, Miss. Most of these infested properties are small garden patches. In the majority of cases the degree of infestation was listed as light; however, in some instances the degree of infestation was fairly severe."

#### MEXICAN BEAN BEETLE 2

Generally speaking, severe damage by the Mexican bean beetle (Epilachna corrupta Muls.) in the Eastern States in 1931 was more prevalent in areas not affected by the drought of 1930. These areas were chiefly New Jersey, Delaware, Long Island, and Connecticut. However, a remarkable recovery was made in southern Ohio and Kentucky, and damage was severe in those states. In addition, considerable damage was done in parts of Tennessee, North and South Carolina, Virginia, southeastern Pennsylvania, western Maryland, and northern Alabama. Appearance in the field and seasonal life history were similar to 1930. The survival over winter in Ohio was the highest of record. At Arlington Farm it was lower than average, but at Norfolk, Va., it was about average. Infestations outside of the known area of 1930 were found in Dougherty County, Ga.; Vigo, Parke, and Cass Counties, Ind.; Windham County, Vt.; Bristol County, Mass.; Washington County R. I., and the 12 westernmost counties in Kentucky.

#### COREID BUGS

Late in July two species of coreid bugs (Alydus pilosulus H. S. and A. eurinus Say) were found to be seriously injuring bush lima beans in east-central Georgia. The injury resulted from the insertion of the beak through

1 K. L. Cockerham, Bureau of Entomology, U. S. D. A.

2 N. F. Howard, Bureau of Entomology, U. S. D. A.



the pod and the withdrawal of the sap from the developing seeds. Both species seem to be well distributed in the United States, occurring from New England southward to Florida and westward to California. Heretofore neither species has been recorded as of any economic importance.

#### VARIEGATED FRITILLARY

Larvae of the variegated fritillary (Euptoieta claudia Cram.) destroyed a large portion of a 13-acre patch of soybeans and lesser areas of snap beans, corn, sweetpotatoes, and cowpeas during early July in eastern Tennessee. These fields had a considerable growth of passion-flower vines, which seems to be the preferred food plant. Late in September larvae were collected on privet (Ligustrum sp.) at Belzoni, Miss.

#### PEA APHID

Late in February and March the pea aphid (Illinoia pisi Kalt.) became very troublesome in the Salt River Valley in Arizona, where it attacked peas, alfalfa, and vetch, and in the Willamette Valley of Oregon, where it attacked vetch. During March it appeared in outbreak numbers in southern California and during April in parts of Kansas and northeastern Arizona with isolated infestations reported from Mississippi. During May it was quite generally reported from widely scattered localities throughout the country, although the outbreaks were limited in extent. During June late peas in Wisconsin were carrying the heaviest infestation recorded in the last 8 years, and during July this insect destroyed practically the entire canning pea crop in the eastern part of Michigan and was causing considerable damage to peas in northern and western New York. During late October the aphid started to increase again in Wisconsin to by far the largest infestation experienced in the fall since 1922.

#### CABBAGE MAGGOT

Eggs of the cabbage maggot (Hylemyia brassicae Bouche) were found on cabbage in Pennsylvania during the first week in May, and egg laying was well under way in central New York by the middle of the month. The first egg laying in Massachusetts was observed on May 6 and in Connecticut on May 15. By the end of May this insect was damaging from 5 to 25 per cent of the cabbages in parts of Connecticut, one grower alone losing between 2,000 and 3,000 plants. The maggot became so serious in central and western New York that unscreened cabbage beds were quite generally damaged from 16 to 60 per cent and in a few cases all of the plants were destroyed. Similar serious depredations were reported from New Jersey, where the insect was said to be worse than it had been for several years. Other States reporting damage by this insect were Indiana, Kentucky, Wisconsin, and Montana.

#### IMPORTED CABBAGE WORM

During the latter part of February the first adults of the imported cabbage worm (Pieris) Ascia rapae L.) were observed in the fields as far north as North Carolina and Missouri. Early in April the first adults were observed in Nebraska and by this time they were becoming very plentiful in the Southern States. In early May the adults had been observed in North











Dakota and the larvae were becoming troublesome as far north as Indiana. During June this insect was reported as abundant as far north as Iowa and Wisconsin, and during July it was quite generally reported as unusually troublesome in the Central States as far westward as Minnesota and Kansas. Serious depredations continued in the Middle Atlantic and Central States during the greater part of the summer and well into the fall, the area of serious numbers extending as far west as the Dakotas and Iowa.

#### HARLEQUIN BUG

The harlequin bug (Murgantia histrionica Hahn) was observed active in eastern Texas during the middle of February, and the first adults to be seen in the field along the Atlantic seaboard were observed on April 9 in Virginia and two weeks later in North Carolina. By the middle of April the insect was very abundant in the Gulf Coast region, where it was doing considerable damage to turnips, kale, and collards. As the season advanced heavy infestations were reported in the Norfolk district of Virginia and northward to southern New Jersey, and late in the season, mid-August, it was found in numbers in southeastern Nebraska, Indiana, Kentucky, and the District of Columbia.

#### A PLANT BUG

During midsummer calls were received from several growers of tomatoes in Orange County, Calif., asking for assistance in controlling the plant bug Engytatus geniculatus Reut. This insect was found to be quite numerous in the field and feeding spots were evident on the stems. This appears to be the first record of this insect as a tomato pest in the United States. The species was described in 1876 from Texas. It has been reported from Louisiana as a predator on the eggs of Heliothis spp. and is apparently widely distributed in this country, being recorded from Florida, Louisiana, Texas, and California. Van Duzee says the species occurs from Florida to southern California. It has also been recorded from Mexico, Brazil, and Hawaii. In Brazil it is said to be injurious to tobacco and in Hawaii it is recorded as the most serious pest of tomatoes where it damages the fruit by sucking the juice from the developing ovaries, causing a premature falling of the blossoms. The insect was first collected in the Hawaiian Island by O. H. Swezey in 1924. It was also reported from there in 1925, 1926 and 1929.

#### SQUASH BUG

During June we began receiving reports of the squash bug (Anasa tristis DeG.) from the South Atlantic and Lower Mississippi Valley States, where the insect was doing considerable damage to summer squash. As the season advanced, reports became much more numerous and included the Middle Atlantic and Central States extending westward to Kansas and Nebraska. Serious damage was reported from the East Central, the West Central, the Middle Atlantic, and the South Atlantic States westward to Mississippi, and also from Idaho, Utah, and New Mexico. The crops damaged included squash, pumpkin, melon, and cucumber. In Utah this insect has been a pest for a number of years and has practically eliminated squash as a crop in many



localities. Throughout practically the entire territory the insect was said to have been more troublesome than in many years, and in Ohio it was more destructive than ever before recorded.

#### BANDED CUCUMBER BEETLE

The banded cucumber beetle, (Diabrotica balteata Lec.) was quite generally reported in the Gulf region from Florida to Arizona. As far as the records of the Survey go, this insect was first recorded in Florida in 1926 and it now seems to be quite prevalent in that State, particularly over the Peninsula. Although it is doing occasional damage to snap beans, dahlias, and a number of other crops, it was not of any considerable economic importance this year.

#### PICKLE WORM

The first adult of the pickle worm (Diaphania nitidalis Stoll) to be recorded was observed in Mississippi on May 16. The first larvae of the season were observed boring in summer squash on July 17 in North Carolina. As the spring advanced this insect became increasingly numerous. Reports of damage were received from practically the entire lower Mississippi Valley and South Atlantic region northward to New England and Ohio. Usually this insect is of very minor importance in the Northern States, but this year it did considerable damage in Maryland, Ohio, and Connecticut. This is the first record of it as a pest in Connecticut.

