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Owlet Moths (Phalaenidae) Taken at Light Traps in Kansas and Nebraska[1]

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United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, in Cooperation with the Nebraska Agricultural Experiment Station.

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INTRODUCTION

The information contained in this publication was obtained through the operation of light traps located at six widely separated points in the Missouri Basin, in areas typical of both the semiaried and humid phases of the agriculture of this region. It deals with the seasonal occurrence and abundance of the owlet moths (Phalaenidae (Noctuidae)), a group composed largely of such notoriously injurious pests as the corn earworm, the pale western cutworm, the western armyworm, the wheat-head armyworm, and many other seriously injurious cutworms inhabiting the region surveyed. This region is of exceptional interest to workers in applied entomology because it contains an owlet moth fauna representing not only the strictly subterranean species, controllable only by modification of cultural practices, but those possessing either intermediate or surface-inhabiting characteristics, and more or less amenable to insecticidal treatment.

The data herein contained, revealing the distribution, seasonal flight periods, and peaks of abundance of the various species, are basic to, or of value in, the consideration of cultural control and other methods for the suppression of the various pests involved.

The use of light traps offered an efficient means of obtaining this information. Accordingly, in the fall of 1934 traps were set up in

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several locations and their operation was continued during the flight seasons of 1935–37. A record of the nightly catch was kept, the species, number of moths captured, and the proportion of the sexes being tabulated. The traps were put in operation early enough in the spring so that the first flights could be observed, and they were kept in operation until cold weather in the fall stopped all flight activity.

Observations were made in the following six localities: Cherryvale, Garden City, Hays, and Manhattan in Kansas and Lincoln and Scottsbluff in Nebraska (fig. 1). These localities ranged in elevation

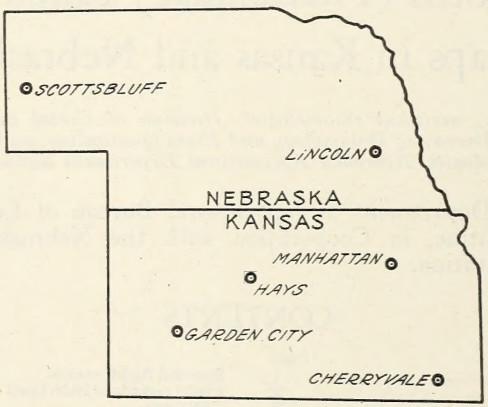

FIGURE 1.—Location of the light traps.

as follows: Cherryvale 800 feet, Garden City 2,800 feet, Hays 2,000 feet, Manhattan 1,100 feet, Lincoln 1,200 feet, and Scottsbluff 3,900 feet.

TRAPS

With the exception of the one used at Manhattan, the traps were of similar type and were designed by the senior writer. They consisted of an inverted galvanized-iron cone, 2 feet in diameter, with a roof of the same material. The lamp (fig. 2, *B*) was suspended in the center just above the rim, and a fruit jar was attached to the bottom of the cone for receiving the catch. The killing agent, calcium cyanide, was put in a small sack and placed in the fruit jar. The cyanide was renewed daily.

The trap used at Manhattan (fig. 2, *A*) was designed by R. C. Smith, of the Kansas Agricultural Experiment Station. Except for a more shallow cone, and the use of glass buffers about the lamp, this trap was the same as those at the other localities. Five-hundred-watt clear lamps were used at Manhattan and Lincoln and 200-watt inside-frosted lamps elsewhere.

The locations of the traps were probably not ideal, but the availability of electric outlets was the deciding factor in the selection of sites. These were as follows:

(1) At Cherryvale the location was unsatisfactory. It was on a flour mill that was illuminated nearly every night and near a transformer station that was always brilliantly lighted. The competition of these other lights greatly affected the catches, and the results from this trap are not considered of much value.

(2) At Garden City the trap was located on the grounds of the Garden City Branch Station, Kansas Agricultural Experiment Station, about 5 miles northeast of the city. The light was visible in all directions, although a small grove of trees on the southwest somewhat obscured it in that direction. It was placed about 5 feet above the ground.

(3) At Hays the trap was placed in an open space between buildings on the grounds of the Fort Hays Branch Station, Kansas Agricultural Experiment Station. It was about 5 feet above the ground and was visible for a long distance to the east and south.

