

## INSECTS OF INDIANA FOR 1928.

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The following account is a summary of the more important insect problems of the year. The first annual account published in the Proceedings was for 1925. These records should prove of future value in determining causes for insect abundance and in predicting insect troubles.

**Weather Conditions.** January, February and March were not far from normal. However, in February and March, cold periods and freezing and thawing when little or no snow covered the ground resulted in serious damage to wheat. April was cool throughout as was also May for the most part. This cool weather had a noticeable retarding effect on fruit blossoming and on insect development. June was unseasonably cool but with high rainfall. Insect development was somewhat retarded during this period. July was normal, especially so during the latter half, as was also August. September was cool and dry which retarded development of insects, such as the Hessian fly, which are normally active at that season. October, in contrast with the previous month, was abnormally warm. (Table I, fig. 1.)

## CEREAL AND FORAGE INSECTS.

Grasshoppers (*Melanoplus differentialis* Thos.) continued scarce in most portions of the state. Sazama reports this species more abundant than 1927 and some injury to soybeans at Vincennes in late summer of 1928.

White grubs (*Lachnosterna* spp.) were reported abundant in soil at New Carlisle, La Grange, Washington, Crown Point and Lagro. Apparently all were in their third year of development. They were responsible for winter-killing of lawn grass at Elkhart and damaging strawberry plantings at Elkhart (May 27), Mulberry (June 5), and Summitville (July 1). Garden crops were injured at Mishawaka, June 18. Asilid larvae were reported very abundant in soil in St. Joseph County, June 23, where grubs were abundant last year. At Tipton grubs damaged Delphinium May 21.

Wireworms (*Elatерidae*) damaged corn at Liberty (May 21), Covington (May 26), and Salem (June 20), and to potatoes Indianapolis (August 5).

Hessian fly (*Phytophaga destructor* Say) situation was reported by C. M. Packard, as follows: "Wheat went into the winter a year ago

<sup>1</sup>The writer is indebted to H. F. Dietz, B. A. Porter, R. F. Sazama, C. M. Packard, H. K. Riley, L. F. Steiner and Neale F. Howard for records.

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TABLE I. Comparative Monthly Weather Data for Indiana, 1928

MONTH	Temperature		Precipitation		Number of days			
	State mean	Departure from normal	State Average	Departure from normal	Clear	Partly cloudy	Cloudy	
	°F	°F	ins.	ins.				
January	Normal.....	28.6	4.6	3.05	1.21	10	7	14
	1928.....	29.0	+0.4	1.74	-1.31	13	7	11
February	Normal.....	29.6	4.1	2.51	1.19	9	7	12
	1928.....	32.0	+2.4	2.79	+0.25	9	6	14
March	Normal.....	40.7	3.9	3.86	1.54	10	8	13
	1928.....	39.6	-1.1	1.81	-2.05	11	9	11
April	Normal.....	52.0	2.1	3.49	1.23	11	9	10
	1928.....	48.0	-4.0	2.95	-0.54	11	10	9
May	Normal.....	62.2	2.6	4.01	1.07	12	10	9
	1928.....	61.0	-1.2	2.95	-1.06	15	9	7
June	Normal.....	71.6	2.2	3.83	0.96	13	10	7
	1928.....	65.8	-5.8	7.05	+3.22	8	9	13
July	Normal.....	75.3	1.7	3.40	1.05	15	11	5
	1928.....	74.7	-0.6	3.55	+0.15	17	11	3
August	Normal.....	73.3	1.7	3.31	1.04	15	10	6
	1928.....	74.6	+1.3	3.80	+0.49	16	11	4
September	Normal.....	67.0	2.6	3.12	1.02	15	8	7
	1928.....	62.6	-4.4	1.26	-1.86	19	8	3
October	Normal.....	54.5	2.5	2.69	1.16	15	7	9
	1928.....	58.2	+3.7	3.55	+0.86	15	7	9
November	Normal.....	42.2	2.4	3.90	1.19	12	7	11
	1928.....	43.5	+1.3	3.16	-0.74	9	4	17

containing on the whole light infestations of Hessian fly. The widespread plowing up of winter-killed wheat last spring was an important factor in keeping down fly abundance. In northern and central Indiana spring fly development was retarded by lack of moisture and low temperatures. Weather conditions in southern Indiana, however, were more favorable to fly activity and considerable spring infestation developed there, some fields suffering material injury.

"There was little growth of volunteer wheat during the summer and no fly activity. These conditions continued until late September due to lack of sufficient rainfall and humidity to cause general pupation. Fly emergence this fall was, therefore, retarded considerably beyond the normal time throughout the state, and material infestations developed in seedings made on or within a week following the normal fly-free date. In mid-November the insect was still largely in the larval stage though some had formed puparia.

