

PARASITES OF THE EUROPEAN CORN BORER  
IN ILLINOIS

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The European corn borer (*Pyr-  
austa nubilalis* [Hbn.]) was first  
reported from Illinois in 1926 in  
Kankakee County by Worthley and  
Caffrey (19) and Flint *et al.* (16).  
This early infestation was followed  
by intensive and apparently success-  
ful efforts to exterminate the pest in  
the state.

Even before the European corn  
borer was first reported in Illinois,  
the Illinois Natural History Survey,  
Section of Economic Entomology,  
had released one species of parasite  
in the state in an effort to establish  
it on native hosts (16). The record  
of this release by W. P. Flint did  
not name the species, but J. H. Big-  
ger of the Survey recently found  
a record in his notes that 300 *Habro-  
bracon* (*Microbracon*) *brevicornis*  
Wesm. were released near Jackson-  
ville, Morgan County, on October 6,  
1923. Mr. Bigger recalled that this  
species was reared in the laboratory  
of the Section of Economic Ento-  
mology and therefore concluded that  
*H. brevicornis* was probably the spe-  
cies to which Flint referred. No  
other records were found to account  
for the "several thousand . . . liber-  
ated at four points in Illinois."

After the European corn borer  
was reported in the state in 1926,  
the Bureau of Entomology and  
Plant Quarantine released two exotic  
species of parasites in Washington

Township, Will County—362 adults  
of the ichneumon *Exeristes roborator*  
(F.) and 3,635 adults of the  
braconid *Microbracon brevicornis* in  
1927 and 1,940 more adults of *E.  
roborator* in 1928 (7, 8). Baker and  
Jones (8) reported unsuccessful at-  
tempts to recover *E. roborator* fol-  
lowing these releases.

A program to establish exotic spe-  
cies of parasites in the state was  
started by the Bureau in 1942. It  
was expanded in the autumn of 1943  
when the Section of Economic Ento-  
mology of the Illinois State Natu-  
ral History Survey began active par-  
ticipation in it. Since then the work  
has continued annually as a coopera-  
tive project between the two agen-  
cies. State participation included  
the services of the junior author, in  
the fall of 1943 and 1944 at the  
Bureau's Moorestown, New Jersey,  
laboratory where he worked with  
D. W. Jones<sup>1</sup> in procuring parasites  
for releases. The state has made most  
of the releases and collected most of  
the host larvae for information on  
the parasites since the fall of 1944;  
the Bureau has produced the adult  
parasites for releases, processed the  
collections for information on para-  
sites, and assembled the information  
for both agencies.

\* U.S.D.A., Agr. Res. Adm., Bureau of Ento-  
mology and Plant Quarantine.

\*\* State Natural History Survey.

<sup>1</sup> D. W. Jones has been in charge of the Bu-  
reau's parasite laboratory at Moorestown since  
the autumn of 1943 and has been responsible for  
procuring adult parasites for release, the process-  
ing of collected borers for parasite recoveries, and  
the identification of recovered parasites. The au-  
thors wish to express their gratitude to Mr. Jones  
and other members of his staff, especially S. W.  
Carter, for their contribution to the study.

TABLE 1.—NUMBERS OF ADULT PARASITES OF THE EUROPEAN CORN BORER RELEASED IN ILLINOIS TO DECEMBER 31, 1950<sup>1</sup>

Year	<i>Chelonus annulipes</i>	<i>Eulophus viridulus</i>	<i>Horogenes punctorius</i>	<i>Lydella stabulans grisescens</i>	<i>Macrocentrus gifuensis</i>	Total
Before—						
1942.....						5,937 <sup>2</sup>
1942.....			594		1,895	2,489
1943.....			494	973	3,829	5,296
1944.....	597		836	5,890	40,492	47,815
1945.....	488		931	2,342	32,035	35,796
1946.....	296	2,961	1,429	2,978	32,896	40,560
1947.....			989	2,334	35,467	38,790
1948.....					18,938	18,938
1949.....					17,815	17,815
1950.....	2,974					2,974
Total.....	4,355	2,961	5,273	14,517	183,367	216,410

<sup>1</sup> The number of *Microbracon brevicornis* released by the state prior to 1926 is not available.