(4) At Manhattan the trap was placed on top of an outbuilding near the college power plant. The lamp was about 20 feet above the ground and could be seen for

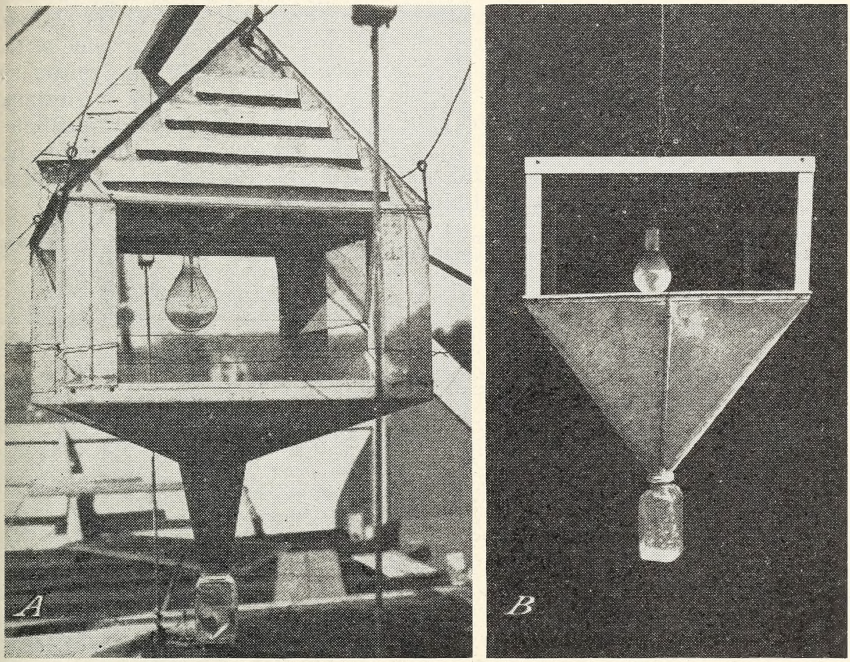

FIGURE 2.—Light trap used at Manhattan, Kans. (*A*), and at the other locations (*B*).

some distance to the west, south, and north, but was obscured by buildings on the east.

(5) At Lincoln the trap was placed at the east edge of the Nebraska Agricultural Experiment Station orchard, well within the city limits. It commanded a view to the east for some distance, but in other directions the light was obscured by the orchard trees nearby.

(6) At Scottsbluff the trap was located on the grounds of the Scottsbluff Branch Station, Nebraska Agricultural Experiment Station, about 6 miles northwest of the city. The trap was elevated about 10 feet above the ground and was visible for a long distance in all directions.

COLLECTIONS

The several light traps were in operation for various periods during the 4 years. Except for certain unavoidable interruptions, they were operated each night throughout the flight season.[2] The catches from Cherryvale, Garden City, Hays, and Scottsbluff were forwarded to

[2] The traps at Manhattan and Lincoln were operated by the writers and those at Cherryvale, Garden City, Hays, and Scottsbluff by the N. Sauer Milling Co., F. A. Wagner, L. C. Aicher, and John Carter, respectively.

either Manhattan or Lincoln, where the material was sorted and the results were tabulated. The number of nights for which records were obtained are as follows: Cherryvale 202, Garden City 612, Hays 214, Manhattan 629, Lincoln 656, and Scottsbluff 406.

It was at first intended to record all species of Phalaenidae taken at the several traps. Limitations of time, however, made it necessary to omit some of the smaller forms and the species of the genus *Catocala*, and in 1937 only species of known economic importance were recorded from Manhattan and Garden City. Altogether 305 species were taken and 525,547 individuals. The total yearly catch of each species for the different localities, together with the flight period, is shown in table 1. The sequence of genera and species is in accordance with McDunnough's Check list of Lepidoptera.[3] Much of the material was identified by the writers, largely by comparison with specimens determined by J. F. Gates Clarke, of the Division of Insect Identification, Bureau of Entomology and Plant Quarantine, Rowland R. McElvare, New York City, and the late F. H. Benjamin. Credit is due these men for their careful and painstaking work.

[3] McDUNNOUGH, J. CHECK LIST OF THE LEPIDOPTERA OF CANADA AND THE UNITED STATES OF AMERICA. PART I. MACROLEPIDOPTERA. South. Calif. Acad. Sci. Mem. 1,275 pp. 1938.