"Owing to the general scarcity of fly in northern and central Indiana last spring and fall weather conditions unfavorable to them no serious infestations have developed this fall in this part of the state. In southern Indiana, however, particularly the southwestern portion, the greater abundance of flies surviving the summer, the large acreage of early seeding, and the retarded though plentiful emergence of adults, have combined to produce severe infestations of Hessian fly in much of

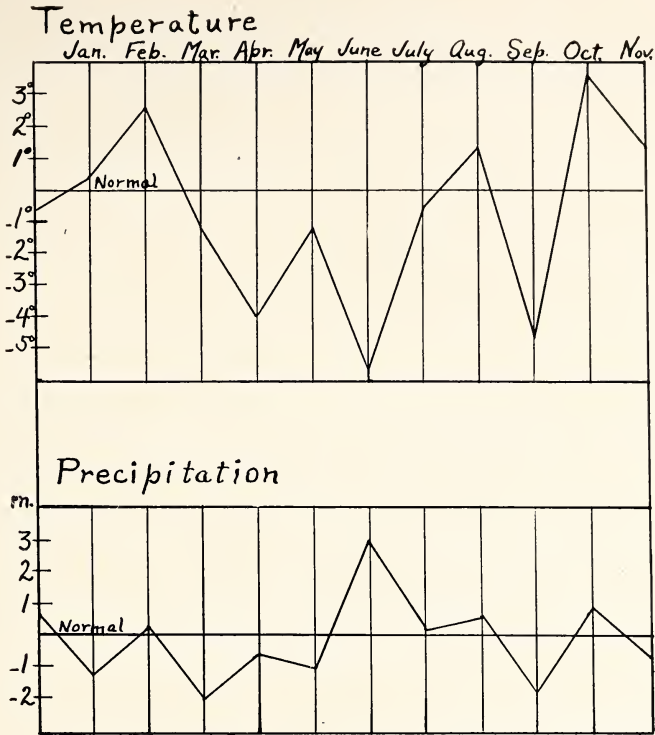


Fig. 1—Departures from normal temperatures and precipitation in Indiana for the year 1928, based on data in Climatological Data, issued monthly by the U. S. Weather Bureau.

the earlier seeding, with a prospect of serious losses to the current crop.”

Chinch bug (*Blissus leucopterus* Say) was not observed in injurious numbers anywhere in the state.

Fall Armyworm (*Laphygma frugiperda* S. and A.) appeared in destructive numbers, according to reports received, in only one locality, namely Monticello (September 17), where three acres of alfalfa were destroyed.

The common armyworm (*Cirphis unipuncta* Harv.) was not once reported during the season. Late in May, Steiner reports numerous armyworm moths in codling moth bait traps, which was indicative of armyworm outbreaks.

European corn borer (*Pyrausta nubilalis* Hbn.) continued to extend its distribution in Indiana and to increase in abundance in the older infested areas. Scouting in 1926, the year of the first occurrence in Indiana, revealed its presence in 39 townships in six counties. In 1927, more intensive search showed its occurrence in 89 additional townships in a total of 16 counties. It was evident that some of the townships first found infested in 1927 were 1926 infestations, the facilities of the

federal scouting force being insufficient to find the extreme limits of infestation in 1926. In 1928, 56 additional townships were found infested, with a total of 21 counties. The slow spread in 1928 may be attributed to the short period of moth flight which did not permit as rapid spread or as distant flight as in previous years. The infestation in the older infested counties is increasing according to expectations. D. J. Caffrey, in charge of corn borer investigations for the U. S. Bureau of Entomology, has furnished us with the following statement based on extensive counts made in the six Indiana counties first infested in 1926.

- Maximum percentage of plants infested in any one field  
(Otsego Township, Steuben County) .....3.2 per cent.
- Maximum average borer population, per township (York  
Township, Steuben County) per 100 plants.....1.94 per cent.
- Maximum average percentage of plants infested, per  
township, (Richland Township, Steuben County)..1.22 per cent.

The effectiveness of recommended clean-up practices were clearly demonstrated in Canada, Lucas County, Ohio, and elsewhere. Excellent progress has been made by federal and state workers in corn variety studies, mechanical methods of destroying crop residues, and introduction of parasites. G. A. Ficht, Purdue University Agricultural Experiment Station investigator, who is conducting fundamental research studies at the federal laboratory at Monroe, Michigan, reports excellent progress in studies on the behavior of the moth and other fundamental studies which will be of much value in developing future controls.

The common stalk borer (*Papaipema nitela* Gn.) was again conspicuously abundant and destructive. The first report was received May 17 from Indianapolis where second instar borers were injuring tomato plants in outdoor hot beds. The first report of injury to corn was from Stewartsville, May 30, followed by reports beginning June 17 and continuing into September, from Delphi, Hope, Franklin, Frankfort, Logansport, Hartford City, Lowell, Atlanta, Attica, North Liberty, Linden, Thorntown, New Richmond, DePauw, Greenfield, Rockville, Waynetown, Stendal, Monon, Remington, Plymouth, Owensville, Clinton, Tipton, Aurora, Petersburg, Albany, Peru, Jeffersonville, Fowler, Madison, Worthington, Heltonville, Williamsport, Cynthiana, Whitestown, North Vernon, Camden, Gaston, Greensburg, Brownstown, Lafayette, Indianapolis, and Kimmel. The large majority of reports referred to corn as the principal host. Early injury resulted in killing the central shoot but during August the injury included weakening the stalk causing the plants to break over in some cases. Other crops reported damaged included sweet corn, popcorn, wheat, oats, barley, tomato, potato, mint, dahlia, zinnia, hollyhock and strawflower.