<sup>2</sup> Includes 362 and 1,940 adults of *Ezeristes raborator* released in 1927 and 1928, respectively, and 3,635 *Microbracon brevicornis* released in 1927.

The Bureau has published reports of the releases (2, 3, 4, 6, 10, 13, 15), summary reports of recoveries (5, 11, 12, 14, 17), and a review of the status of parasites to the fall of 1947 has been published by the senior author (1).

#### SOURCES OF PARASITES FOR COLONIZATION

The five exotic species of parasites released in Illinois since 1943 had been established in the United States before 1940 (7) and all of them were obtained for release here directly or indirectly from field sources in North America. Those obtained directly were reared under laboratory conditions from hibernating European corn borer larvae collected in

the fall from areas where the parasites were plentiful. The larvavorid, *Lydella stabulans grisescens* R. D. came mainly from the vicinity of Moorestown, N. J. The ichneumonid *Horogenes punctorius* (Roman) was mostly from East Hartford, Conn., but one colony in 1947 came from the Cattaraugus Indian Reservation in western New York, at that time the westernmost area in which this parasite was known to be established. The braconid *Macrocentrus gifuensis* Ashm. was obtained principally from Taunton, Mass., until 1948 and since then from East Hartford, Conn. *Chelonus annulipes* Wesm., another braconid, was obtained for releases directly from hibernating hosts from Taunton in

1944, 1945 and 1946 but those released in 1950 were laboratory-bred adults reared on *Ephestia kuehniella* Zell., as described by Bradley (9), to supplement numbers available from the field. The eulophid *Eulophus viridulus* Thoms. was obtained from the Dominion Parasite Laboratory, Belleville, Ontario, Canada, where it was bred in the laboratory from domestic field stock. The numbers of adult parasites released in Illinois are shown in table 1.

#### COLONIZATION TECHNIQUE

The procedure described by Baker *et al.* (7) was generally followed in selecting the localities where parasites were released in Illinois. Multiple releases were made of *Macrocentrus* throughout Madison and St. Clair counties in 1947, in the vicinity of the Prairie Township, Hancock County, site in 1948, and at Bruce Township, LaSalle County, in 1949. These colonies were released close to one another because recovery rearings had shown that male parasites predominated among recovered *Macrocentrus* in Illinois and other midwestern states, indicating that mating was not readily accomplished in the field. It was thought that colonies released near enough to one another to provide an overlapping of dispersion from the release sites would thus increase the concentration of adults and consequently the chances of contact between sexes. Results to date are inconclusive regarding the effectiveness of this technique as compared with the usual method of releasing single colonies.

#### STATUS OF PARASITES

Collections of hibernating European corn borer larvae were taken

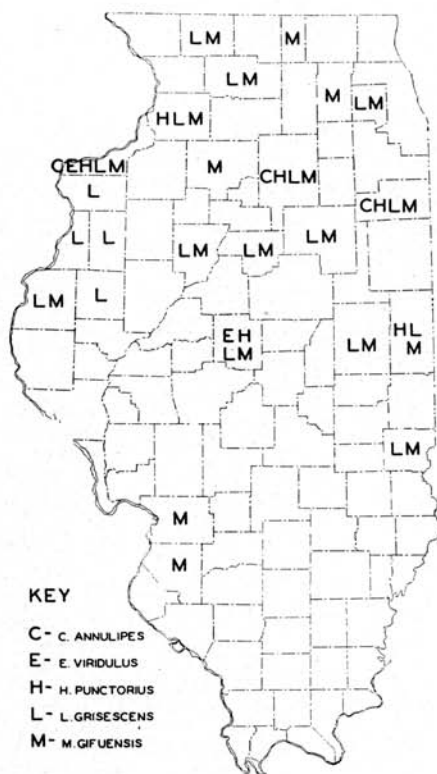


FIG. 1.—Counties of Illinois in which exotic species of parasites were released against the European corn borer from 1942 through 1950.

annually at release sites in the state beginning in the fall of 1942. Surveys over extensive areas were made in each of the years 1948, 1949, and 1950, when samples were taken without regard to release sites, but were chosen systematically from about every other township in several counties. Results from the 1950 collections are not yet available, but the information accumulated through 1949 is presented for each of the exotic species and for native parasites encountered during this study.