TABLE 1.—*Phalaenid moths caught in light traps at various localities in Kansas and Nebraska, 1934–37*

Species	Flight period	Number of moths caught															
		Cherryvale, Kans.,	Manhattan, Kans.			Hays, Kans.		Garden City, Kans.				Lincoln, Nebr.			Scottsbluff, Nebr.		
		Apr. 8 to Oct. 31, 1935	Sept. 8 to Dec. 5, 1934	Mar. 13 to Nov. 1, 1935	Apr. 8 to Oct. 30, 1936	Apr. 12 to Oct. 15, 1937	Sept. 26 to Oct. 30, 1934	Apr. 5 to Oct. 30, 1935	Sept. 28 to Nov. 23, 1934	Mar. 24 to Nov. 20, 1935	Apr. 10 to Oct. 31, 1936	Apr. 12 to Nov. 12, 1937	Mar. 14 to Oct. 28, 1935	Apr. 9 to Oct. 31, 1936	Apr. 13 to Oct. 30, 1937	July 13 to Oct. 19, 1935	May 3 to Oct. 31, 1936	May 17 to Oct. 18, 1937
Pantheinae:																		
Raphia abrupta Grt	Apr.–June			1	21						3			13	50		48	13
R. coloradensis Putn	June																7	
Acronictinae:																		
Acronicta rubricoma Guen	May–Aug			4	10									3	1			
A. americana (Harr.)	May–Sept		2		30									8	2		1	
A. lepusculina Guen	Apr.–Sept	3		12	30						5		7	19	15		18	1
A. parallela (Grt.)	Apr.–Oct	4	12	74	73		26	49	1	43	17		182	389	43		2	4
A. connecta Grt	Apr.–July			2														
A. vinnula (Grt.)	Apr.–Sept	1		3	13									1	7		1	
A. morula G. and R	Apr.–July	4		2	4									1	3		1	
A. interrupta Guen	Apr.–Sept			2	1													
A. lobeliae Guen	Apr			1														
A. pruni (Harr.)	Aug	1																
A. retardata (Walk.)	Apr.–June			2	1									35			2	
A. caesarea Sm	May													1				
A. brumosa Guen	Apr	1																
A. lithospila Grt	July			1														
A. oblinita (A. and S.)	Apr				1								1					
Simyra henrici (Grt.)	Apr.–May			1	1													
Phalaeninae (Agrotinae):																		
Euxoa ciccata (Sm.)	Oct			1		5	256	211	34	39	31	531		1		20	117	81
E. olivia (Morr.)	Sept.–Oct											6		2		26	260	99
E. brevipennis brevistriga Sm.	do																35	21
E. cicatricosa (G. and R.)	Sept																13	1
E. niveilinea (Grt.)	Aug.–Oct		14	4	2	51	159	59	3,694	150	111	3,082	12	65	145	280	460	290
E. quadridentata (G. and R.)	Sept																	18
E. atristrigata (Sm.)	July															1		
E. catenula (Grt.)	Aug.–Oct														2	1		3
E. pallipennis (Sm.)	Sept.–Oct							1							2	50	567	54
E. mitis ura Sm	Sept															1		
E. aurulenta f. *aurulentoides* (Strand.)	May–June														2		26	
E. detersa (Walk.)	July–Oct		3	16	3	8	1	3		1	1	23		1	2	25	48	22
E. intrita (Morr.)	July																1	

TABLE 1.—*Phalaenid moths caught in light traps at various localities in Kansas and Nebraska, 1934–37*—Continued