Corn earworm (*Heliothis obsoleta* Fab.) was unusually scarce and not noticed at all until late in the season.

Billbugs (*Sphenophorus zea* Walsh and *S. parvulus* Gyll.) were unusually abundant and destructive throughout central Indiana. *S. zea* was decidedly the predominant species. The reason for this out-

break of billbugs can be traced back to the winter of 1926-27 when much of the clover was winter-killed. The wet spring of 1927 was responsible for a rank growth of grass and timothy, offering ideal conditions for maximum increase of billbugs. This ground heavily invested with billbugs, was planted to corn in the spring of 1928 and the resulting damage followed. The first reports of damage reached us May 18 and the beetles were active until June 4. Damage to corn (fig. 2) was reported from the following counties: Benton, Blackford, Boone, Carroll,

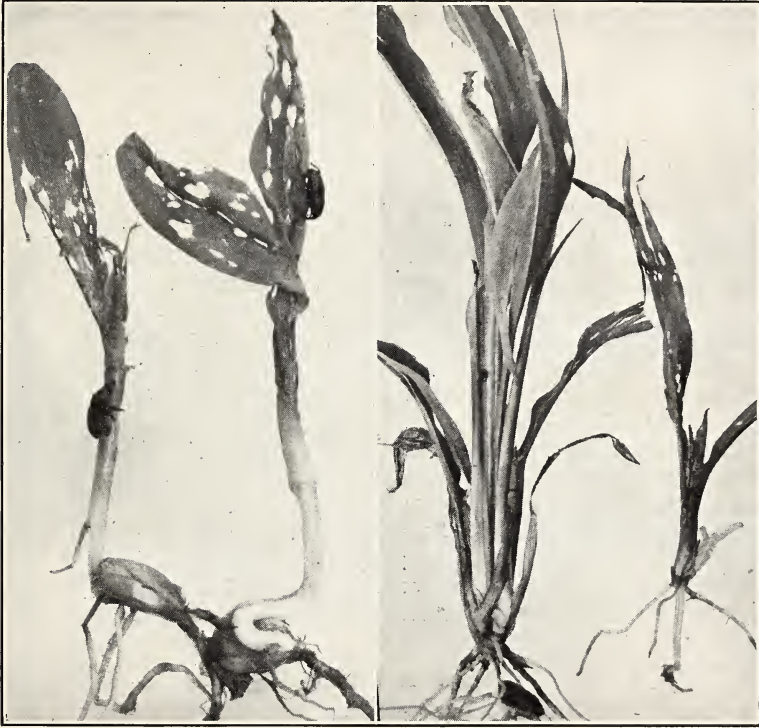


Fig. 2—Billbug injury to corn, showing at left typical early injury. At right, effect of early injury, causing tillering, stunting or death of corn plant.

Clinton, DeKalb, Fayette, Fountain, Grant, Howard, Johnson, Madison, Parke, Rush, Tippecanoe, Tipton, Union, Wayne, and Cass.

Webworms (*Crambus caliginocellus* Clem., et spp.) were abundant in the same areas infested by billbugs but the injury resulting was less serious. Evidently the conditions favoring billbug increase were responsible for the abundance of webworms. Definite reports were received from Bartholomew, Boone, Carroll, Fayette, Fountain, Grant, Henry, Jasper, Miami, Morgan, Stark, St. Joseph, and Union counties. The first reports were received May 17 and the last May 31. In all cases injury to corn was reported, excepting the report from St. Joseph County, May 31, where the worms were damaging mint.

The striped flea-beetle (*Systema taeniata* Say) destroyed three acres of soybeans at Clinton, July 7. A small black species (probably *Epitrix cucumeris* Harr.) was reported damaging corn at Connersville, May 24.

Tipulid larvae (Tipulidae) were abundant and reported cutting off corn at Anderson (May 26) and Delphi (June 2).

Cutworms (*Euxoa* sp.) destroyed three or four acres of corn at Winamac, June 2, and according to a report received July 1, the yellow-headed cutworm (*Hadena arctica* Bvd.) caused considerable damage to corn in the same locality. The greasy cutworm (*Agrotis ypsilon* Rott.) was abundant and apparently killing bent grass on golf greens at Bluffton, September 8.

