

## PAPERS FROM THE PROGRAM OF THE ZOOLOGY SECTION

INSECTS OF INDIANA FOR 1933<sup>1</sup>

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The winter of 1932-33, following two successive mild winters, was only moderately severe and in most areas there was a covering of snow preceding the severest cold spells. As a result there was not the noticeable check on some insects as was anticipated. Mexican bean beetle, harlequin cabbage bug, corn earworm, and others, which are usually somewhat checked by winter conditions, continued to be more abundant north of their normal habitat.

As will be noted in Table I, the temperature was above normal during the mid-winter and summer months and the rainfall appreciably above normal in the early spring months but below normal during the summer months. This had a disastrous effect on some crops and proved highly favorable to many insects, such as codling moth, chinch bug, earworm and Oriental fruit worm.

## CEREAL AND FORAGE CROP INSECTS

Chinch bug (*Blissus leucopterus* Say). This insect was more destructive in Indiana the past year than for at least 10 years. It was especially destructive in Benton, Newton, Lake, Porter and LaPorte counties in northwestern Indiana, and in Adams, Allen, Blackford, Elkhart, Jay, Steuben and Wells counties in northeastern Indiana. Of the small grains barley was especially heavily infested and apparently the source of the heaviest infestations. Summer conditions have been unusually favorable and the carry-over of bugs is probably the largest for over 40 years. With favorable conditions next spring we can anticipate great abundance of the chinch bug throughout the northern half of Indiana in 1934.

"Hessian Fly (*Phytophaga destructor* Say) has been at a low ebb throughout the year as a result of the very low carry-over from the fall of 1932, unusually high winter mortality, dry weather during the summer and early fall conditions unfavorable to fly activity. Infestations at harvest-time averaged only 7 per cent of the stems for the state as compared with 41 per cent in 1932. Summer mortality of aestivating puparia, due about equally to desiccation and parasitism, was unusually high, amounting to about 97 per cent in six northern and central localities where observations were made. On account of the

<sup>1</sup>This is the eighth report on the insects of Indiana, intended as an annual summary of the economic entomology of the state, and especially for use of future workers in the prediction of insect troubles. The writer is indebted to the following for records and information contained in this report: C. M. Packard, R. A. Sazama, W. B. Noble, B. J. Wilkins, G. A. Ficht, G. E. Marshall, G. E. Gould, V. R. Diamond and L. I. Musgrave.

low fly potentiality, and delay of wheat sowing, as well as fall fly activity as a result of the drouth, infestations this fall are likely to be very light.”

“Wheat jointworm (*Harmolita tritici* Fitch). The harvest-time survey showed very low infestations over much of the state, but the average was brought up to 8 per cent of the stems by the unusual abundance of this insect in the north-central area. Here the average was 15 per cent and some really heavy infestations occurred in occasional fields.”<sup>2</sup>

TABLE I. COMPARATIVE MONTHLY WEATHER DATA FOR INDIANA, 1933

MONTH		Temperature		Precipitation		Number of Days		
		State Mean °F	Departure from Normal °F	State Average Inches	Departure from Normal Inches	Clear	Partly Cloudy	Cloudy
January	Normal.....	29.0	.....	3.13	.....	10	7	14
	1933.....	38.6	+9.6	3.17	+0.04	11	7	13
February	Normal.....	30.5	.....	2.47	.....	9	7	12
	1933.....	31.4	+0.9	1.88	-0.59	14	7	7
March	Normal.....	40.5	.....	3.75	.....	10	8	13
	1933.....	40.1	-0.4	5.41	+1.66	8	8	15
April	Normal.....	51.9	.....	3.55	.....	11	9	10
	1933.....	51.8	-0.1	4.52	+0.97	10	9	11
May	Normal.....	62.1	.....	4.06	.....	12	10	9
	1933.....	65.0	+2.9	8.14	+4.08	9	11	11
June	Normal.....	71.4	.....	3.81	.....	14	10	6
	1933.....	77.2	+5.8	1.16	-2.65	23	6	1
July.....	Normal.....	75.4	.....	3.36	.....	16	10	5
	1933.....	77.0	+1.6	2.56	-0.80	18	9	4
August	Normal.....	73.2	.....	3.36	.....	15	10	6
	1933.....	72.8	-0.4	2.79	-0.57	17	9	5
September	Normal.....	67.2	.....	3.37	.....	15	8	7
	1933.....	72.4	+5.2	4.94	+1.57	14	7	9

European corn borer (*Pyrausta nubilalis* Hbn.) again experienced a very unfavorable season, the survival of larvae being the lowest since 1928, with the exception of 1930. Borers overwintered safely and early season conditions were favorable. However, during moth emergence and thereafter during oviposition and hatching of larvae the hot, dry weather was very unfavorable and, furthermore, most of the corn was small at the time of egg-laying and many of the egg masses that were laid peeled off as the corn plants showed the effect of the drought by a curling of the leaves. As a result there was not an appreciable increase in borer population, although in some fields where the corn was planted early and in regions not as severely affected by drought, the population increased very noticeably, again indicating the potentialities of this insect under normally favorable seasons. The extent of spread during 1933 was not determined as state and federal funds for this work have been discontinued.