#### SEED CORN MAGGOT

The first report of damage by the seed corn maggot (Hylemyia cilicrura Rond.) was received from southern Mississippi on January 21; and on February 18 it was observed destroying corn in Eastland County, Tex. In March the insect was reported as destroying cucumber plants in central Florida. It was not so serious as usual on potato seed pieces, beans, and peas in the trucking section of Virginia and the Carolinas, although it was reported as causing considerable damage to snap beans in North Carolina, and during the cool weather of May it did considerable damage to bean seed in Virginia and to corn, peas, and beans in western Texas, Illinois, Missouri, parts of Kansas, and Utah. During June the insect was rather destructive to bean plantings in western New York and was reported as damaging corn and beans in Indiana, Michigan, Minnesota, and Nebraska.

#### ASPARAGUS MINER

Although the asparagus miner (Agromyza simplex Loew) has been known in northern and central California for a good many years, it was recorded this year for the first time in the southern part of the state in Los Angeles County.



BOLL WEEVIL 1

"In the Rio Grande Valley of Texas the boll weevil (Anthonomus grandis Boh.), was active throughout the winter of 1930-31, and more numerous in the month of May in southern counties than for a number of years, continuing to increase and becoming more destructive as the season progressed. By July it was active in practically every county in the main cotton belt of the State as far west as Tom Green County. Damage became serious in August in scattered localities in northeastern, central, and southeastern counties. In Oklahoma weevils were numerous in 29 counties in the eastern half of the State in June, increasing in numbers and damage during July and August. In Arkansas infestation and damage were light and widely scattered. In Louisiana weevil population and damage were slight until after July 15, when showery weather caused rapid reproduction with serious damage, which continued into September, when damage to bolls became quite general. In Mississippi infestation was comparatively light and scattered until after July 15. Continued rains promoted an increase in infestation in all parts of the State during August and September, with considerable damage resulting to young bolls. In Georgia dry weather held the infestation to practically a minimum with very little damage to the crop. In Alabama infestation in the latter part of June was considerable in southern counties and light but general in the central section of the State. In North Carolina the weevil was fairly numerous and damage along the South Carolina border and in a few scattered counties in central and northern sections. Rains in August caused a heavy increase in number of weevils and damage in most districts, practically all squares becoming infested. The extreme southern counties appeared to suffer the greatest damage. In South Carolina a high degree of infestation developed during June and continued in most fields during July and August. Dry weather during September and October reduced weevils to moderate numbers. In general, infestations and resulting damage were heavy throughout southern and eastern Texas, eastern Oklahoma, Louisiana, Mississippi, and southern Alabama, and comparatively light in Arkansas, Tennessee, northern Alabama, Georgia, and the greater part of North Carolina. Another area of rather heavy infestation occurred in South Carolina and the southern tiers of counties in North Carolina."

THURBERIA WEEVIL 2

The Thurberia weevil (Anthonomus grandis thurberiae Pierce) has this fall been found outside the areas previously under regulation on account of this pest, near Eloy, Pinal County, Ariz.

PINK BOLL WORM 3

Scouting for the pink boll worm (Pectinophora gossypiella Saund.) in the crop year 1931 had not yet been completed on December 1, the date of

1 G. A. Maloney, Bureau of Entomology, U. S. D. A.

2 Plant Quarantine and Control Administration, U. S. D. A.

3 Plant Quarantine and Control Administration, U. S. D. A.



the last available report. The scouting thus far indicated relatively heavy infestations in Presidio County and the southeastern corner of Hudspeth County, Tex.; light infestations in Brewster, El Paso, Reeves, and Ward Counties, and a trace in Midland and Pecos Counties, Tex. On November 12, 13, and 14 a study of 14 fields in the Big Bend area in Presidio County, the most heavily infested section in the United States, indicated 21 per cent of unpickable bolls. In New Mexico, slight infestations were found in Chaves, Dona Ana, Eddy, and Otero Counties, and in Arizona in Graham, Greenlee, and Maricopa Counties. Scouting and the examination of gin trash in the Salt River Valley (Maricopa County) indicate progress in the direction of the elimination of infestation.

#### COTTON LEAF WORM

The cotton leaf worm (Alabama argillacea Hbn.) was first reported this year from Nueces County, Tex., on June 27. This is somewhat later than the observations of 1930, as this insect was very prevalent in practically all fields in the lower Rio Grande Valley in the last week in June of that year. No reports from the lower Mississippi Valley region were received until late August this year, and the insect reached the cotton too late to do any material damage. Late in October a single specimen was taken in Michigan, and large numbers were present in Brown County, Wis., on October 1. The moths did serious damage to peaches in Cass County, Nebr., during the first week in October. No large flights were observed in any of the Northern States this year. It will be recalled that last year a very heavy flight occurred into the Northern States, extending over the East Central, Middle Atlantic, and New England States, finally reaching Canada.

#### PERIODICAL CICADA

Brood V of the periodical cicada (Tibicina septendecim L.), a very compact brood centering in West Virginia and eastern Ohio, appeared in large numbers over practically its entire range. A very well defined colony on the eastern end of Long Island, New York, was definitely confirmed by this year's observations. Brood V appeared during 1931 in the following counties:

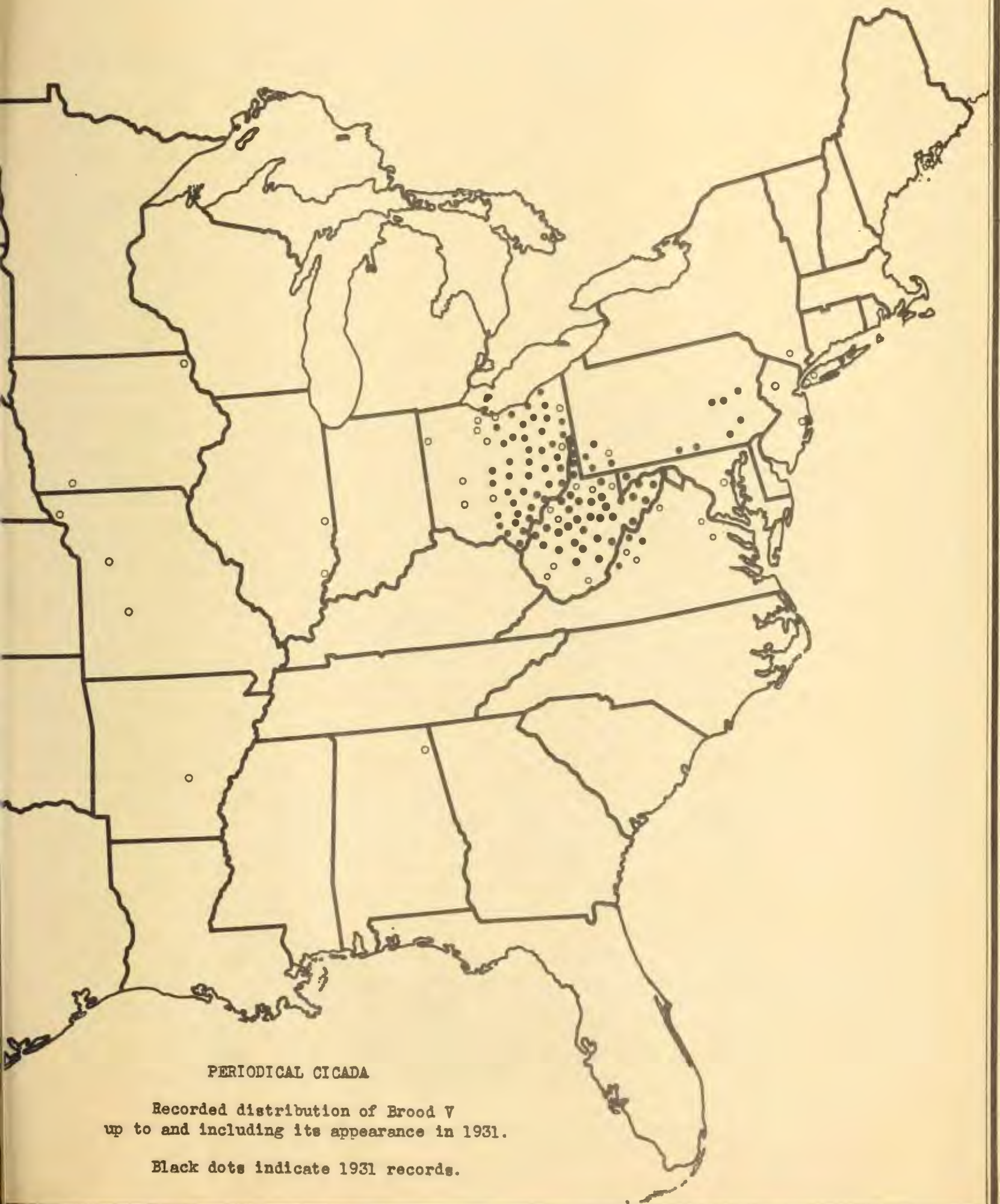
##### Ohio

Ashland, Athens, Belmont, Carroll, Coshocton, Columbiana, Cuyahoga, Delaware, Fairfield, Franklin, Gallia, Geauga, Guernsey, Harrison, Hocking, Holmes, Huron, Jackson, Knox, Lake Lawrence, Licking, Lorain, Mahoning, Medina, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Portage, Richland, Ross, Scioto, Stark, Summit, Tuscarawas, Vinton, Washington, Wayne.

##### West Virginia

Barbour, Braxton, Brooke, Calhoun, Clay, Doddridge, Fayette, Gilmer, Grant, Greenbrier, Hampshire, Hancock, Hardy, Harrison, Jackson, Kanawha, Lewis, Lincoln, Marshall, Mason, Mineral, Monongalia, Morgan, Nicholas, Ohio, Pendleton, Pleasants, Pocahontas, Putnam, Randolph, Ritchie, Roane, Taylor, Tucker, Tyler, Upshur, Webster, Wood.





PERIODICAL CICADA

Recorded distribution of Brood V  
up to and including its appearance in 1931.

Black dots indicate 1931 records.







Pennsylvania

Adams, Allegheny, Berks, Carbon, Fayette, Chester, Franklin, Greene, Lancaster, Northumberland, Schuylkill, Washington.

Virginia

Alleghany, Augusta, Highland, Shenandoah.

Maryland

Garrett.

New York

Suffolk.

GIPSY MOTH and BROWN-TAIL MOTH 1

(Porthetria dispar L.)

There was less defoliation caused by the gipsy moth/this summer than for several years, and the trees in most of the area were practically free from gipsy moth feeding. Defoliation was severe in the counties of Bristol, Plymouth, and Barnstable, Mass. There was recorded a total of 204,720 acres in New England which showed some feeding by the gipsy moth caterpillars, but over one-half of this was classified as less than 10 per cent defoliated, leaving 101,583 acres classified as from 10 to 100 per cent defoliated, and over one-half of this amount (54,710 acres) was in the southeastern section of Massachusetts. No infestation of the gipsy moth was found in 1930 to 1931 on Long Island by the <sup>New York</sup> conservation department, except in the towns of North Hempstead and Oyster Bay. In the former, 110 egg clusters were discovered in 17 infested localities, and in the latter, 67 were found in 24 infested localities. Practically all of these infestations were found in woodland. During the past year to July 1, 1931, no gipsy moth infestation was found in the barrier-zone area in Vermont in the scouted territory. Early in July, 1931, a scattered infestation was found in Colebrook, Conn., near the Massachusetts State line. A group of towns including Sandisfield and New Marlboro, Mass., and North Canaan, Canaan, and Norfolk, Conn., have carried numerous infestations, many of them in woodland, during the last two years. The result of work in the New York barrier zone shows somewhat fewer infestations than during the previous fiscal year and indicates that marked progress has been made in cleaning up infested locations. The last gipsy-moth infestation in New Jersey was found in May, 1929. The southern half of Bridgewater Township and the northern half of Hillsboro Township have been examined with special care, as this area was the most heavily infested when the insect was first found in New Jersey. The work done thus far has failed to reveal any trace of the gipsy moth during 1930-31.

The brown-tail moth (Nygmia phaeorrhoea Don.) has not been found outside the regulated area this year.



## SATIN MOTH 1

During 1931 the satin moth (Stilpnotia salicis L.) was found in new localities in the following counties and quarantine regulations were modified to cover the additional areas: Piscataquis, Somerset, and Franklin Counties, Me.; Orange County, Vt.; Berkshire and Franklin Counties, Mass.; and Hartford, Litchfield, New Haven, and Fairfield Counties, Conn.

## TENT CATERPILLARS

The forest tent caterpillar (Malacosoma disstria Hbn.) was generally reported from the New England and the northern Middle Atlantic States as very scarce. Late in April the insect was active and abundant in the Gulf region in Alabama and Louisiana. In Louisiana, after defoliating the sweet gum and willow, it attacked oak and wild blackberries and also inflicted considerable injury to strawberries by eating the flowers. During May, in Virginia, several hundred acres of forest land in Fluvanna County were completely defoliated; a similar outbreak occurred in Buckingham County. These were said to be the worst outbreaks ever experienced in that State. From June 10 to 20 the moths of these caterpillars were so numerous in the streets of Lynchburg and Roanoke, Va., that merchants were forced to turn out their window lights. Adults were observed early in May in large numbers at Orlando, Fla. During June there was some defoliation reported from Hancock County, Me. The eastern tent caterpillar (Malacosoma americana Fab.) on the whole was not abnormally numerous this year throughout the New England, Middle Atlantic, and South Atlantic States. On the other hand, reports of unusual numbers of this insect were received from Arkansas and Texas. During the late spring there were reports of some defoliation, especially of wild black cherry, in southern Maine, and it was also recorded as abundant in restricted localities in the other New England States. The California tent caterpillar (M. californicus Pack.) was extremely prevalent in late March around Phoenix, Ariz., where it was defoliating cottonwoods and severely injuring apricot foliage.

"The western tent caterpillar (Malacosoma pluvialis Dyar.) was again abundant on alder, poplars and willow along the coast of Oregon and the Columbia River. However, defoliation of these trees was not so severe as last year and only a few places showed trees completely stripped." 2

## SADDLED PROMINENT

Adults of the saddled prominent (Heterocampa guttivitta Walk.) issued in the New England area during May and early June. Eggs hatched in the Berkshire Hills of Massachusetts on June 10 and in the White Mountains of New Hampshire on June 16. This insect, which was at the peak of its abundance in 1930, is still quite numerous throughout western Massachusetts, southern Vermont, and New Hampshire. The greater part of the defoliation was confined to maple and beech.

1 Plant Quarantine and Control Administration, U. S. D. A.

2 Forest Insect Investigations, Bureau of Entomology, U. S. D. A.



## FALL WEBWORM

During the third week in May there was a sizable first brood of the fall webworm (Hyphantria cunea Drury) in the Georgia pecan orchards, and early in June this insect was also found on pecan in South Carolina and southern Mississippi. Over northern Mississippi this insect was comparatively scarce this year, and in general was not so serious as usual throughout the South. Late in August it was reported as being very abundant throughout the New England and Middle Atlantic States and as far South as Delaware. In New England it was more troublesome than it has been any time during the past 20 years.