Zebra caterpillar (*Ceramica picta* Harr.) was reported attacking field corn at Marion June 16 and Franklin June 25. This species also received from McCoysburg, June 16, on peas; from Rockville, June 23, on sweet corn; from Judson, June 27, on onion; and from Thorntown, July 2, on peas, cabbage and beets.

The saddle back caterpillar (*Sibine stimulea* Clem.) was sent in from every section of the state for identification but in only one case (Franklin, August 17) was information given. In that case it was reported as occurring on corn. All reports came in the last half of August.

An interesting case-bearing lepidopterous larva, determined by August Busck as a new species of *Coleophora*, was reported from Lapel, June 6, feeding on grass and timothy (fig. 3). The observer reported their presence on the grass appeared as oats scattered in the vegetation.

The pea aphid (*Macrosiphum pisi* Kalt.) was widespread and destructive to alfalfa in Elkhart and LaGrange counties May 21. This aphid was apparently also general in Fulton County about the same time, for ladybird beetle larvae were very abundant in an alfalfa field May 28 where the pea aphid had been destructive a short time before.

Clover leaf weevil (*Hypera punctata* Fab.) was damaging sweet clover at Marion, May 17, and common on alsike clover at Waveland May 28. Not generally destructive this year, however; in fact it was less common than usual.

#### VEGETABLE INSECTS.

Cabbage worm (*Pontia rapae* Linn.) damaged cabbage at Warsaw and Marion, July 23 and 24, respectively.

Cabbage curculio (*Ceutorhynchus rapae* Gyll.) damaged cabbage at Battle Ground, May 28.

Cabbage and radish maggot (*Hylemyia brassicae* Bouche) reported damaging radish at Logansport, May 29, and Morocco, May 26, and injuring cabbage at South Bend, May 31.

Striped flea-beetle (*Systema taeniata* Say) destroyed 13 acres of recently transplanted tomatoes at Worthington, June 16.

Black potato flea-beetle (*Epitrix cucumeris* Harr.) reported damaging potato at Ambia, July 6; also at Vincennes. Dietz reports this species as damaging potato and tomato in Marion County May 31.

Potato leaf-hopper (*Empoasca fabae* Harr.) injured potatoes at Napanee, June 6, Waterloo, July 21, Bringhurst, July 25, and at Vincennes.

A stem borer, probably the potato stalk borer (*Trichobaris trinotata* Say) damaged potato at Deputy, June 22.

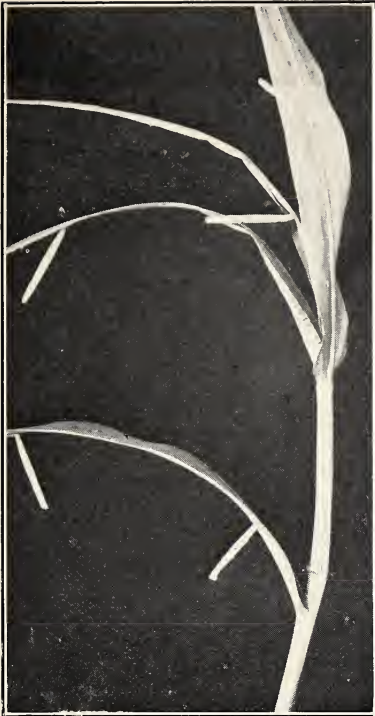


Fig. 3—A new species of case-bearer found on grass. The numerous cases attached to grass gave the appearance of scattered oats.



Fig. 4—The cause of spotting of onion foliage and dying of tips which was very prevalent in 1928 is unknown although there is some evidence that a common leaf-hopper is responsible.

Onion thrips (*Thrips tabaci* Lind.) not generally abundant. Only report of injury received was from Elwood, July 17.

Onion maggot (*Hylemyia antiqua* Meig.) apparently more destructive than for several years. Reports of damage were received as follows: Rensselaer, June 3, Plymouth, June 6, Elkhart, June 6, Warsaw, June 8, Angola, June 11, Bourbon, June 26, and Calumet City, July 17.

A common leaf-hopper (*Cicadula 6-notata* Fall.) (DeLong det.) was thought to be responsible for an onion trouble which was general in the northern half of Indiana during August, causing thousands of dollars damage. The injury is indicated by small white streaks on the foliage, superficially resembling thrips injury, shortly thereafter the tops wilting over and turning brown (fig. 4). Dr. M. W. Gardner, of the Purdue Botany Department, does not consider it a plant disease. The evidence against the leaf-hopper is largely circumstantial.

Striped cucumber beetle (*Diabrotica vittata* Fab.) was serious on cucumber at Forest, June 15. Earlier (May 31) it entered cucumber greenhouses at Indianapolis and caused much damage.



Fig. 5—The pickle worm was very abundant in 1928. At right, infested pickles showing exit holes. They become yellowed, eventually collapsing since the worms completely hollow out the fruit. At left, inside view of infested pickle.