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Phalaeninae (Agrotinae)—Con.																		
E. immixta (Grt.)	May–July			227	312	774					1		25	132	152	1	8	21
E. velleripennis (Grt.)	Sept.–Oct		1										1	3				1
E. scandens (Riley)	May–Aug													1	1	51	251	242
E. medialis poncha Sm	Oct			2														
E. placida B. and McD	do		3															
E. mimallonis (Grt.)	Aug															1		
E. messoria (Harr.)	June–Oct		8	2	9	22	1			6	6	29	79	157	230	100	77	10
E. recticincta (Sm.)	Sept.–Oct						35	75	137	14	1	7				3	2	
E. tessellata (Harr.)	May–Aug				1						1			9	7	14	342	80
E. tessellata tesselloides (Grt.)	Oct														1			
E. remota (Sm.)	July													3	1		37	
E. simona McD	June										2						1	
E. declarata (Walk.)	July–Sept															30		
E. verticalis (Grt.)	July																1	
E. albipennis (Grt.)	June–Sept														3			18
E. obeliscoides (Guen.)	July–Oct		1				3						4	1	6			
E. costata idahoensis (Grt.)	July																	1
E. clausa McD	June																2	
E. tristicula (Morr.)	May–Aug										4				1	8	269	76
E. tristicula nesilens Sm	May																1	
Chorizagrotis auxiliaris Grt	Apr.–Oct	1	307	1,769	72	181	560	2,839	2,058	18,062	28,300	12,775	90	210	288	285	909	1,020
C. auxiliaris montanus Cook	July									16						1		
C. thanatologia (Dyar)	May–Oct								1	2								
C. thanatologia perfida (Dod.)	do									3								
Protexarnis balanitis (Grt.)	Sept															2		
Loxagrotis apicalis (Grt.)	do		20	14	12			31		1	1		5	1	3			
L. albicosta (Sm.)	Aug.–Oct								2							7	1	
Onychagrotis rileyana (Morr.)	Aug.–Oct	3	139	96	101	1,221	98	25	52	7	10	31	39	250	1,111	169	661	402
Eucoptocnemis fimbriaris (Guen.)	Oct				1												1	1
E. tripars (Walk.)	do			1														1
Agrotis vetusta Walk	Sept.–Oct		14	10	2	14	101	23	562	250	108	414	1	1	4	147	161	65
A. daedalus (Sm.)	Apr.–June			2	1			3		56	49		3				39	14
A. orthogonia Morr	Aug.–Oct						36	14	395	24	69	489				16	64	19
A. gladiaria Morr	Sept.–Oct	34	185	310	208	4,062		2					77	316	291		4	2

A. venerabilis Walk.	do	156	276	459	428	3,171	892	100	71	2	3	21	679	1,171	2,701	240	413	211
A. volubilis Harv.	May-July																126	38
A. malefida Guen.	June-Nov.	1	2	2	3	2	2		26	34	73	13						
A. ypsilon (Rott.)	Mar.-Nov.	131	14	201	53	382	28	93	590	800	1,179	768	107	75	620	24	14	17
Feltia subgothica (Haw.)	Aug.-Oct.	228	1,031	4,344	1,263	1,522	1,737	2,957	52	198	268	341	1,181	6,317	3,487	292	279	186
F. annexa (Treit.)	Apr.-Oct.	90		92	74	53		3	10	3	49	10	1	9	24			
Copablepharon grandis Stkr.	July-Sept.									3	5					3	61	1
C. contrasta McD.	Aug.																	1
C. longipenne Grt.	do																6	
C. alba (Harv.)	June-Aug.															2	13	
Spaelotis clandestina (Harr.)	June-July															1	4	2
S. havilae (Grt.)	June-July																4	
Choephora fungorum G. and R.	Sept.-Oct.	49	2	14						1								
Anicla infecta (Ochs.)	July-Aug.			1	2		1				2				1			
Hemieuxoa rudens (Harv.) and f. *pellucidalis* (Grt.)	Apr.-Sept.			1	2			3		6	9				11			4
Cerastis tenebrifera (Walk.)	Apr.														1			
Peridroma margaritosa Haw. and f. *saucia* (Hbn.)	Mar.-Nov.	93	22	761	356	4,683	6	77	49	727	1,055	2,224	455	420	2,197	77	71	357
Caradrina quadrangula clemens (Sm.)	May																1	
Amathes c-nigrum (L.)	May-Oct.	1	1	47	123	113			1	17	16	50	21	48	197	27	48	8
A. badinodis (Grt.)	Sept.-Oct.	39	24	41	26	41	2						12	30	25			
Pseudoglaea olivata (Harv.)	Sept.																1	
Abagrotis placida (Grt.)	July																1	
A. barnesi (Benj.)	June-Sept.	1			3	2				3						5	8	10
Rhynchagrotis cupida (Grt.)	July																1	
Ufeus satyricus Grt.	Oct.								3								1	
U. plicatus Grt.	do														1			
Hadeninae:																		
Scotogramma trifolii (Rott.)	Mar.-Nov.	153	861	3,677	1,100	984	89	3,615	498	86,661	75,021	42,325	970	2,492	8,295	1,396	742	403
S. trifolii albifusa (Walk.)	May														2		1	
Trichoclea postica Sm.	June-Aug.										1			2	1			
T. artesta Sm.	do																10	
Polia legitima (Grt.)	June-Sept.	4	6	15	5								1	4			1	3
Lacinipolia meditata (Grt.)	do		3	9	21			76					57	102	28	1		1
L. anguina (Grt.)	Apr.			5														
L. incurva (Sm.)	do				1													
L. vicina (Grt.)	May-Oct.		32	43	7		233	101		2	1			12	2	4	7	2
L. renigera (Steph.)	do	33	2	23	65								211	1,011	60	7	5	3
L. erecta (Walk.)	Apr.				1													
L. lorea (Guen.)	June													1			1	
L. olivacea (Morr.)	Aug.															2		
L. marinitincta (Harv.)	Sept.-Oct.	2	5	8	2													
Anepia capsularis (Guen.)	May			1	2													
Tricholita signata (Walk.)	Aug.													1				
Ulolonche culea (Guen.)	May			2														
U. modesta disticha (Morr.)	Sept.						2											
Orthodes akalus (Stkr.)	do						1											
O. incincta (Morr.)	July-Oct.	16	51	104	83	141	10	16		1			36	91	103	117	98	9
O. saturnus (Stkr.)	Sept.-Oct.		2															
O. crenulata (Butl.)	May-June	3			6									3			8	