TABLE 2.—NUMBERS OF *Lydella stabulans grisescens* RELEASED IN ILLINOIS BEFORE DECEMBER 31, 1950

County	Township	1944	1945	1946	1947	Total <sup>1</sup>
Champaign	Champaign	493	0	0	0	493
Clark	Martinsville	491	0	0	0	491
Du Page	Lisle	490	0	497	0	987
Hancock	Prairie	0	0	0	498	498
Henderson	Media	0	0	0	495	495
Kankakee	Aroma	0	491	0	0	491
"	St. Anne <sup>2</sup>	484	987	0	0	1,966
LaSalle	Bruce	486	0	496	0	982
Livingston	Dwight	0	0	494	0	494
Logan	West Lincoln	489	0	0	0	489
McDonough	Tennessee	0	0	0	498	498
Mercer	New Boston	0	0	0	349	349
Ogle	Oregon	494	0	498	0	992
Peoria	Timber	495	0	494	0	989
Rock Island	Black Hawk	0	374	0	0	374
Stephenson	Silver Creek	497	0	0	0	497
Vermilion	Grant <sup>3</sup>	489	490	0	0	1,467
Warren	Tompkins	0	0	0	494	494
Whiteside	Lyndon	489	0	499	0	988
Woodford	Roanoke	493	0	0	0	493
Total		5,890	2,342	2,978	2,334	14,527

<sup>1</sup> Totals in this column include the numbers given in footnote to this table.

<sup>2</sup> In 1943, 495 adults were released here.

<sup>3</sup> In 1943, 488 adults were released here.

### *Lydella stabulans grisescens* R. D.

This species was released in 21 townships in 20 counties from 1942 to 1947, as shown in table 2, and none was released from 1948 to 1950. The counties in which this species was released are shown in figure 1, where releases of other exotic species except *Exeristes roborator* and *Microbracon brevicornis* are also shown.

*Lydella* was the most successful of the exotic species of parasite released against the European corn borer in Illinois. Of the counties in which it was released, no collection to determine its status was ever taken in Clark, Henderson, Livingston, McDonough or Mercer. Among the localities where collections were taken it was not recovered from Du Page County where it was released

in 1944; failures to recover it were recorded in only five other counties, (table 3). These counties and the years in which no parasites were recovered are Hancock in 1947, Ogle in 1944, Peoria in 1948, Rock Island in 1946, and Whiteside in 1944. However, even where none were released after the failure, a later collection showed *Lydella* present in Hancock, Peoria, and Whiteside counties, indicating that it probably was present in the year when it was not recovered but that the sampling was inadequate to reveal its presence.

The recoveries at *Lydella* release sites through 1947 indicated that this parasite had been successful in establishment. Furthermore, a series of 12 collections taken from a polar



TABLE 3.—RECOVERIES OF *Lydella stabulans grisescens* FROM PARASITE RELEASE LOCALITIES IN ILLINOIS

County	Township	Percent of borers parasitized					
		1944	1945	1946	1947	1948	1949
Champaign.....	Champaign.....	...*	....	36.9	21.6	.... <sup>1</sup>	41.3 <sup>2</sup>
Hancock.....	Prairie.....	....	....	....	0 *	1.1	....
Kankakee.....	St. Anne.....	5.9**	16.9*	16.0	27.6	25.0	28.6 <sup>3</sup>
LaSalle.....	Bruce.....	.7*	....	15.4*	17.5	16.6	20.1
Logan.....	West Lincoln.....	...*	....	23.1	19.2	10.0	14.9
Ogle.....	Oregon.....	0*	....	30.4*	19.8	27.3 <sup>3</sup>	25.0 <sup>3</sup>
Peoria.....	Timber.....	...*	....	4.3	1.9	0	12.5
Rock Island.....	Black Hawk.....	0	.2*	0	1.2	18.4	21.6
Stephenson.....	Silver Creek.....	...*	....	38.0	56.5	54.5 <sup>3</sup>	....
Vermilion.....	Grant.....	6.7**	10.3*	18.2	31.8	14.0	40.0
Warren.....	Tompkins.....	....	....	....	4.5*	....	....
Whiteside.....	Lyndon.....	0 *	1.4	21.8*	25.0	11.1 <sup>3</sup>	....
Woodford.....	Roanoke.....	...*	....	40.0	23.5	32.6	15.4