Pickle worm (*Diaphania nitidalis* Stall) (fig. 5) was very abundant and destructive in several sections. Reports with specimens were received from Evansville, August 20, Decatur, August 25, Bluffton, August 28, and Boonville, September 18.

Mexican bean beetle (*Epilachna corrupta* Muls.) was reported from the following counties not hitherto recorded: Madison, Grant, Howard, Allen, Whitley and Steuben. No reports of further westward spread have been received. Evidence indicates that it may be occasionally destructive a little north of Indianapolis.

Bean root aphid (*Prociphilus erigeronensis* Thos.) reported damaging beans at Shelbyville, June 21, Pennville, July 5 and Salem, July 2.

Turnip aphid (*Aphis pseudobrassicæ* Davis) was destructive to turnip this past fall at Indianapolis and Greensburg.

Greenhouse centipede (*Scutigera immaculata* Newp.) was destructive in greenhouses in central Indiana. Experiments at Lafayette and Indianapolis by H. K. Riley have resulted in effective control of this pest of lettuce and other greenhouse vegetables, by carbon bisulphide fumigations.

#### FRUIT INSECTS.

Sowbugs (*Isopoda*) damaged mushrooms at Culver, June 6.

Codling moth (*Carpocapsa pomonella* L.) was normally abundant in southern Indiana although early season conditions were unfavorable and the numbers overwintering less than normal, due largely to a scarcity of fruit in 1927. The regular spray schedule gave good re-



sults. According to observations by B. A. Porter at Vincennes and L. F. Steiner at Bedford, the first moths did not emerge until May 14 at Vincennes and May 16, at Bedford, the delay being due to cool weather in April and early May, which likewise delayed apple blooming. At Bedford, the first eggs were observed May 17, but cool weather following did not permit hatching until May 26. At Vincennes, the first eggs hatched June 1, but not in numbers until June 10, the cool, wet weather since petal fall being responsible for the late hatching date. The generally unfavorable weather conditions during the appearance of the first brood held infestations to a minimum but favorable conditions during the last half of July and during August were responsible for an abundance of second and possibly third brood worms in many sections. Unlike 1927, there was a distinct period of about ten days between the first and second broods, due probably to a scarcity of hibernating worms. In 1927, the two broods overlapped about a week. In spite of this difference the second brood worms, however, appearing about the same time this year as last. Second brood worms began hatching July 23 in 1928 and the same date in 1927.

With an abundance of late worms and sufficient fruit to carry them through this past fall, large numbers are going into hibernation, which would lead us to predict an abundance of codling moth in 1929 if conditions this winter and next spring are normal.

Plum curculio (*Conotrachelus nenuphar* Hbst.) seems to be definitely on the increase in most orchard sections. Porter reports the curculio more abundant than usual on peach and apple in southwestern Indiana and his observations show considerable damage even in "pretty well sprayed" orchards. Other conditions equal, there is more curculio damage in dusted than in sprayed orchards.

Peach tree borer (*Aegeria excrucians* Say) is still reported as a pest but Porter observes that the regular use of paradichlorobenzene in some sections, as in Knox County, has reduced the numbers almost to extermination.

Tarnished plant bug (*Lygus pratensis* Linn.) more abundant than last year according to Porter. Likewise there is more "cat-facing" of peaches than in 1927.

Green stink bug (*Nezara hiliaris* Say) less common than usual on peach at Vincennes.

San Jose scale (*Aspidiotus perniciosus* Comst.) was very scarce this past year and there was less specking of fruit than for many years. In his check experimental block, Sazama found only two out of 600 alive. This was due to the high winter mortality. First crawlers were observed at Vincennes June 15, which was abnormally late.

Rosy apple aphid (*Anuraphis rosaeus* Baker) was abundant early but naturally checked in most orchards before serious damage resulted.

Shot hole borer (*Scolytus rugulosus* Ratz.) was not generally destructive. This beetle was apparently responsible for the death of apple and peach shoots by boring into the base of foliage and fruit spurs at Washington during June.

Oblique-banded leaf-roller (*Cacoecia rosaceana* Harr.) was observed eating into fruit of peach, June 22, but was not common.

Rose beetle (*Macrodactylus subspinosus* Fab.) was abundant in some sections. At Michigan City it damaged iris flowers and foliage and fruit of apple; at South Bend attacked roses; at Goshen damaged green peaches; at Winamac they were generally abundant; at Monterey young apple and plum trees; at Ray every apple in a ten-acre orchard was damaged; abundant at Crown Point, June 9-July 5, and at Medaryville causing death of young chickens, June 18.

Cotton caterpillar moth (*Alabama argillacea* Hbn.) was again completely absent.

Cherry slug (*Caliroa cerasi* Linn.) was moderately abundant in all sections of the state, occasional trees being defoliated.

Yellow-necked apple caterpillar (*Datana ministra* Drury) common on quince at Franklin, August 18, and on apple at Oden previous to October 2.