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Hadeninae—Continued.																	
O. furfurata (Grt.)	May			1													
Nephelodes emmedonia (Cram.)	Sept.-Oct	20	22	27	58	116	9		1			1	14	25	51	2	2	3
Xylomyges sp	May																1	
Orthosia garmani (Grt.)	Apr				1													
O. hibisci f. norm. *insciens* Walk.	do									1				1	5			
Ceramica picta (Harr.)	Apr.-Oct	1		9	39	12		6			7	3	9	33	102	119	27	32
Protoleucania rubripennis (G. and R.)	Aug.-Sept	1	15		1					9	1							
P. albilinea (Hbn.)	Mar.-Oct	139	63	1,440	477	327	33	1,118	32	1,023	403	649	339	1,120	413	71	55	15
Leucania phragmatidicola Guen.	Apr.-Oct	20	8	211	159	266	5	82	18	98	104	15	36	107	108	17	16	3
L. unipuncta (Haw.)	Apr.-Nov	1,029	381	4,107	273	3,357	145	152	613	577	450	2,250	1,035	822	3,140	113	48	252
Cucullinae:																		
Cucullia speyeri Lint	May-June														4			
C. laetifica Lint	Apr.-Oct	4		172	41			71		24	173		3	9	10		2	
C. asteroides Guen	May-Sept			34	15			1			1		1				2	
Nycterophaeta luna (Morr.)	May-Aug															3	13	59
Oncocnemis balteata Sm	Aug																1	
O. iricolor Sm	Sept.-Oct			1														11
O. sanina Sm	do		1				48		91	5	6					367	481	143
O. augustus Harv	do							1			25					91	146	3
O. saundersiana Grt	Oct				1													
O. occata (Grt.)	Apr.-Oct			36	3					1	7				11		2	2
O. riparia Morr	May-June				10													
O. sp. nov	Sept															1		
Homohadena badistriga (Grt.)	June													1				
H. stabilis Sm	May-June			9	43									26	1	11	19	
H. infixa dinalda Sm	May-July			58	101								1	3	11			
Adita chionanthi (A. and S.)	Sept.-Oct		4	11	6		18	7					3	36	30		1	
Psaphidia grotei (Morr.)	Mar.-Aug	4		29	16			1					1	210	37		53	
Eutolype depilis (Grt.)	Apr				2													
E. rolandi (Grt.)	do				2													
Graptolitha georgii (Grt.)	Apr.-Oct													1			4	