\* Shows that a release was made here this year; ( . . . ) that no collection was taken; zero (0) that a collection but no recovery was made.

\*\* Released here this year and in 1943.

<sup>1</sup> No collection taken in this township but one was taken in Harwood Township.

<sup>2</sup> A collection was also taken in Urbana Township where 11.1 percent of the borers were found parasitized.

<sup>3</sup> The collection was taken in this township as a sample in an area survey.

coordinate design including about 80 square miles, used in Bruce Township, LaSalle County, in the fall of 1947, produced *Lydella* from every one of the collections. State workers had observed *Lydella* puparia in the field at considerable distances from release sites during other studies on the pest. In order to gain more knowledge on the distribution and abundance of *Lydella*, an extensive survey of a seven-county area in northwestern Illinois was conducted in the fall of 1948. One sample was taken from about every other one

of the townships in the seven counties. A survey in 1949 was made again in the seven counties, two townships from an adjoining county were sampled, and all or part of five northeastern and three east-northeastern counties were also surveyed.

Recoveries from the two years surveys are shown in table 4. Among the sixteen counties from which samples were taken, no *Lydella* release was ever made in eleven. These counties are Boone, Bureau, Carroll, Cook, De Kalb, Jo Daviess, Kane, Lee, McHenry, Will and Winnebago.

TABLE 4.—PERCENT OF HIBERNATING EUROPEAN CORN BORER LARVAE FOUND PARASITIZED BY *Lydella stabulans grisescens* IN SURVEYS IN ILLINOIS

County	Township	1948	1949	County	Township	1948	1949
Boone				McHenry			
	Belvidere.....		15.0		Door.....		2.2
	Boone.....		20.6	Ogle			
	Manchester.....		31.0		Buffalo.....	65.4	
Bureau					Dement.....	38.5	18.4
	Fairfield.....		52.9		Flagg.....		16.5
	Walnut.....		60.0		Grand Detour.....	46.7	
Carroll					Lafayette.....	10.7	16.7
	Cherry Grove.....	29.6			Marion.....	22.6	
	Mt. Carroll.....		30.3		Maryland.....	44.4	
	Salem.....	35.0			Monroe.....	28.6	
	Woodland.....		34.3		Oregon <sup>3</sup> .....	27.3	25.0
	York.....	22.7	44.0		White Rock.....	40.0	18.8
Cook				Stephenson			
	Thornton.....		10.0		Harlem.....	25.0	15.4
De Kalb					Kent.....		75.0
	Malta.....		25.0		Loran.....	63.3	
	South Grove.....		19.7		Oneca.....	33.3	
Du Page					Ridott.....		30.0
	Bloomington.....		75.0		Silver Creek <sup>4</sup> .....	54.5	
	Lisle <sup>1</sup> .....		7.9	Whiteside			
	Milton.....		25.0		Erie.....	18.2	
Jo Daviess					Jordan.....	15.0	
	East Galena.....	5.6			Lyndon <sup>3</sup> .....	11.1	
	Hanover.....		38.2		Mt. Pleasant.....		20.6
	Stockton.....		45.7		Prophetstown.....		60.0
	Ward Grove.....	28.6			Ustick.....		12.5
	Woodbine.....	23.5	0	Will			
Kane					Monce.....		17.2
	Campton.....		4.3		Peotone.....		24.3
Kankakee					Will.....		10.8
	Kankakee.....		12.8	Winnebago			
	Manteno.....		41.4		Owen.....	50.0	
	St. Anne <sup>2</sup> .....		28.6		Pecatonica.....	38.5	
Lee					Rockford.....	29.2	30.6
	China.....	34.8			Seward.....		28.6
	East Grove.....		21.9		Winnebago.....		59.3
	Marion.....		16.7				
	Reynolds.....		30.4				
	South Dixon.....	20.7	29.2				
	Viola.....	5.3	29.7				

<sup>1</sup> Released here in 1944, not recovered that year, again released in 1946.<sup>2</sup> Released here in 1944 and in 1945.<sup>3</sup> Released here in 1944 and in 1946.<sup>4</sup> Released here in 1944.