The black or greasy cutworm (*Agrotis ypsilon* Rott.) was unusually abundant and destructive to corn in many sections of the state, thousands

<sup>2</sup> Statements in quotation by C. M. Packard.

of acres of corn being destroyed during June. Earliest reports were received the first of June and the last reports before the close of the month.

Webworms (Crambidae) were damaging corn at Rochester, June 27, the only report received during the year.

The common stalk borer (*Papaipema nebris* Gn.) was damaging corn at Vincennes, June 30, at which time they were quite small. No other reports, except a report of injury to potatoes at Milton, July 29, were received indicating that this stalk borer was not as abundant as usual.

Flea beetles (species unknown) were destructive to corn at Kempton, June 27.

White grubs (*Lachnosterna* spp.) were reported damaging lawns, corn and aster in a few localities in northern Indiana.

Alfalfa webworm (*Loxostege similalis* Gn.) destroyed alfalfa in a few northern Indiana localities the last of May and young alfalfa in several central Indiana localities the last week in September.

Clover leaf weevil (*Phytonomus punctata* Fab.) was abundant on alfalfa May 20, at Fairmont. Apparently much less abundant than normal.

Corn leaf aphid (*Aphis maidis* Fitch) was reported seriously damaging corn at Jeffersonville, August 19.

Wheat Midge (*Thecodiplosis mosellana* Gehin) was abundant in threshed wheat at Converse, August 12.

The carrot beetle (*Ligyrus gibbosus* DeG.) damaged sunflower grown for seed at Kendallville, August 10, by eating the underground parts.

#### VEGETABLE INSECTS

Harlequin cabbage bug (*Murgantia histrionica* Hahn) was destructive as far north as Austin but not as serious as in 1932.

Cabbage worms (*Pieris rapae* L. and *Autographa brassicae* Riley) were normally abundant.

Melon Aphid (*Aphis gossypii* Glov.) was unusually destructive to melons and cucumbers throughout the state during August. In the extensive melon section in the vicinity of Decker two-thirds of the melons were destroyed by this pest.

Onion thrips (*Thrips tabaci* Lind.) was more than usually destructive to onions in a number of localities in northern Indiana in July. The same species destroyed 30 acres of seedling carrots at Fort Wayne the last of July.

The flower thrips (*Frankliniella tritici* Fitch) caused the premature dropping of bean blossoms at Corydon in August.

Potato leaf-hopper (*Empoasca fabae* Harr.) was more than normally abundant and destructive in central and northern Indiana.

Potato flea-beetle (*Epitrix cucumeris* Harr.) was damaging potatoes at Kokomo early in July.

Mole cricket (*Gryllotalpa borealis* Burm.) was reported August 30, as damaging potatoes at Elkhart.

Tarnished plant bug (*Lygus pratensis* L.) was very destructive to late potatoes early in September at Kimmell and other points in northern Indiana.

Mexican bean beetle (*Epilachna corrupta* Muls.) was abundant throughout the state early in the season. The hot, dry conditions during mid-season reduced their numbers but they came back in abundance on the late beans. The potato beetle killer (*Perillus bioculatus*) was reported several times as commonly attacking Mexican bean beetle larvae.

Striped cucumber beetle (*Diabrotica vittata* Fab.) was somewhat more abundant than usual.

Corn earworm (*Heliothis obsoleta* Fab.) was unusually abundant and destructive to corn and tomatoes throughout the state.

Squash bugs (*Anasa tristis* DeG.) were very abundant in many sections of the state during July and August, attacking pumpkin, squash, melon and cucumber.