G. unimoda (Lint.)	Oct															4			
Fishia betsia (Sm.)	do																1		
Rusina bicolorago (Guen.)	do	2	5	10	1				3	2			2	3	9				1
Anathix agressa (Sm.)	do			1					2										
Homoglaea carbonaria (Harv.)	do							1									1	1	
Amphipyrinae:																			
Septis relicina (Morr.)	Oct						1												
S. arctica (Feyer)	June																	1	
S. inordinata montana (Sm.)	May–Sept																	45	15
Agroperina helva (Grt.)	July–Sept	1			1														1
Crymodes devastatrix (Brace)	do		1							1	1			4		9	1		
C. burgessi (Morr.)	Sept.–Nov		99	54	14			934	25				26	122	158	24	2	3	
Trichoplexia virguncula (Sm.)	May–Aug																67	35	
Protagrotis niveivenosa (Grt.)	July															1	12	7	
Luperina innota Sm	Sept															1			
L. passer (Guen.)	June–July																2	1	
L. sp. nov	Sept.–Oct			5															
Archanara oblonga (Grt.)	Aug															1			
A. subflava (Grt.)	do															1			
Ipimorpha subvexa (Grt.)	July–Aug															1	1		
Apamea sp	July																1		
Papaipema serrata (Grt.)	July–Aug																4		
P. circumlucens (Sm.)	Oct	9	1	1											1				
P. nebris Guen. and f. *nitela* Guen.	Sept.–Oct	66	3	7	7	6	10		1				1		2				
P. maritima Bird	Oct				1														
Trachea delicata (Grt.)	May–July	1			2									5	1		2	1	
Phosophila miselioides (Guen.)	June–July			2	2														
Amphipyra pyramidoides Guen.	Sept																2		
A. glabella (Morr.)	June–Aug															2	5		
Dipterygia scabriuscula (L.)	Apr.–Sept	1	2	9	15						1		3	72	9	1			
Delta ramosula (Guen.)	July–Aug	3		3															
Andropolia diversilineata (Grt.)	July																1		
Perigea xanthioides Guen	May–Sept			6	65								1	10	16		1		
Platysenta videns (Guen.)	May–Aug				16														
Pl. vecors (Guen.)	Apr	1																	
Pl. sutor (Guen.)	Sept.–Nov	4	3	3	1														
Elaphria festivoides f. *varia* (Walk.)	Sept			3															
E. grata Hbn	May–July			1	1														
Platyperigea extima (Walk.)	May–Oct			8	2			3		12	11		1	16	55	315	690	262	
P. meralis (Morr.)	Sept.–Oct		2																
Crambodes talidiformis Guen.	Apr.–Oct	1	1	110	1,126			3		1	2		10	424	291	52	76	37	
Prozenus miranda (Grt.)	May–Oct			4	24									57	2				
Galgula partita Guen	Apr.–Oct													168	793				

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Species	Flight period	Number of moths caught															
		Cherryvale, Kans., Apr. 8 to Oct. 31, 1935	Manhattan, Kans.			Hays, Kans.		Garden City, Kans.				Lincoln, Nebr.			Scottsbluff, Nebr.		
			Sept. 8 to Dec. 5, 1934	Mar. 13 to Nov. 1, 1935	Apr. 8 to Oct. 30, 1936	Apr. 12 to Oct. 15, 1936	Sept. 26 to Oct. 30, 1934	Apr. 5 to Oct. 30, 1935	Sept. 28 to Nov. 23, 1934	Mar. 24 to Nov. 20, 1935	Apr. 10 to Oct. 31, 1936	Apr. 12 to Nov. 12, 1937	Mar. 14 to Oct. 28, 1935	Apr. 9 to Oct. 31, 1936	Apr. 13 to Oct. 30, 1937	July 13 to Oct. 19, 1935	May 3 to Oct. 31, 1936	May 17 to Oct. 18, 1937
Amphipyrinae—Continued.																	
G. partita f. *hepara* Guen	Apr.–Oct			2										11			
Balsa malana (Fitch)	May				2								2	55		1	
Prodenia ornithogalli Guen	Mar.–Oct	273	177	1,616	503	1,669	14	197	62	631	165	240	1,683	262	2,352	15	5	
Laphygma frugiperda (A. and S.).	Aug.–Oct	23	12	133	31	28	3	5	29	43	17	49	21	3	82	1		
L. exigua (Hbn.)	May–Nov	5	96	332	340	142	37	48	966	285	201	316	36	59	1,260	11	7	5
Magusa orbifera (Walk.)	Aug.–Nov	2	1	3			1		7	6	1							
Enargia decolor (Walk.)	July										1						2	
Cosmia canescens f. *calami* (Harv.).	Aug																	1
Atethmia substa Hbn	Oct			2														
Arzama obliqua (Walk.)	July–Aug																	2
Pyrrhia umbra (Hufn.)	May–Aug			4	4												1	
Erythroecia suavis (Hy. Edw.).	May–Sept		2	15	30			33		60	21			4	1	14	12	3
Escaria clauda Grt	June–July																2	
Catabena lineolata Walk	Apr.–Sept			29	242						1		3	139	358	8	36	9
Ogdoconta cinereola (Guen.)	May–Oct	3		24	163									6			1	6
Selicanis cinereola Sm	Oct.–Nov	3	28	26	5		31	4	8		2			1	2	1	1	
Stibadium spumosum Grt	June–Sept	12	2	22	35			6			8		2	33	30	223	195	168
Plagiomimicus pityochromus Grt.	Aug.–Sept	14		4	47									3	2		1	1
P. expallidus Grt	Sept			1														
Stiria rugifrons Grt	May–Oct	18	13	107	29			91		181	73		1	3	6	155	359	640
Basilodes pepita Guen	Aug.–Sept				7						1							
B. chrysopis Grt	Sept									2								
B. catharops Dyar	do										1							
Cirrhophanus duplicatus Sm	June																8	
Stiriodes perflava (Harv.)	do													2				
Pseudacontia crustaria (Morr.).	May–July																9	33
Heliothinae:																		
Heliophana bina (Guen.)	Sept				2													
Heliothis chloropha (Hbn.)	do		4	1	1													
H. paradoxa (Grt.)	May–Oct	1	2	138	263			17		20	164		13	87	68	1	24	3
H. phloxiphaga G. and R	Apr.–Sept	2	1	37	59			4	1	1	8		2	49	33		4	