A special study was conducted in southern Ogle and neighboring counties in the fall of 1949. Collections were taken at about one mile intervals in the four cardinal directions from Rochelle, an important center

for the corn canning industry. The results are shown in table 5. *Lydella* was recovered from every one of the 29 collections and parasitized 21.8 percent of the 1,061 borers observed. The closest release site to this area

TABLE 5.—PARASITIZATION OF HIBERNATING EUROPEAN CORN BORER LARVAE BY *Lydella stabulans grisescens* NEAR ROCHELLE, ILL., IN THE FALL OF 1949

Distance— miles from Rochelle	Number of borers observed				Percentage parasitized			
	North	East	South	West	North	East	South	West
1.....	47	39	29	48	4.3	17.9	10.3	17.9
2.....	0	17	34	0	.....	17.6	44.1	.....
3.....	48	29	42	0	20.8	20.7	35.7	.....
4.....	43	36	45	31	20.9	19.4	22.2	19.4
5.....	42	0	43	36	9.5	.....	23.3	38.9
6.....	0	0	21	42	.....	.....	14.3	35.7
7.....	40	41	36	35	22.5	9.8	33.	17.1
8.....	34	0	42	0	29.4	.....	35.7	.....
9.....	36	0	0	35	13.9	.....	.....	8.6
10.....	0	35	0	38	.....	31.4	.....	2.6
11.....	0	0	37	0	.....	.....	29.7	.....
Total...	290	197	329	265	17.3	19.5	27.6	20.0

is in Oregon Township, Ogle County, 18 miles west of Rochelle. These collections were taken in seven townships where the combined collections in each township showed an average parasitization by *Lydella* as follows: De Kalb County, South Grove Township (collections East 7 and 10) 19.7 percent; Lee County, Reynolds Township (collections South 2 through 10) 30.4 percent and Viola Township (collection South 11) 29.7 percent; Ogle County, Dement Township (collections East 2, 4 and 5) 19.5 percent, Flagg Township (collections North 1 and 3, South 1 and West 1, 4 and 5) 18.2 percent, Lafayette Township (West 6 through 10) 16.7 percent, and White Rock Township (North 4 through 9 and East 1) 12.8 percent.

The 1949 survey in northeastern counties apparently reached the limits of *Lydella* dispersion in that area since it was not taken in some of the De Kalb, Kane, and McHenry County samples (table 6). It was recovered in all the Boone and Du Page County samples in the northeast and also in the east-northeastern counties including Cook, Kankakee, and Will.

In northwestern Illinois, one township sample from the 29 townships surveyed in 1948 failed to produce *Lydella* and one failed among 24 township samples taken in 1949, as shown in table 7. Percentages of borers parasitized in each county showed considerable variation between the two years, but the average parasitization of all borers taken in

TABLE 6.—PARASITIZATION OF HIBERNATING EUROPEAN CORN BORER LARVAE BY *Lydella stabulans grisescens* IN TWO AREAS OF ILLINOIS IN 1949