Oriental fruit worm (*Laspeyresia molesta* Busck) is definitely known to be well established in southern Indiana. Heavy losses occurred in Floyd and Dearborn counties. Other definite infestations are known from Vanderburgh, Posey, Warrick and Knox counties, in a few orchards rather severe. Steiner collected two worms in peaches at Mitchell which are almost certainly the oriental fruit worm, although adults were not reared. Peach was the host observed (fig. 6), excepting in one of our records from Dearborn County where the fruit (fig. 7) of a small quince orchard, normally yielding over 100 bushels, was completely ruined.



Fig. 6—Early season infestation by the Oriental fruit worm recognized by the dying peach twigs.

Late season leaf-hoppers (*Erythronoeura obliqua* Say, *E. hartii* Gill. and *E. maculata* Gill.) were present in many sections causing a specking of apples by excrement dots (fig. 8). The first named species is probably largely responsible in Indiana.

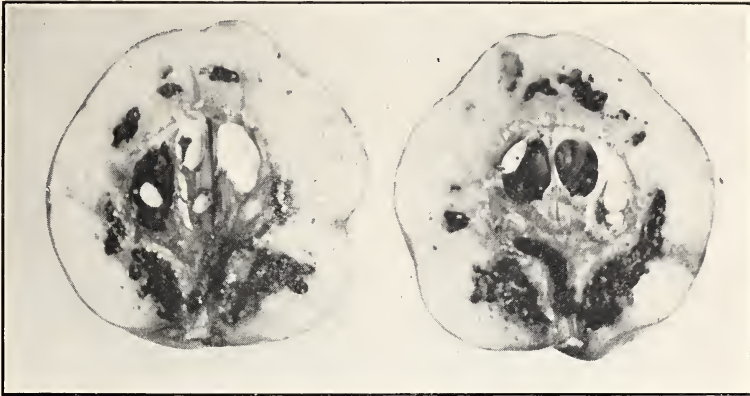


Fig. 7.—Cross section of quince showing typical infestation by Oriental fruit worm.

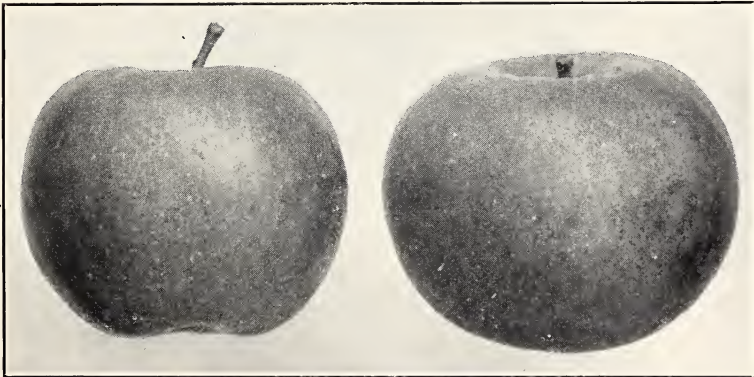


Fig. 8.—Leaf-hoppers not only injure apple by sucking the juices from the foliage, but speck the fruit with excrement as in the illustration. ( $\frac{2}{3}$  natural size.)

Potato leaf-hopper (*Empoasca fabae* Harr.) was about as abundant on apple as the year before, according to Porter.

European red mite (*Paratetranychus pilosus* C. and F.) was noticed in many orchards and seems to be generally distributed but no commercial damage reported.

Tree cricket (*Oecanthus nigricornis* Walk.) eggs were reported commonly in raspberry canes in central Indiana during April.

Raspberry fruit worm adults (*Byturus unicolor* Say) were damaging both red and black raspberries in LaPorte County, May 21. This is the

second consecutive year these beetles have been destructive according to our correspondent.

Raspberry sawfly (*Monophadnoides rubi* Harr.) (determined from foliage injury) was abundant at North Manchester, June 9.

Gooseberry gall aphid (*Aphis houghtonensis* Troop) reported damaging gooseberry at Greensburg, July 7.

The currant worm (*Pteronidea ribesi* Scop.) defoliated gooseberries at Lafayette. The larvae were full grown May 24. Dietz reports serious damage to both currants and gooseberries in the vicinity of Indianapolis, May 23.

Strawberry leaf-roller (*Ancyliis comptana* Frohl.) was reported abundant in the egg and moth stages at Walkerton, May 2, where the leaf-roller was very destructive last year.

A strawberry slug (*Empria* sp.) damaged strawberry at South Bend, May 31.

Strawberry crown borer (*Tyloderma fragariae* Ril.) reported by Dietz as increasing in Floyd County, serious in Clark County and isolated infestations in Cass County.

#### SHADE TREE AND SHRUB INSECTS.

Cottony maple scale (*Pulvinaria vitis* Linn.) was again conspicuous and destructive throughout central and northern Indiana. Reports usually on soft maple, but occasionally on grape. Ladybird beetles (*Hyperaspis binotata* Say) were conspicuously abundant in central Indiana where the cottony maple scale has been destructive. In spite of their numbers they do not appear able to effectively check the scale.