## BAGWORM

The bagworm (Thyridopteryx ephemeraeformis Haw.) was reported as very abundant on arborvitae in George County, Miss., in February. In June the insect was reported from Columbus, Ohio. During July reports were received of serious damage to evergreens in Vermont, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, and Ohio. The bagworm was quite generally reported during August from New York westward to Indiana and Kansas, and southward to Mississippi and Florida. Reports continued to come in during September from this same general area.

## BARK BEETLES 1

The mountain pine beetle (Dendroctonus monticolae Hopk.), which has been sweeping through all of the lodgepole and white pine stands of the Pacific Northwest, is now decreasing in many sections, owing largely to a lack of suitable host material. The most serious epidemic in California is in the Medicine Lake district of Shasta National Forest and there is evidence of a decided increase in some stands of sugar pine in the Sierra Nevadas. In Oregon and Washington epidemics have been noted during the year on the Fremont, Crater Lake, and Deschutes National Forests, the Klamath Indian Reservation, and throughout the Cascades of Washington. The outbreak in Mount Rainier National Park was completely under control. Increased losses occurred throughout the lodgepole pine forests of Montana and Idaho, and within the Beaverhead National Forest alone there were over twelve million trees destroyed in 1931. There was also a marked increase in losses in Yellowstone National Park. In central Idaho the infestation has spread throughout Salmon, Challis, Payette, Weiser, and Idaho National Forests, and it is now moving northward. Similar outbreaks continued to ravage the Pine Forest on the Kaniksu and Pend Oreille National Forests. In general the western pine beetle is not materially advancing in intensity of infestation. However, losses running as high as 8 per cent of the stand were observed along the western slopes of the Sierra Nevadas in the Sierra, Stanislaus, and Sequoia National Forests, California. Throughout southeastern and eastern Oregon and Washington losses were particularly heavy on the Fremont, Deschutes, Ochoco, and Malheur National Forests, the Klamath Indian Reservation, and the private timber lands adjacent to these areas. In southern Oregon the infestation is increasing and reached 3 to 4 per cent of the timber stand this year, while on the Ochoco and Malheur



areas losses ran from 5 to 7 per cent of the timber. It is estimated that approximately six hundred million board feet of western yellow pine was killed by this beetle during the year throughout Oregon and Washington. In Glacier National Park, "The southern pine beetle (D. frontalis Zimm.) was exceedingly scarce throughout the forest in the Southeastern States. This situation was believed due to the nearly complete natural control of the beetle during the late fall and winter of 1930-31, brought about largely through two factors, namely, (1) abnormally high temperatures and (2) to a lesser extent to the activities of birds, particularly woodpeckers. The high temperatures during October and November of 1930 brought about premature maturity and emergence of broods which normally overwinter in the larval, pupal, and adult stages. A large percentage of those broods were destroyed by woodpeckers as they reached the mature larval, pupal, and callow adult stages. Others which emerged attacked trees but were unable successfully to establish their broods in them so late in the season. The only activity noted during 1931 was in the vicinity of Asheville, N. C., where the deficiency in rainfall continued to be somewhat greater than in surrounding noninfested areas. Near Asheville several spot outbreaks occurred, becoming more noticeable in the late summer and fall months."

#### PINE SHOOT MOTHS

Pine shoot moths (Rhyacionia spp.) are causing considerable concern in the Northeastern States as serious pests to cultivated conifers, particularly nursery stock, upon which they are destructive to the terminals. Reports of serious damage to Scotch pine (Pinus montana), red pine (Pinus rubra), mugho pine (Pinus montana mughus), Austrian pine (P. nigra), and other species of pine nursery stock in Pennsylvania by Rhyacionia buoliana Schiff., and in the vicinity of New Haven, Conn., and the Metropolitan district of Boston, Mass., were reported. Rhyacionia frustrana Scudd. appeared in large numbers in a plantation of pitch pine (P. rigida) during August at Cheney, Pa., and also occasioned considerable injury to young "spruce pine" (Tsuga canadensis) at Laurel, Miss. A new species of pine shoot moth (Eucosma gloriola) described by Heinrich (Proceedings Ent. Soc. Washington, Vol. 23, No. 8, page 196, Nov. 23, 1931) was found to be quite generally abundant last year in the lateral shoots of white pine (P. strobus) at North Stamford, Conn. During this year it was sufficiently numerous at some places to cause an appreciable amount of injury. The moths from the type material emerged during the early part of May of this year from larvae collected during early July, 1930, by Dr. E. P. Felt.

#### SPRUCE BUDWORM

The first adults of the spruce budworm (Harmoloba fumiferana Clem.) of this year were observed at Fargo, N. Dak., on June 17. This insect defoliated large areas of balsam fir and several species of pine in Wisconsin and North Dakota. During early July, in Wisconsin, areas in some cases covering an entire township had practically every tree completely defoliated. An outbreak of this insect was first recorded in the Cody Canyon, Shoshone National Forest, of Wyoming in 1926, and since that time has spread over a tremendous acreage and destroyed large areas of Douglas fir; this outbreak decreased somewhat in severity during 1931. Another outbreak in the Ochoco



National Forest in Oregon has produced large areas of dead and dying white fir and Douglas fir and larch during the year.

#### HEMLOCK LOOPER

The hemlock looper (Ellopia fiscellaria Guen., var. lugubrosa Hulst) during the past three years has built up a tremendous epidemic in Pacific and Grays Harbor Counties of Washington. During 1931, ninety million board feet of hemlock, with some western red cedar and Sitka Spruce, is estimated to have been killed in Pacific County and another 10 million board feet killed in Grays Harbor County. A total of 162 million board feet has been killed in Pacific County during the three years of the epidemic.

#### LARCH CASE BEARER

The larch case bearer (Coleophora laricella Hbn.) was reported as severely damaging large stands of larch in Maine, Vermont, Massachusetts, and Pennsylvania. In three counties in Maine the insect defoliated from 50 to 100 per cent of every stand of larch. This damage continued into June, when reports of damage were also coming from Massachusetts, New York, and New Hampshire. A late brood of this insect defoliated larch in September in New York.

#### BIRCH SKELETONIZER

Birches were very severely skeletonized by the birch skeletonizer (Bucculatrix canadensisella Chamb.) during the late summer and early fall in Maine, New Hampshire, Vermont, New York, Wisconsin, and Minnesota. In many places in the Adirondacks of New York State the birches were completely defoliated. In Maine hundreds of thousands of acres of birch in the northern part of the State were browned by this insect. The birch leaf-mining sawfly (Phyllotoma nemorata Fall.) was associated with B. canadensisella throughout the New England area and New York.

#### A LEAF ROLLER

Although the leaf roller Cacoecia conflictana Walk. has been known for a good many years as a poplar pest in Western Canada, it seems to be a comparatively new pest in the United States. This year we received a report of approximately 43,000 acres of poplar being defoliated in the Moosehead Lake district in Maine. The adults were in flight the last week in June and by the middle of July another brood of larvae were feeding on the poplars.

#### ELM LEAF BEETLE

Overwintering adults of the elm leaf beetle (Galerucella xanthomelaena Schrank) were abundant in late April at Narragansett, R. I., and during the latter part of June eggs and small grubs were very numerous in southern New England. Indications of the work of this insect were also observed during June in West Virginia, and it was reported as very abundant at



Jackson and Lexington, Oreg. During July it was quite generally reported from New Hampshire southward along the Atlantic seaboard to Maryland, with occasional outbreaks in Ohio and Kentucky. Early this spring this beetle was recorded for the first time in Yosemite National Park, Calif., and late in the season a report was received that it was spreading rapidly in many parts of California.