Area and County	Township	Number of borers		Percentage parasitized
		Observed	Parasitized	
<i>Northeastern</i>				
Boone.....	Belvidere.....	40	6	22.4
	Boone.....	34	7	
	Manchester.....	42	13	
County total.....		116	26	
De Kalb.....	Genoa.....	24	0	11.4
	Malta.....	32	8	
	Sycamore.....	14	0	
County total.....		70	8	
Du Page.....	Bloomington.....	4	3	18.9
	Lisle.....	38	3	
	Milton.....	32	8	
County total.....		74	14	
Kane.....	Campton.....	23	1	2.1
	Dundee.....	11	0	
	Plato.....	4	0	
	Sugar Grove.....	9	0	
County total.....		47	1	
McHenry.....	Door.....	45	1	1.1
	Dunham.....	31	0	
	Nunda.....	19	0	
County total.....		95	1	
Area total.....		402	50	12.4
<i>Eastern Northeast.....</i>				
Cook.....	Thornton.....	30	3	10.0
Kankakee.....	Kankakee.....	39	5	25.3
	Manteno.....	29	12	
	St. Anne.....	7	2	
County total.....		75	19	
Will.....	Monee.....	29	5	17.5
	Peotone.....	37	9	
	Will.....	37	4	
County total.....		103	18	
Area total.....		208	40	19.2



TABLE 7.—PARASITIZATION OF HIBERNATING EUROPEAN CORN BORER LARVAE BY *Lydella stabulans grisescens* IN NORTHWESTERN ILLINOIS IN 1948 AND 1949

County	Number of townships sampled		Number of borers observed		Percent parasitized	
	1948	1949	1948	1949	1948	1949
Bureau.....	0	2	.....	27	.....	55.6
Carroll.....	3	3	69	93	29.0	35.5
Jo Daviess.....	3	3 <sup>1</sup>	49	70	18.4	41.4
Lee.....	4 <sup>1</sup>	3	87	80	17.2	22.5
Ogle.....	9	4	223	185	35.0	14.6
Stephenson.....	4	3	48	50	43.8	26.0
Whiteside.....	3	3	60	55	15.0	21.8
Winnebago.....	3	3	75	98	37.3	37.8
Total or average.....	29	24	611	658	28.5	31.9

<sup>1</sup> No *Lydella* was taken from one collection in this county.

the two years was about the same. The 28 percent shown in 1949 is the same as the maximum reported by Thompson and Parker (18) for *Lydella* in Europe, and it was higher than the average (20.6 percent) for this species in the seven years, 1943-49, in a study area in New Jersey, where the parasite was obtained for release in Illinois.

The known distribution of *Lydella* in Illinois is shown in figure 2.

#### *Chelonus annulipes* Wesm.

This braconid was released in three Illinois localities (table 8), including a group release made in Bruce Township, LaSalle County in 1950, using the technique described by Baker *et al.* (7).

The results from the 1950 release will be known when the 1950 collections have been processed. *Chelonus*

*annulipes* was recovered in 1944 at the Rock Island County site, but no later recovery resulted from annual collections taken there. There is no evidence that *Chelonus* is established in Illinois.

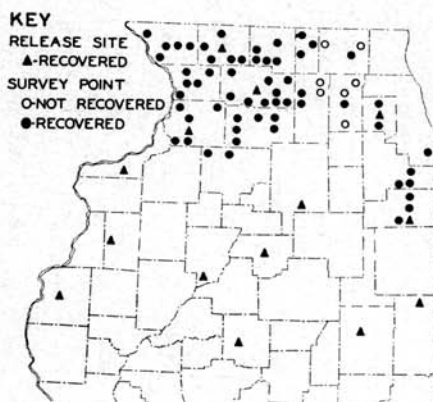


FIG. 2.—Localities in northern Illinois where *Lydella stabulans grisescens* was taken and the location of collections from which it was not reared in 1949.

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TABLE 8.—NUMBERS OF *Chelonus annulipes* RELEASED IN ILLINOIS  
BEFORE DECEMBER 31, 1950

County	Township	1944	1945	1946	1950	Total
Kankakee.....	St. Anne.....	0	488	296	0	784
LaSalle.....	Bruce.....	0	0	0	2,974	2,974
Rock Island.....	Black Hawk.....	597	0	0	0	597
Total.....		597	488	296	2,974	4,355

TABLE 9.—NUMBERS OF *Macrocentrus gifuensis* RELEASES IN ILLINOIS  
BEFORE DECEMBER 31, 1950