H. armigera (Hbn.)	Apr.-Nov	180	1,676	1,946	1,695	1,829	1,062	487	701	1,035	1,219	2,186	266	610	2,120	45	25	49
H. virescens (F.)	July-Sept			4	4			4		4	8			4	1	7	6	2
Canthylidia scutosa (Schiff.)	May-Oct		11	6	8		1	2		4	9		1	2	2	1	7	1
Oxylos citrinellus (G.andR.)	June-Sept			7	1			1		58	2			3		1	68	2
Chlorocleptria simplex Sm	do		1	5	10			7		158	167		1		20	21	42	54
Dasyspoudaea lucens(Morr.)	do			30	67								1	3	1		5	
D. meadi (Grt.)	May-Aug			3	11			4		140	195			4	3	11	233	209
Rhodophora gaurae(A.andS.)	May-Oct	3		94	17			1		1			4	11	14		5	3
Thyreion rosea Sm	May-June				4												4	2
Schinia cumatilis (Grt.)	Aug.-Sept				131						6			1			1	2
S. hulstia Tepper	Sept				7	13									2			
S. reniformis Sm	July-Aug																3	4
S. chrysella (Grt.)	Aug.-Oct			3	33	5					1			9	1		1	2
S. trifascia Hbn	Aug														7		3	4
S. oleagina Morr	do					6									3			1
S. gracilenta Hbn	Aug.-Oct			42	120			179		13	27		1	3	2		7	
S. acutilinea (Grt.)	Aug																	4
S. diffusa Sm	do					3												
S. walsinghami (Hy. Edw.)	do																	3
S. nundina (Dru.)	Sept			1														
S. tertia (Grt.)	Aug.-Oct	36		2,043	6,624			1,024		17	106		33	334	79	1	4	6
S. albafascia Sm	Aug																	1
S. regia (Stkr.)	July-Sept				1			3		2	50					1	4	4
S. gloriosa (Stkr.)	Sept	3		5													1	
S. sanguinea (Geyer)	Aug					1												
S. saturata (Grt.)	July-Oct			13	268			3			13			2	2			
S. thoreaui (G. and R.)	July-Sept	21		10	53	10												
S. marginata (Haw.)	Aug.-Sept	30		8	4			1			2				2			
S. lora Stkr	Sept				6													
S. bifascia Hbn	Aug														4			
S. ultima (Stkr.)	Sept				10	5					1							
S. jaguarina (Guen.)	May-Sept	7		965	73			25		27	16		22	27	14	8	7	3
S. lynx (Guen.)	June-July													1	1			
S. arcigera (Guen.)	Aug.-Oct	2	1	6	11			1									3	
S. bicuspida Sm	July-Sept			13	36	2		1			2			1			3	2
S. mortua (Grt.)	Aug.-Sept					3						2						3
S. mortua packardii (Grt.)	do	3		8	155			5		15	8					3	16	1
S. mortua nobilis (Grt.)	Sept		1															
S. sordida Sm	do				27	22												
S. siren (Stkr.)	Aug.-Sept			4	48					3	15							
S. roseitincta (Harv.)	June																4	1
Trichosellus cupes (Grt.)	June-July				1					6								
Acontiinae:																		
Erastria synochitis G. and R.	June-July													2				
E. carneola Guen	May-Sept			1	77						1			395	314			2
Neorastria apicosa (Haw.)	June-Sept				2									3				
Chamyris cerintha (Treit.)	June													1				
Amyna octo (Guen.)	Sept			1														
Tarachidia erastrioides(Guen.)	May-Oct													1,081	944		22	10
T. tenuescens (Sm.)	Aug																	1
T. semiflava (Guen.)	June																1	