#### BOXELDER BUG

Early in the spring the boxelder bug (Leptocoris trivittatus Say) became very much of a nuisance as a household pest in many parts of Iowa, Missouri, Colorado, and Utah. Early in April it was reported from North Dakota. By mid-July it was starting to become troublesome in dwellings in Indiana, and as the summer advanced it became unusually abundant throughout the East Central States and in the Middle Atlantic States from Delaware southward.

#### BEECH SCALE 1

"In April of this year the beech scale (Cryptococcus fagi Bar.) was found in the vicinity of Boston, Mass. As a result of preliminary survey this insect was found in three distinct areas: One is between Augusta and Belfast in Maine, another includes Gloucester, Essex, Manchester, and Beverley in northeastern Massachusetts, and the third includes the Boston district. As far as it is known, this insect is limited to beech, both the American and the European species being attacked. It is believed, both in Europe and Canada, that the slime flux often associated with this insect is more dangerous to the trees than the scale itself. This insect is recorded as quite prevalent in the Maritime Provinces of Canada."

#### JAPANESE BEETLE

During the summer the Japanese beetle (Popillia japonica Newm.) was collected at several places outside of the previously known infested areas, including Charleston, S. C.; points in Somerset, Worcester, Anne Arundel, Talbot, and Wicomico Counties, Md.; Richmond, Franktown, and Nassaradox, Va.; Altoona and Erie, Pa.; Little Falls, Watkins Glen, Ft. Edwards, and Albany, N. Y.; Taunton, Mass.; Pawtucket, R. I.; and Cleveland and Columbus, Ohio.

#### ASIATIC BEETLE 2

The Asiatic beetle (Anomala orientalis Waterh.) did considerably more damage to lawns in Westchester County, New York, than in previous years. On Long Island damage is being successfully controlled. This insect is now known to be distributed in Suffolk, Nassau, Queens, Westchester, and Schenectady Counties, N. Y.; Essex, Bergen, and Union Counties, N. J.; and Fairfield and New Haven Counties, Conn.

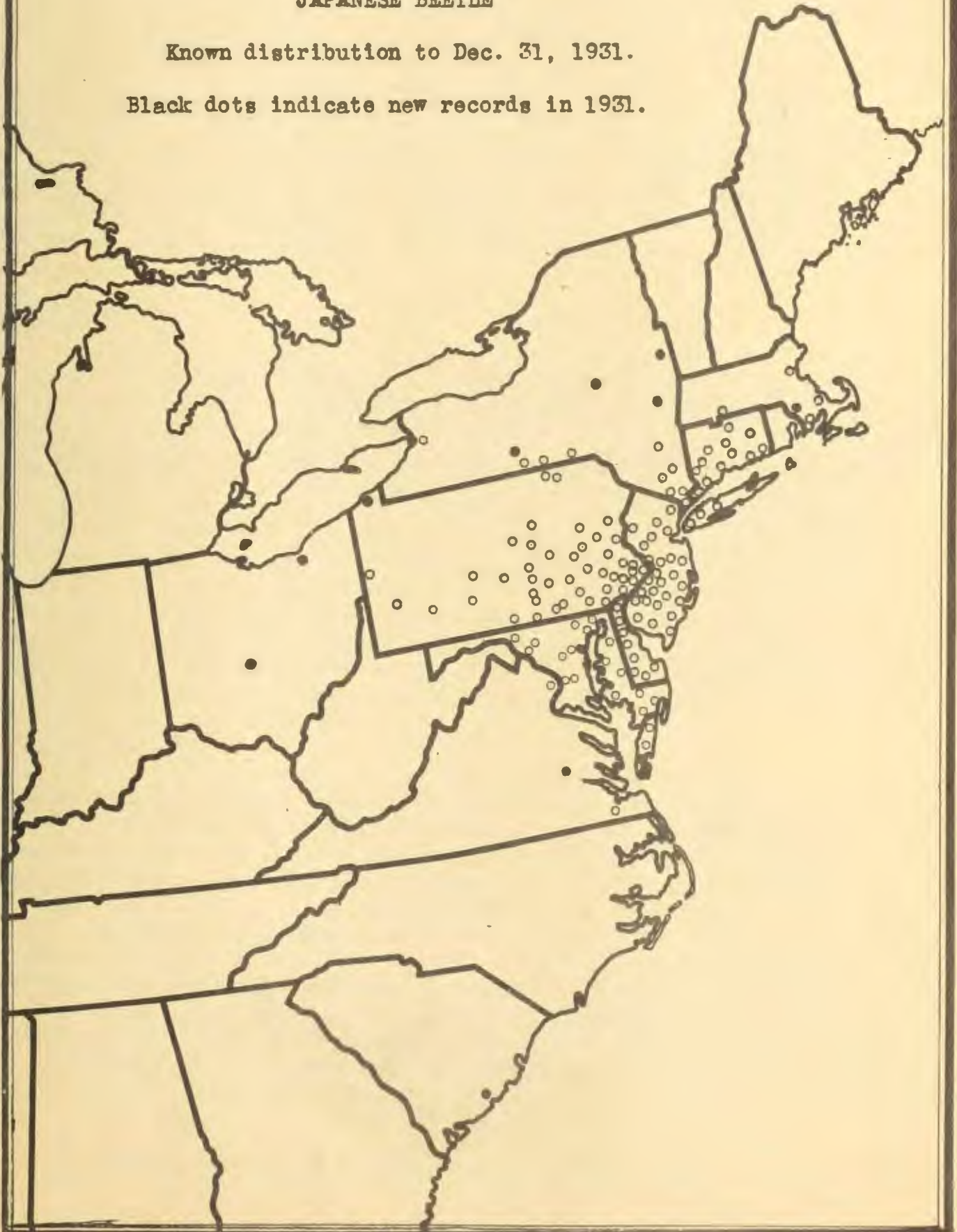
- 1 J. V. Schaffner, Jr., Bureau of Entomology, U. S. D. A.
- 2 H. C. Hallock, Bureau of Entomology, U. S. D. A.



JAPANESE BEETLE

Known distribution to Dec. 31, 1931.

Black dots indicate new records in 1931.









ASIATIC GARDEN BEETLE 1

The area of heaviest infestation by the Asiatic garden beetle (Autoserica castanea Arrow) was found on Long Island in Nassau and Queens Counties. An area of continuous infestation occurred around New York City in New York and New Jersey covering the western end of Long Island as far east as the eastern border of Nassau County, the southern portion of Westchester County, and in New Jersey the counties of Bergen, part of Passaic, Hudson, Essex, Union, and a small part of the north end of Middlesex and Monmouth. There were also outlying infestations at New London, New Haven, Cromwell, Manchester, Mansfield, New Canaan, and Southport, Conn.; Kingston, Fishkill, Babylon, Patchogue, Brookhaven, Amawalk and Mt. Kisco, N. Y.; Riverton, Palmyra, Hamonton, Allens, and Cedar Grove, N. J.; Philadelphia and Harrisburg, Pa.; Milford and Winterthur, Del.; Frederick and New Church, Md.; East Falls Church, Va.; and Washington, D. C.

A SCARABAEID

During the fall of this year reports from widely scattered localities in the Eastern States were received complaining of the damage done to golf greens, fairways, and private lawns by the larvae of the scarabaeid beetle Ochrosidea villosa Burm. In some cases the roots were so completely cut from the sod that it could be rolled up by hand. Among the reports received this year was one from Washington, D. C.; one from Bayside, Long Island; another at Lawrence, N. Y.; and a third at Woodmere, N. Y. Some 3 acres of lawn were also ruined on an estate near South Norwalk, Conn. This insect has been observed as a pest of lawns and golf greens in previous years. In 1908 it was reported from Middletown, Pa., and in 1930 it was reported as damaging golf greens in Sacramento, Calif. The insect is known to occur over practically the entire United States, having been reported from New York to California and southward to Alabama.