County	Township	1944	1945	1946	1947	Total <sup>1</sup>
Boone.....	Belvidere.....	2,033	1,840	1,469	0	5,342
Bureau.....	Princeton.....	1,894	0	1,880	0	3,774
Champaign.....	Champaign.....	3,726	1,961	1,874	0	7,561
Clark.....	Martinsville.....	1,894	0	0	0	1,894
Du Page.....	Lisle.....	2,065	1,870	1,590	0	5,525
Hancock.....	Prairie <sup>2</sup> .....	0	0	0	3,839	22,777
Kane.....	Campton.....	2,026	1,790	1,619	0	5,435
Kankakee.....	Aroma.....	0	2,930	0	0	2,930
LaSalle.....	St. Anne <sup>3</sup> .....	3,752	3,826	1,885	0	11,407
	Bruce <sup>4</sup> .....	2,053	1,850	3,400	0	25,118
	Streator.....	0	0	1,652	0	1,652
Livingston.....	Dwight.....	1,837	1,785	1,842	0	5,464
Logan.....	West Lincoln.....	1,966	1,840	1,890	0	5,696
Madison.....	Collinsville.....	0	0	0	7,643	7,643
	Edwardsville.....	0	0	0	1,958	1,958
	Fort Russell.....	0	0	0	3,920	3,920
	Moro.....	0	0	0	1,884	1,884
Ogle.....	Oregon.....	3,717	1,815	1,764	0	7,296
Peoria.....	Timber.....	1,909	950	1,922	0	4,781
Rock Island.....	Black Hawk.....	0	0	1,642	1,918	3,560
St. Clair.....	Canteen.....	0	0	0	1,935	1,935
	Centerville.....	0	0	0	1,700	1,700
	Engelmann.....	0	0	0	1,569	1,569
	Mascoutah.....	0	0	0	1,747	1,747
	Prairie du Long.....	0	0	0	3,744	3,744
	Shiloh Valley.....	0	0	0	1,766	1,766
	Smithton.....	0	0	0	1,844	1,844
Stephenson.....	Silver Creek.....	4,027	1,880	1,599	0	7,506
Vermilion.....	Grant <sup>5</sup> .....	3,912	1,983	5,296	0	14,971
Whiteside.....	Lyndon.....	1,675	1,915	1,639	0	5,279
Woodford.....	Roanoke.....	2,006	1,800	1,833	0	5,689
Total.....		40,492	30,035	34,896	35,467	183,367

<sup>1</sup> Totals in this column include the numbers given in footnotes of this table.

<sup>2</sup> In 1948, 18,938 adults were released here.

<sup>3</sup> In 1943, 1,944 adults were released here.

<sup>4</sup> In 1949, 17,815 adults were released here.

<sup>5</sup> In 1942, 1,895 adults were released here, and 1,885 in 1943.

*Macrocentrus gifuensis* Ashm.

This braconid was released in greater numbers and more extensively than any other species (183,367 adults). The release points including 31 localities in 20 counties are given in table 9.

Collections were not taken in all localities to determine the parasite's status after the releases were made, but many have been taken and from them only two recoveries resulted. They were in Silver Creek Township, Stephenson County, in 1946, where it was not taken from 1947 and 1948 collections, and in Bruce Township, LaSalle County, where it was taken in 1949 following a release that year. A test of its survival at Bruce will come from the 1950 collections taken at that site, but to date there is no evidence that the species has survived in Illinois beyond the year of release.

*Horogenes punctorius* (Roman)

This ichneumonid was released in six sites as shown in table 10 and the

total number of adults was 5,273. All of them, except the 491 released in LaSalle County, came from Eastern states areas, principally from East Hartford, Connecticut. Those released in LaSalle came from the Cattaraugus Indian Reservation, New York, and they were used because it was thought that the *Horogenes* from that locality might be better adapted to midwestern environments than those from near the Atlantic sea coast.

No advantage was demonstrated for Illinois conditions by the western New York form over that from coastal areas. Three recoveries were made in the state, two where eastern *Horogenes* were released in Rock Island County in 1945 and in Vermilion County in 1946 and the third in LaSalle County in 1947 when the New York adults were released there. Collections were taken annually after these recoveries were made at each one of the three sites and no *Horogenes* was recovered, indicating that there was no survival after the year of release.