Elm scurfy scale (*Chionaspis americana* Johns.) was normally abundant and continues as an important pest of young elms. Spray tests made by Riley at Lafayette, April 16, 1928, just as the buds were ready to open gave complete control with three per cent Dendrol, Sunoco, and lubricating oil emulsion, and with a six per cent Volck. Volck was not tested at a lesser strength. This year eggs began hatching the first week in June at Lafayette.

European elm scale (*Gossyparia ulmi* Linn.) was abundant on elm at Marion, June 23.

Oyster shell scale (*Lepidosaphes ulmi* Linn.) was normally abundant. Killing of lilac and ash was reported from several localities. At Lafayette the eggs were first hatching, June 2. Dietz reports the light brown form from weeping birch.

The tulip tree scale (*Toumeyella liriodendri* Gmel.) abundant on tulip tree at Logansport, Salem, and Nashville.

Elm cockscomb gall (*Colopha ulmicola* Fitch) reported abundant at Frankfort, June 13. This gall insect is abundant throughout the state every year.

The giant aphid (*Longistigma longistigma* Monl.) was abundant at Brownstown, June 8.

Spiraea aphid (*Aphis spiraeicola* Patch) was generally abundant on bridal wreath throughout the state as usual, during June and July.

Catalpa sphinx caterpillar (*Ceratonia catalpae* Boisd.) defoliated catalpa at Lafayette, Kingman, and Thorntown early in September. Not common at Vincennes according to Porter.

Red-humped oak worm (*Symmerista albifrons* S. and A.) defoliated 50 acres of oak near Crown Point, according to a report received September 13.

Tussock moth caterpillar (*Hemerocampa leucostigma* S. and A.) was not generally destructive although reported abundant and causing partial defoliation at Franklin, July 9, and Garrett, August 31.

Bagworm (*Thyridopteryx ephemeraeformis* Haw.) were common in southern Indiana. Reports of injury were received between June 15 and August 30, from Aurora, Columbus, Danville, Franklin, Indianapolis, Martinsville, Terre Haute, and Vincennes. At Vincennes some young apple orchards, not thoroughly sprayed, were damaged.



Fig. 9—The hickory horned devil, the immature stage of the beautiful regal moth, is very often sent to us for identification, not because it is a serious pest but rather because of its large size and conspicuousness.

Hickory horned devil (*Citheronia regalis* Fab.) (fig. 9) was frequently sent in the last part of August. No injury recorded and apparently all specimens were sent in for identification because of their conspicuousness.

Spruce budworm (*Harmaloga fumiferana* Clem.) damaged blue spruce and to a lesser extent Norway pine at Cambridge City, May 31.

Walnut caterpillar (*Datana integerrima* G. and R.) was not noticeable anywhere in the state according to observations and reports.

Locust borer (*Cyrtus robiniae* Forst.) was reported destructive at Francesville, Vincennes, and Lafayette.

Red spider (*Tetranychus telarius* Linn.) abundant on evergreens at Rising Sun and Aurora during July and on juniper at Elkhart early in August.

*Paratetranychus* sp. near *unnunguis* (Ewing det.) was reported by Dietz as causing injury to Norway spruce in June in central Indiana. The willow shoot sawfly (*Janus integer* Nort.) damaged basket willow at Richmond, July 19.

Catalpa leaf-miner (*Agromyza citreifrons* Mass.) was common on catalpa at Vincennes and Terre Haute early in August.

#### FLOWER GARDEN AND ORNAMENTAL GREENHOUSE INSECTS.

Iris borer (*Macronoctua onusta* Grt.) reported injuring iris at Greencastle, June 25, and Dietz reports it as abundant as last year in the vicinity of Indianapolis. Dietz observed first hatching of eggs at Indianapolis, April 30, and hatching continued until May 25.

Glassy cutworm (*Hadena devastatrix* Brace) damaged Delphinium at Tipton, May 21. The same correspondent reported injury to Delphinium by white grubs (*Lachnosterna* spp.).

*Neodiprion pinetum* Nort. (larval det.) was reported by Dietz as occurring and sometimes defoliating nursery and ornamental plantings of white pine and to a lesser extent Scotch pine in Elkhart, Hendricks, Howard, Kosciusko, LaPorte and Marion counties.

Rose slugs (*Caliroa aethiops* Fab.) were reported abundant at Connersville, Spiceland, Lafayette, Indianapolis, South Bend, Vincennes and Valparaiso, reports being received from the last of May through the month of July.

Blister beetles not as common as last year. This was to be expected with the continued absence of grasshoppers. The striped blister beetle (*Epicauta vittata* Fab.) damaged dahlia flowers at Connersville, July 18, and the black blister beetle (*E. pennsylvanica* De G.) was reported damaging flowers at Gary, Sept. 2, although less abundant than for several years.