GLADIOLUS THRIPS.

During July, August, September, and October considerable alarm was caused in the cut-flower producing sections of Massachusetts, New York, Pennsylvania, and Ohio by the appearance of the gladiolus thrips (Taeniothrips gladioli Moulton) appearing in such numbers that buds and blossoms were ruined and leaves badly browned by its feeding, the damage occurring both in field-grown and greenhouse material. This insect was so prevalent in northern Ohio that several large growers were unable to exhibit at the National Gladiolus show at Cleveland. Another thrips (T. atratus montanus Hal.) was collected at Longmeadow, Mass., on gladiolus bulbs. This is a common European species that has not heretofore been recorded from North America. In Europe it feeds on a wide variety of plants, including asters, primroses, mullein, sweet clover, and scabiosa.



## A LEAF ROLLER OF ROSES 1

Severe infestation of foliage-eating lepidopterous larva on roses at Blue Point, Long Island, N. Y., was reported during August. Larvae were collected and adults reared, which were determined by Mr. A. Busck as Tortrix ivana Fern. This insect had previously been reported only from Florida, where it was reared from Iva imbricata (Fernald, C. H., Jour. New York Ent. Soc. 9 (2): 49-52, 1901). It is undoubtedly a true southern species. The larvae usually eat the young tender foliage around and on the developing buds and in this way quite often ruin the flowers. They also curl and roll the leaves, especially when ready to pupate. The Supreme, Killarney, and Briarcliff varieties of rose were being grown here but no one particular variety appeared to offer any preferential attraction to the insect.

## PAINTED LADY

During late June and July the larvae of the painted lady (Vanessa cardui L.) became very numerous in the New England States and in the entire upper Mississippi and Ohio River Valleys, covering the East Central, North Central, and West Central States. The larvae of the butterfly did no considerable damage, although they fed to some extent on hollyhocks in New England. In New England this species had not been reported in numbers since 1926. This insect is normally a thistle feeder and occasions much more alarm than damage when it appears in numbers.

## EYE GNATS

During the month of July eye gnats (Hippelates flavipes Loew and H. pusio Mall.) became quite troublesome along the Atlantic seaboard from Maryland southward to the Gulf region. In Georgia it appeared that human conjunctivitis cases were closely associated with the abundance of these insects, and in South Carolina cases of conjunctivitis of man and horses were said to be associated with the presence of these flies. As the season advanced these insects were found to be much more prevalent than they had been for many years in the South Atlantic States, and conjunctivitis was almost epidemic in southwestern South Carolina.

## STABLE FLY

During mid-September an unprecedented outbreak of the stable fly (Stomoxys calcitrans L.) occurred along the Atlantic Seaboard from Maryland to Florida. On the Eastern Shore of Maryland horses and cattle were so annoyed that many rushed into the surf to avoid the flies and were drowned, while others that were unable to reach the surf died on the beach. Dairies in the Carolinas reported considerable reduction in milk production. Reports were received from Missouri and the Gulf States



of less serious outbreaks. This condition persisted into early October. The abrupt decline in these flies along the coast seemed to be associated with very high tides.

TERMITES 1

During the current year 654 cases of damage by termites (Isoptera) were brought to the attention of the Bureau of Entomology. These cases were scattered over 36 States, the District of Columbia, the Philippine Island, and Hawaii, as indicated in the following list:

Alabama	35	Nebraska	1
Arizona	4	New Jersey	7
Arkansas	15	New York	14
California	34	North Carolina	41
Colorado	1	Ohio	12
Connecticut	6	Oklahoma	18
District of Columbia	29	Oregon	2
Florida	82	Pennsylvania	15
Georgia	27	South Carolina	21
Illinois	8	Tennessee	37
Indiana	7	Texas	57
Iowa	8	Utah	2
Kansas	5	Virginia	66
Kentucky	15	West Virginia	5
Louisiana	22	Washington	2
Maryland	8	Wisconsin	3
Massachusetts	7	Wyoming	2
Michigan	7		
Mississippi	4	Philippine Islands	2
Missouri	24	Hawaii	1

1 T. E. Snyder, Bureau of Entomology, U. S. D. A.



SUMMARY OF INSECT CONDITIONS IN HAWAII FOR 1931

O. H. Swezey

The sugarcane leafhopper (Perkinsiella saccharicida Kirk.) has been well controlled by natural enemies. On one plantation on the island of Hawaii there was an outbreak covering about 200 acres in early summer, but natural enemies, chiefly egg parasites, the egg-sucking bug Cyrtorhinus mundulus Bredd., and spiders, soon gained control.

No unusual infestation of the sugarcane weevil borer (Rhabdocnemis obscura Boisd.) has been noted. There is very satisfactory control by the New Guinea tachinid Ceromasia sphenophori Vill. The better control of rats in the sugarcane fields has lessened injury, for where cane is gnawed into by rats, the female borer more readily lays eggs in the cane, resulting in increased infestation.

The nutgrass armyworm (Spodoptera mauritia Bdv.) developed unusually bad outbreaks in several localities where sugarcane fields had been infested with nutgrass, especially on the island of Maui. Usually this pest is controlled by parasites, but poisoning had to be resorted to on a large scale.

In several localities in one plantation the grubs of the Asiatic beetle (Anomala orientalis Waterh.) caused enough injury to the roots of sugarcane to affect the yield. In most of the infested area, however, grubs have not been numerous enough to be detrimental. This pest is usually controlled by Scolia manilae Ashm., but in some cases, in fields of heavy infestation, the wasps were unable to gain access to the grubs, and in these areas some damage was done. Afterward, Scolia gained access and the grub infestations were controlled.

The Chinese grasshopper (Oxya chinensis Thunb.) has spread more widely on the Islands of Maui and Hawaii and gives indication of becoming a sugarcane pest of importance, as shown by the ragged leaves of fields bordering infested grass fields or grassy roadways. An egg parasite (Scelio sp.) introduced from the Malay States is being reared for distribution.

The pink sugarcane mealybug (Trionymus sacchari Ckll.) is very generally present in all sugarcane fields, but without causing particular injury. A parasite (Anagyrus sp.) has recently been introduced from the Philippines and has become established in a few localities. A ladybeetle (Pullus sp.) which specially preys on this mealybug, also introduced from the Philippines, is being reared and distributed and will no doubt help to ameliorate the mealybug conditions.



The gray sugarcane mealybug (Trionymus boninsis Kuwana) has been noticed rather more than usual in the cane fields, but it is mostly well controlled by the parasite Pseudococcobius terryi Ful.

The rose beetle (Adoretus sinicus Burn.) continues a troublesome pest in gardens and on many ornamental plants.

The corn ear worm (Heliothis obsoleta Fab.) is not usually a pest of corn here, but this year it has been very injurious. Half or more of the ears of green corn are found infested.

The coconut leaf roller (Omiodes blackburni Butl.) apparently has been held in control by parasites; in Honolulu the coconut leaves have been in perfect condition. However, on the Island of Maui the coconut trees are very ragged from the ravages of this pest.

The Mediterranean fruit fly (Ceratitis capitata Wied.) has been less abundant this year than in some other years. A comparison of infestation for the years 1930 and 1931 shows a slightly lower infestation this year in several host fruits. The average infestation for 10 of the principal hosts was 59.4 per cent in 1930 and 50.4 per cent in 1931.