TABLE 10.—NUMBERS OF *Horogenes punctorius* RELEASES IN ILLINOIS BEFORE DECEMBER 31, 1950

County	Township	1944	1945	1946	1947	Total <sup>1</sup>
Kankakee.....	St. Anne.....	409	0	490	0	899
LaSalle.....	Bruce <sup>2</sup> .....	0	0	0	491	491
Logan.....	West Lincoln.....	0	0	0	498	498
Rock Island.....	Black Hawk.....	0	459	0	0	459
Vermilion.....	Grant <sup>3</sup> .....	427	0	492	0	2,007
Whiteside .....	Lyndon .....	0	472	447	0	919
Total.....		836	931	1,429	989	5,273

<sup>1</sup> Totals in this column include the numbers given in footnotes to this table.

<sup>2</sup> The *Horogenes punctorius* released here were obtained from the Cattaraugus Indian Reservation, in western New York; all others were from eastern states areas near the sea coast.

<sup>3</sup> In 1942, 594 adults were released here and 494 were released in 1943.

TABLE 11.—RECOVERIES OF *Eulophus viridulus* IN ILLINOIS.

County	Township	Year recovered	Percentage of hosts parasitized
Bureau...	Fairfield...	1949	11.8
Du Page...	Lisle.....	1946*	
Jo Daviess	Not known	1948**	
Kane.....	Campton..	1946*	
Kankakee	St. Anne..	1946*, 1947	0.5
LaSalle...	Bruce.....	1947	1.1
Livingston	Pontiac...	1946*	
Ogle.....	Flagg.....	1949	0.1
"	Mt. Morris	1946*	
"	Oregon....	1947	0.6
Warren...	Tompkins..	1947	2.3
Woodford	El Paso...	1946*	

\* Percentage not known.

\*\* Overwintered pupae collected May 7, all others collected in the fall.

*Eulophus viridulus* Thoms.

Two releases of this eulophid were made in Illinois in 1946 when 982 adults were released in West Lincoln Township, Logan County, and 1,979 in Black Hawk Township, Rock Island County.

As noted by Baker *et al.* (7) this species is often recovered at considerable distances from the release site without concentrations building up near the site. Thirteen recoveries in ten Illinois counties have been recorded and none was made in either county where *Eulophus* was released (table 11). Percentages of the hosts parasitized were based on

the number of parasites and hosts observed while the hibernating borers were being collected for recovery records, but additional parasites were taken incidental to other work on the pest and in such cases percentages were not determined. The records of recovery show a wide distribution of *Eulophus* in the northern half of the state, but the percentages of hosts parasitized was not high.

## NATIVE SPECIES OF PARASITES

Three native species of parasites were reared from the European corn borer in Illinois, namely, two larvavorids, *Aplomya caesar* (Ald.) and *Pyraustomyia penitalis* (Coq.) and the ichneumonid *Bassus agilis* (Cress.).

*Aplomya caesar* was recovered in 1944 at Grant Township, Vermilion County, where 1.7 percent of the European corn borers were parasitized.

*Pyraustomyia penitalis* was the species most often taken on the European corn borer and their records are as follows:

Township	County	Year	Per cent
Lisle .....	Du Page .....	1944	0.8
Prairie .....	Hancock .....	1948	1.6
St. Anne .....	Kankakee .....	1944	0.8
		1946	0.3
Bruce .....	LaSalle .....	1944	2.5
Black Hawk..	Rock Island..	1944	0.5
		1945	0.2
		1947	2.7
Milan .....	Rock Island..	1945	1.7
Grant .....	Vermillion ..	1942	0.3
		1944	0.7
Lyndon .....	Whiteside ..	1944	0.6
		1945	0.8
		1946	1.2

*Bassus agilis* was recovered once, in Oregon Township, Ogle County, in 1947, when it killed 0.6 percent of the European corn borers observed.



There is no indication that any native species is becoming adapted to the European corn borer as a host in Illinois.

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