Other vegetable crop pests reported included cabbage aphid (*Aphis brassicae* L.), spotted cucumber beetle (*Diabrotica 12-punctata* Fab.), asparagus beetles (*Crioceris asparagi* L. and *C. duodecimpunctata* L.), Colorado potato beetle (*Leptinotarsa decemlineata* Say), squash vine borer (*Melittia satyriniformis* Hbn.) attacking squash and pumpkin in northern Indiana the first half of July, blister beetles (*Epicauta vittata* Fab., *E. pennsylvanica* DeG. and *E. marginata* Fab.) were destructive to potatoes, tomatoes and dahlias, white fly (*Aleyrodes vaporariorum* Westw.) was damaging greenhouse tomato and cucumber at Indianapolis, and the naked slug (*Limax* sp.) damaged lettuce the last of May at Anderson.

Strawberry leafroller (*Ancylis comptana* Fröhl.) was abundant in all parts of the state, especially in northern Indiana during July.

Turnip aphid (*Aphis pseudobrassicae* Davis) was very abundant on turnip in Northern Indiana the last of September.

#### FRUIT INSECTS

The codling moth (*Carpocapsa pomonella* L.) came through the winter of 1932-33 in large numbers and with favorable conditions during the season increased to enormous numbers, especially in the southern part of the state. Three full broods and a partial fourth occurred in southern Indiana. The following records of development were furnished by G. E. Marshall for Bedford. The first adult moth was taken in a packing house April 8 and the first moth was caught in an orchard bait trap May 11. First eggs were laid in field cages May 15 and hatched May 23. The larvae began to leave apples June 12 and the first moths of the second generation were observed June 22, the first eggs of this brood being laid June 29 and they were hatching July 3. The first third brood moths issued August 4 and they laid eggs August 8 which were hatching August 14. We have no definite records for the fourth brood worms.

Oriental fruit worm (*Laspeyresia molesta* Buseck) was very abundant and destructive to late peaches and also to apples. In some cases peaches were 100 per cent infested.

Shot hole borer (*Scolytus rugulosus* Ratz.) was reported abundant attacking plum and cherry in several places in southern Indiana during August.

Rose chafer (*Macrodaetylus subspinosus* Fab.) damaged apple fruits at Evansville, May 29.

Cherry slug (*Eriocampoides limacina* Retz.) defoliated cherry throughout the northern half of the state during July.

#### SHADE TREE AND SHRUB INSECTS

Orange-striped oak caterpillar (*Anisota senatoria* A. and S.) was reported as defoliating oaks at Kouts, September 7. Other reports without specimens for identification, indicated that this caterpillar was very prevalent throughout Northwestern Indiana.

Fall webworms (*Hyphantria cunea* Dru.) were common throughout the state, attacking wild and ornamental shrubs and trees, and unsprayed apples.

Bagworms (*Thyridopteryx ephemeraeformis* Haw.) were destructive farther north in the state than ever before, reports of defoliation of such trees as arbor vitae, blue spruce, and Lombardy poplar, being received as far north as Anderson and Lafayette.

Catalpa sphinx caterpillar (*Ceratonia catalpae* Bois.) and ailanthus webworm (*Atteva aurea* Fitch) and the walnut worm (*Datana integerrima* G. & R.) were normally abundant, the last being much less abundant than in 1932.

Fall canker worm (*Alsophila pomataria* Harr.) was notably destructive to boxelder, maple, apple and plum at Shipshewana, May 29.

Boxelder bug (*Leptocoris trivittatus* Say) was annoying in homes throughout a greater part of the state during the past winter and spring months. The past summer and fall the species has reappeared in large numbers but apparently not as abundant as a year ago.

Oyster shell scale (*Lepidosaphes ulmi* L.) and pine leaf scale (*Chionaspis pinifoliae* Fitch) were abundant as usual, especially in the northern half of the state.

European elm scale (*Gossyparia spuria* Mod.) is apparently increasing and becoming a serious elm pest in the state.

Woolly maple aphid (*Phenacoccus acericola* King) was abundant on hard maple at Jasper early in June.

Red spider (*Tetranychus telarius* L.) has been abundant and destructive as usual to evergreens and shrubs; also to phlox.

Elm cockscomb gall (*Colophya ulmicola* Fitch) and the maple bladder mite gall (*Phyllocoptes quadripes* Shim.) were normally abundant throughout the state.

Bronze birch borer (*Agrilus anxius* Gory) was responsible for the death of birch trees at Fort Wayne and Muncie.

Flat-headed borer (*Chrysobothris femorata* Oliv.) was a serious pest of hard and Norway maple throughout the state.

Mottled willow and poplar borer (*Cryptorhynchus lapathi* L.) was abundant in pussy willow and poplar throughout the northern half of the state.

Lilac borer (*Podosesia syringae* Harr.) was destructive to lilac at Crown Point during August.