The melon fly (Bactrocera curcurbitae Coq.) has been about as prevalent as usual this year, not preventing good crops of melons and cucumbers.

Infestations by the rice borer (Chilo simplex Butl.) were not serious, about normal crops of rice being obtained.

A leafhopper (Empoasca sp.) has been present in the Islands for about 13 years. It has fed chiefly on anaranth weeds and other weeds, but this summer was very destructive to melon vines in one region.

The little fly Agromyza virens Loew, whose maggots live in the stems of Zinnia and a number of other ornamental plants, is becoming more destructive in gardens. It was first observed in Honolulu three years ago, and is now widely spread on Oahu.

The green scale (Coccus viridis Green) is becoming more destructive in Honolulu gardens, where it attacks several kinds of ornamental shrubs and other plants.

Hibiscus hedges are more and more infested with Hemichionaspis minor Mask., which seems to affect this plant particularly, though it also attacks many other shrubs.



NOTES FROM ANNUAL REPORT ON INSECT CONDITIONS IN PORTO RICO

July 1, 1930, to June 30, 1931

M. D. Leonard

Insular Experiment Station, Rio Piedras, Porto Rico.

A leafhopper, Agallia albidula Uhler, was common on watermelon vines at Arecibo on November 4, 1931 (Mills and Anderson; P. W. Oman det.). This species has apparently not been definitely recorded before from Porto Rico.

The woolly white fly (Aleurothrixus floccosus Mask.) moderately infested about 20 young Meyer lemon trees on the Station grounds in April at Rio Piedras.

The bamboo scale (Asterolecanium bambusae Bdv.) (H. Morrison det.), was reported as heavily infesting bamboo at Cidra and at Mayaguez in August and September (A. S. Mills) and as infesting bamboo at Maricao in January (A. G. Harley). It was, however, undoubtedly generally distributed and common throughout the Island.

The eggplant stem-borer (Baris torquata Oliv.) found on beans.

An adult of the eggplant borer Baris torquata Oliv. was found on a bean leaf at Rio Piedras on Feb. 14, 1931. (A. S. Mills; L. L. Buchanan det.).

Specimens of Blissus leucopterus var. insularis Barber, were found on a garden pea plant from Vieques Island, September 10, 1930 (A. S. Mills; H. G. Barker det.).

Larvae of a moth, Brachyacna palpigera Wlsm., were common during the summer and fall in dry pods, and moths were reared from material from several localities. A prototrypid parasite of the larvae, Paralitonastix n. sp. (A. B. Gahan det.), was found in as high as 50 per cent of the larvae in some collections made.

The weevil Callosobruchus chinensis L. was found working in dry pigeon pea pods at Rio Piedras, August 8, 1930 (A. S. M.; H. S. Barber det.).

The palm aphid (Cerataphis lataniae Bdv.) was found badly infesting a plant of Cyrtopodium woodfordia in Santurce on March 4, 1931 (Faxon and Mills; H. Morrison det.).

A leaf beetle, Cerotoma denticornis Fab., was fairly common on string beans at the Station during March and April but apparently not doing much damage. No other definite observations were made during the year, but the insect was probably fairly common and general, as is usual wherever string beans were grown.



Several adults of a leafhopper, Cicadella coffeella Coz., were taken on a coffee tree at Maricao, December 11, 1930 (A. G. Harley; P. W. Oman det.); apparently not recorded before from Porto Rico.

A leafhopper, Cicadella sirena Stal, was lightly infesting a 1/2-acre patch of okra at Trujillo Alto on March 10, 1931 (Anderson and Mills; P. W. Oman det.). This is the first record for okra in Porto Rico.

A scale, Conchaspis angraeci Ckll. (Morrison det.), heavily infesting the branches of an undetermined tree at Rio Piedras, July 7, 1930 (A. S. M.). Listed previously only on vanilla at Mayaguez (1917) and ornamental croton at Mameyes (1912).

Adults of a coreid bug, Corizus hyalinus Fab., were collected from eggplant leaves at Caguas, February 18, 1931 (R. Faxon and A. S. Mills; H. G. Barber det.); previously recorded here only from Rio Piedras in June, 1916, as "very abundant on weeds in a garden, some feeding on tomato" (Wolcott's "List").

At Aguada Cycloneda sanguinea L. was common in infested fields in March, but the pupae were highly infested by an undetermined chalcid. Although the extensive properties of the Aguirre Sugar Co. on the South Coast suffered a considerable dry spell during the winter, Mr. Herbert Osborn, jr., and others reported the aphid not so bad as during the previous year.

The cactus scale, Diaspis echinocacti opuntiae Ckll. (Morrison det.), observed on a cactus (Opuntia?), at Coamo, September 30, 1930 (A. G. Harley), and one plant of Opuntia brasiliense was moderately infested in Santurce, March 24, 1931 (R. F. and A. S. M.).

A few caterpillars of Dione vanillae L. were observed eating the leaves of one vine at Rio Piedras on July 13 (A. S. Mills).

A leaf beetle, Disonycha laevigata Jacoby, was abundant and doing considerable damage to a fair-sized garden patch of both beets and Swiss chard at Palo Seco on August 29, 1930. The grower stated that these beetles had troubled him for several years and had necessitated constant measures of control (M. D. L. & A. S. M.).

Flea beetles, Epitrix cucumeris Harr. and E. puvula Fab., were more or less abundant on eggplant in several localities examined, especially during the fall and winter; more damage was done to seedlings than to plants in the field.

A pentatomid bug, Euschistus crenator Fab., was observed in all stages feeding on the fruits in a 2-acre planting at Arecibo on February 24, 1930; about 15 per cent of the plants were affected (E. G. Anderson and A. S. Mills; H. G. Barber det.).



The "Vaquita verde," Exophthalmodes roseipes Chev., also did some damage to foliage in the main citrus section during the summer and, according to one of the best growers, caused some injury to the fruits in June, 1931, in his locality.

A thrips, Frankliniella (Euthrips) insularis Franklin, was found infesting pigeon pea blossoms at Mayaguez January 2, 1931 (H. Morrison det.).

Larvae of Heliothis virescens Fab. were repeatedly found eating large holes into the green pods of pigeon peas.

The cottony-cushion scale (Icerya purchasi Mask.) (Morrison det.) was found lightly infesting 50 rose bushes at Santurce February 24 (J. Luciano).

A leaf-footed plant bug, Leptoglossus gonagra Fab., did considerable injury from the latter part of November into December in a 65-acre grapefruit grove at Pueblo Viejo. At the same time about 10 acres of grapefruit were attacked a little west of Bayamon and caused about 10 per cent of the fruits to drop. The bugs were present in enormous numbers and were breeding on the wild balsam apple, Momordica charantia L., which was very common in the grove. The adults flew to the ripening fruits and made small feeding punctures under which the pulp became broken down and often had a slightly rotten odor and a bitter taste. By the first of January all trouble was over and it was reported that very few of the bugs could be found in either grove.

The scarabaeid beetle Ligyris tumulosus Burn., was common at lights early in June at Aguirre, but scarce the end of the month.

A thrips, Mesothrips ficorum Marchal (also Gynaikothrips uzeli Zimm.), was observed abundant as usual in several parts of the Island, often considerably curling the leaves of West Indian laurel, Ficus nitida.

The coffee shade tree ant or "horniguilla," Myrmelachista ambigua Forel var. ravulorum Wheeler, was generally present throughout the coffee-growing sections, but during the last year and since the hurricane of 1928 it has been less abundant and injurious than formerly, owing to the destruction of so many of the large coffee shade trees; the ants are less abundant or at least less in evidence during wet weather.