Rose midge (*Dasyneura rhodophaga* Coq.) infestations were observed by Dietz the latter part of the summer in Henry, Howard, and Jay counties, but none were serious.

Chrysanthemum midge (*Diarthronomyia hypogaea* Lowe) was serious in Elkhart and St. Joseph counties, according to Dietz.

Bulb fly (probably *Eumerus strigatus* Fall.) reported by Dietz attacking garden iris at Indianapolis.

Columbine Leaf-miner (*Phytomyza aquilegiae* Hardy) was destructive to commercial plantings of aquilegia at Whiting, June 19. Frequent reports of injury to home plantings were received from all sections of the state.

Common meadow grasshopper (*Orchelimum vulgare* Harr.) was reported by Porter causing serious damage to rose in greenhouse at Vincennes, early in October, by ovipositing in the rose shoots.

The pea aphid (*Macrosiphum pisi* Kalt.) was damaging sweet peas at Woodburn, July 25.

Bean root aphid (*Prociphilus erigeronensis* Thos.) responsible for considerable damage to asters at Muncie in September and early October.

*Phenacoccus gossypii* Towns. and Ckll. (Morrison det.) was reported late in November, 1927, at Vincennes on chrysanthemum, the first record

as a greenhouse pest. In 1928 it was found at Vincennes, Terre Haute and Indianapolis.

The cyclamen mite (*Tarsonemus pallidus* Banks) was very destructive to Delphinium at Lebanon, May 21. The same mite was reported as similarly destructive in 1927. According to Dietz old infestations were cleaned up by spraying at ten-day intervals until nearly ready to bloom, using nicotine sulphate one to 500 plus soap. Dietz reports finding it for the first time on Shasta and field daisies and on petunia among delphinium. One report of 50 per cent loss to geranium in a large commercial planting.

Red spider (*Tetranychus telarius* Linn.) damaged phlox at Hanover, June 22.

Bulb mite (*Rhizoglyphus hyacinthi* Boisd.) reported by Dietz on peony.

#### PESTS OF STORED PRODUCTS.

Bean weevil (*Mylabris obtectus* Say) damaged seed beans at Marion, June 22.

Angoumois grain moth (*Sitotroga cerealella* Oliv.) damaged wheat at Dyer, Aug. 5.

Indian meal moth (*Plodia interpunctella* Hbn.) damaged shelled corn at Albion, May 26.

Larder beetles (*Dermestes lardarius* Linn.) reported infesting home-cured ham at Auburn, August 18.

#### HOUSEHOLD AND MISCELLANEOUS PESTS.

Clothes moths (*Tinea pellionella* Linn.), common carpet beetles or "buffalo bugs" (*Anthrenus scrophulariae* Linn.) and black carpet beetles (*Attagenus piceus* Oliv.) were reported commonly throughout the year as usual. An interesting report from LaPorte called attention to damage to Rayon silk.

Booklice (*Troctes divinatoria* Mull.) were reported abundant in dwellings at Indianapolis and Lafayette, during August.

Silverfish (*Lepisma saccharina* Linn.) have been annoying and damaging book bindings at Lowell and Lafayette, during the past season.

Clover mite (*Bryobia praetiosa* Koch) was abundant and annoying in homes at Edinburg, Rushville, Converse and Lafayette during the last of April and first half of May. This mite was reported injuring lawns at Frankfort, May 12.

Cockroaches (*Blattidae*) were normally abundant in all sections of the state.

Fleas (*Ctenocephalus canis* Curt) was normally abundant, many reports being received from all parts of the state where they were reported troublesome in homes, barns and lawns. Reports were received frequently from April until September.

Ants (*Formicidae*) were generally destructive in lawns and in homes throughout the state. They were reported actually destroying strawberry and other plants in several cases. Dietz reports the large black carpenter ant (*Camponotus herculeanus* Linn.) as abundant in a number of residences in Indianapolis.

Mosquitoes (*Culicidae*) were very abundant at Lafayette and Muncie early in July.

An Ichneumon fly was sent in from Red Key, May 26, which was said to have stung a baby causing much suffering.

Ox warbles (*Hypoderma* sp.) were destructive at Winamac, Lafayette, and Frankfort, during April.

Cattle flies (hornfly, *Haematobia irritans* Linn., stablefly, *Stomoxys calcitrans* Linn., and house fly, *Musca domestica* Linn.) were reported from central and northern Indiana as causing considerable annoyance to dairy cattle during the last half of July.

Termites (*Reticulitermes flavipes* Koll. and *R. virginicus* Banks) were destructive to buildings throughout the state. In July they were damaging dahlia by tunneling the stalks.

Cerambycid larva (*Eburia quadrigeminata* Say, Craighead det.) was reported boring in a hickory-elm floor which has been down 35 years. This report came from Columbia City, May 5.

Powder post beetle (*Lyctus* sp.) damaged building timbers at Crown Point and Edinburg and shovel handles at Terre Haute.