## FLOWER GARDEN AND ORNAMENTAL GREENHOUSE INSECTS

Rose scale (*Anlacaspis rosae* Bouché) and rose slug (*Caliroa aethiops* Fab.) were normally abundant.

Four-lined plant bug (*Poecilocapsus lineatus* Fab.) was destructive to mock orange and perennials at Anderson, June 9.

Lace bugs (*Corythucha marmorata* Uhl., Drake det.) were destructive to dahlia, aster and hardy scabiosa in several sections of the northern half of the state the last of July and during August.

Phlox plant bug (*Lopidea davisi* Knight) was destructive to phlox at Attica in September.

The Mexican mealy bug (*Phenacoccus gossypii* T. and C.) was reported destructive to chrysanthemum at Bloomington the last of August.

Thrips (*T. tabaci* Lind.) were damaging chrysanthemum at Columbus and Lafayette the last of September.

Fern scales (*Hemichionaspis aspidistrae* Sign. and *Saissetia hemisphaerica* Targ.) were reported from many places during the year.

Wireworms (Elateridae) damaged chrysanthemums at South Bend the last of July, the infestation apparently coming in with a shipment of plants.

The wisteria leaf-tier (*Epargyreus tityrus* Fab.) was abundant at Hibbard, August 30.

## MISCELLANEOUS INSECTS

The following household and annoying pests were reported from all parts of the state: ants, fleas, cockroaches, bedbugs, mosquitoes, silver fish, clothes moths, cigarette beetles, larder beetles, crickets and chiggers.

Termites (*Reticulitermes flavipes* Koll.) continue to cause immense losses throughout the state.

*Eburia quadrigeminata* was reported damaging cypress flooring at Shelbyville in May.

Powder post beetles (*Lyctus* sp.) were reported damaging house and barn timbers in all parts of the state.

Grain-infesting insects, including the rice weevil, saw-toothed grain beetle and cadelle, as well as the bean weevil were destructive throughout the state about the same as 1932.

The usual animal parasites, such as poultry lice, hog lice and ox warbles, were common in most sections of the state.

The cicada killer (*Sphecius speciosus* Drury) was apparently more than usually abundant judging from the number of reports received, oftentimes the report advising that they were annoying in lawns.

## BEEKEEPING

Beekeeping is not only an important industry in Indiana for the products—honey and beeswax—which the bees produce, but also as an important aid in commercial fruit growing. The following notes on beekeeping conditions have been furnished by B. J. Wilkins, one of the State Apiary Inspectors. Bees came through the winter in comparatively good condition, ready to build up the colony strength sufficient to store a large crop of honey. Unfortunately drouth retarded the clover nectar

flow to such an extent that many colonies were on the verge of starvation during the summer months. Rainfall late in the summer resulted in a heavy flow of smartweed (heart's ease) nectar, enough in many cases to provide ample winter stores and in some cases a surplus was obtained.

State inspectors found but little European foulbrood but considerable sac brood and an enormous amount of American foul brood, the bulk being found in territory not worked by the inspectors for several years.

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## THE EFFECT OF LOWERED TEMPERATURE ON RETICULOCYTE FORMATION IN THE PIGEON

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### INTRODUCTION

While studying increased reticulocyte formation in pigeons, due to hemorrhagic stimulus, certain observations were made concerning reticulocyte formation in pigeons, due to the stimulus of decreased temperature of the environment.

Many workers (Wills, 1932), (Vaughn, Muller, and Zetzel, 1930) have mentioned the extreme sensitiveness of the blood manufacturing mechanism of the pigeon to many factors. Muller (1927) (1929 a and b) has reported the effects on reticulocyte formation in pigeons to certain articles of food. In an unpublished article, the present writer has reported the effect of hemorrhage on reticulocyte formation in relation to the length of life of the red corpuscle in both the rabbit and pigeon. In the present report the effect of cold on the reticulocyte formation, in pigeons, is presented.

**Experimental Procedure.** The results of this report are based on two planned experiments and two accidental observations. Two pigeons were purposely kept under uniform environmental conditions for nine months, then exposed to a rapid fall in the environmental temperature. Two accidental observations were made on two other pigeons, each of which at different times experienced a rapid fall in their environmental temperature.

In all four pigeons studied the reticulocyte count and environmental temperature were recorded. In case of pigeons of the planned experiments, the body temperature was also recorded over the entire experimental period and the reticulocyte count and body temperature were taken at the same time every day except the day the pigeons were exposed to cold; then their body temperatures were taken by way of the cloaca at one hour intervals for six consecutive hours. This article is a report of the results in the case of the two pigeons used in the planned experiments.