A stratiomyiid fly, Neorondania chalybea Weid. (C. T. Greene det.), was taken on a potato leaf at Cidra, February 18, 1931 (Faxon and Mills). Previously listed only from Rio Piedras.

An adult of Nezara viridula L. was taken feeding on a pepper fruit at Arecibo, February 24, 1931 (E. G. Anderson and A. S. Mills; Barber det.).

Nezara viridula L. was observed injuring about 20 percent of tomato fruits in a garden patch at Rio Piedras in December (A. S. Mills).



The leaf-tier Pachyzancla perisudalis Walk., was present in the field, but was more injurious to a number of experimental plants grown in the greenhouse throughout the year.

Larvae of the greenhouse leaf-tier (Phlyctaenia rubigalis Guen.) were observed doing considerable damage to the foliage of string beans in January and February.

The tobacco leaf miner (~~Gottosyrna~~ operculella Zell.) did considerable damage, more than usual, due to unusually dry weather around Comerio and Caguas, and also in one field near Rio Piedras during February, March, and April.

The citrus rust mite (Phyllocoptes oleivorus Ashm.) was apparently not so injurious on the whole as during the previous year on citrus.

The pineapple mealybug (Pseudococcus brevipes Ckll.) (Det. Morrison), has been generally present but apparently neither common nor injurious. This (according to specimens determined by Dr. Morrison, from Dr. Wolcott) is not P. citri Risso, but is what was listed in Wolcott's "Insectae Portoricensis," p. 281, as P. bromeliae Bouche.

The hemispherical scale (~~Saissetia~~ hemisphaerica Targ.) (H. Morrison det.), was reported as infesting all the fruits on one/<sup>Guava</sup>tree at Juana Diaz, March 13, 1931 (Faxon and Mills). The hemispherical scale, Saissetia hemisphaerica Targ., was reported abundant and causing considerable sooty mould on coffee trees at Guayanilla during April. The hemispherical scale was found to be lightly infesting a 1-acre planting of okra at Trujillo Alto on March 27 (R. Faxon and A. S. Mills; H. Morrison det.).

The onion thrips (Thrips tabaci Lind.) was present as usual wherever onions are grown and often very injurious, more so of course where control measures were not well carried out and in the drier sections and periods.

An adult of the bug Thyanta perditor Fab. was found feeding on tomato fruit at Corozal February 5, 1931 (A. S. Mills; H. G. Barber det.).



INSECT CONDITIONS IN SALVADOR, CENTRAL AMERICA

by Dr. Salvador Calderon

Dirección General de Agricultura, Salvador

Hammoderus spinipennis Thoms. Bores in the trunk of coffee bushes, especially of young plants.

Callipogon barbatum Fab., Macrobasis diversicornis Haag, Oncideres poecila Bates (?), Psiloptera (Lampetis) simplex Waterh., and Pachylis hector Stal damaged Albizia malacocarpa, a tree used as coffee shade, in the eastern part of the State.

Conotrachelus sp. In coffee fruits; probably not injurious.

Apion sp. In fruits of Andira inermis and of coffee.

Idiarthron subquadratum S. Z. & P. Damages coffee by cutting young twigs, leaves, and fruits. This and similar insects are known locally as chacuates, or chacuatetes.

Auxinobasis coffeella Busck. The larva of this moth causes considerable damage to coffee seeds, both in the field and when stored. In the field the larvae are generally found in fruits on the lower branches, or on those that have dropped.

Leucoptera coffeella Staint. Mines in coffee.

Saissetia hemisphaerica Targ., found on coffee, at times abundantly; and S. nigra Neit., found on Coffea liberica and Eugenia malaccensis.

Toxoptera aurantiae Boy. and Toumeyella sp. attack lines.

Cotinis mutabilis G. & P. found in citrus fruits.

Anastrepha serpentina Wied. Bred by Dr. Rafael Gonzalez Sol from avocados, and also reported by him from mangoes. (These are both unusual records for this species.--Bates.)

Rhynchophorus palmarum L. This is the commonest evil in the buds of dying coconut palms; possibly secondary.

Rhina barbirostris Fab. bores in the terminal buds of coconut palms, and the coyol palm (Acrocomia vinifera). It is possible that it is secondary to a bacterial or fungus attack.

Galerita ruficollis Dej. found in dead coconut palms; probably only incidental.



Azochis gripusalis Walk. The larva bores in the terminal branches and buds of the fig (Ficus carica).

Cosmopolites sordidus Gern. found in banana rhizomes.

The following cotton stainers have been found in Salvador: Dysdercus ruficollis ; D. obliquus H. S.; D. minus Say; D. flavolinbatus Stal; and D. albidiventris Stal.

Alabama argillacea Hbn. The most noticed of the insects attacking cotton leaves.

Laphygna frugiperda S. & A. Causes considerable damage as a cutworm, especially in cotton and corn.

The larvae of Rhodoneura terminalis Walk. have been found in Miguel, boring in the tips of the branches of cotton.

Tonaspis inca Guer. found on cotton.

The following leafhoppers have been found on cotton: Cicadella pulchella Guen. and Oncometopia undata Fab.

Pantomorus fenoratus Sharp and Champion was reported from the eastern part of the State, where it was damaging corn.

Mocis repanda Fab. A common cutworm of corn.

Beans are so severely attacked by Pyrota rugulipennis Champion in the region of Tacachico, Department of La Libertad, that their production is almost impossible.

A species of Apion near griseum Smith was very abundant and damaging in unripe seeds of Phaseolus vulgaris in the grounds of the Experiment Station of La Ceiba.

Taeniopoda aurantia Bruner. An important pest of beans in the eastern part of the State.

Schistocerca americana Drury and S. paranensis were especially damaging to beans.

Larvae of Pieris elodia Bdv. and P. monuste L. were found on cabbage.

Eciton coeca Latr. and Ectatomma ruidum Roger were reported as damaging peanuts in the department of Cuscatlan.

Feltia annexa Treit. was very damaging to tobacco.





The buds of Cycas revoluta are destroyed by Aulacoscelis hoegei Jacoby.

Cleogonus rubetra Fab. Found in the fruits of Andira inernis. (Cabbage angelin.)

Umbonia crassicornis Am. & Serv. was found on Inga preussi.

Poekilloptera sp. Found on Cassia grandis, Pithecolobium saman, Inga paterno, and I. punctata.

Dione vanillae L. Observed on Passiflora quadrangularis.

As a larva, Nodonota cretifera Lefevre injures the roots of roses and other plants, whose leaves and flowers are attacked by the adult.

Minthea rugicollis Walk. Found in Spanish cedar wood.

Phelonerus aberrans Sharp, observed in seeds of Cassia grandis; Bruchus obtectus Say and Zabrotes (Spermophagus) pectoralis Sharp, found in stored beans; and Bruchus sp. in seeds of Caesalpinia eriostachys; and Pseudopachymerus brasiliensis Thunb. found in seeds of Mucuna sp.

Pachymerus curvipes Latr. In the fruit of the palm Brahea salvadorensis.

Cathorama herbarium Gorham. Found in Phaseolus vulgaris, seeds of Ramirezella ornata, and dried tobacco.

Sitophilus oryzae L. In stored corn.

The larvae of Plodia interpunctella Hbn. live in the pulp of ripe coffee berries, but without damaging the seed.

The following plants have been found subject to the attack of Atta insularis mexicana Smith: Andira inernis, Theobroma cacao, Canarium odoratum, Carica papaya, Chrysobalanus icaco, various species of Citrus, Punica granatum (pomegranate), Fachyrhizus palmatilobus, Mangifera indica (mango), Nicotiana tabacum.