TABLE 1.—*Phalaenid moths caught in light traps in various localities at Kansas and Nebraska, 1934–37*—Continued

Species	Flight period	Number of moths caught															
		Cherryvale, Kans., Apr. 8 to Oct. 31, 1935	Manhattan, Kans.				Hays, Kans.		Garden City, Kans.				Lincoln, Nebr.			Scottsbluff, Nebr.		
			Sept. 8 to Dec. 5, 1934	Mar. 13 to Nov. 1, 1935	Apr. 8 to Oct. 30, 1936	Apr. 12 to Oct. 15, 1937	Sept. 26 to Oct. 30, 1934	Apr. 5 to Oct. 30, 1935	Sept. 28 to Nov. 23, 1934	Mar. 24 to Nov. 20, 1935	Apr. 10 to Oct. 31, 1936	Apr. 12 to Nov. 12, 1937	Mar. 14 to Oct. 28, 1935	Apr. 9 to Oct. 31, 1936	Apr. 13 to Oct. 30, 1937	July 13 to Oct. 19, 1935	May 3 to Oct. 31, 1936	May 17 to Oct. 18, 1937
Acontiinae—Continued.																		
Therasea angustipennis (Grt.).	May–Aug														1		53	252
Acontia aprica (Hbn.)	May–Oct			197	501			6						104	163		59	2
Euteliinae:																		
Marathyssa inficita (Walk.)	May–June				2												4	
Sarrothripinae:																		
Bailieya australis Grt	Apr–Sept			3	109									95	7		46	
Plusiinae:															2			
Autographa falcifera (Kby.)	Apr																	
A. falcifera simplex (Guen.)	Mar–Oct	10		597	284			72		51	12		363	486	1,743	14	7	35
A. brassicae (Riley)	Mar.–Nov	95	137	3,512	611		5	124		219	45		1,240	262	2,663	195	20	36
A. orygramma Geyer	Sept				1													
A. biloba (Steph.)	Apr.–Oct	6		105	13			4		2	1		3	17	102			6
A. oo (Cram.)	do		2	10	3													
A. precationis (Guen.)	Apr.–July				5										2			
A. californica (Speyer.)	May–Oct			1	3													1
A. oo (Guen.)	May–June														7			
Plusia aerea (Hbn.)	May				2													
Abrostola urentis Guen	Apr.–Sept			28	154								1	10	16		2	
Catocalinae:																		
Parallelia bistriaris Hbn	July–Aug	4																
Caenurgina crassiuscula (Haw.) and *C. erechtea* (Cram.) mixed.	Mar.–Nov	249	63	2,225	696	3,620	9	1,447	28	1,069	872	1,997	1,200	1,082	4,827	67	58	117
Argyrostrotis anilis (Dru.)	May–Aug			1	2									1				
Zale lunata (Dru.)	May–Oct	5		18				1		1			1		8			
Z. galbanata (Morr.)	Apr.–July				15									6	2		1	
Z. lunifera (Hbn.)	May–June			2														
Matigramma pulverilinea Grt.	May–Sept	1	1	20	33			2						1	2		1	
Bendis detrahens (Walk.)	Sept			1											1			
Phoberia atomaris Hbn	Mar			1														
Melipotis indomita (Walk.)	Apr.–Aug	6		47	4			6		117	371		1		6		1	
M. jucunda Hbn	Mar.–Oct		1	11	6		1			3	1				5		3	
Bulia deducta (Morr.)	May–Aug			12	18			1		10	166				1		20	

Drasteria mirifica (Hy. Edw.).	Apr.–Sept.									5	22				1	6	25	6
Drasteria sp.	July																1	
Anticarsia gemmatilis (Hbn.).	Oct.–Nov.		1		1													
Strenoloma lunilinea (Grt.)	June				1												1	
Hypsoropha monilis (F.)	do	1																
H. hormos Hbn.	do	1			1													
H. sp. nov.	May–June				2													
Plusiodonta compressipalpis Guen.	Apr.–Sept.			2	5													
Alabama argillacea (Hbn.)	Aug.–Oct.	170	1,372	2,704	189		11	61	139	48	3		136	28	693	1	1	
Hypeniinae:																		
Tathorhynchus angustiorata (Grt.)	June–Nov.	13	4	240	39			50		57	87		26	11	106	1		12
Plathypena scabra (F.)	June–Oct.	113	2	858	66			20		76			09	16	162		2	1
Herminiinae:																		
Epizeuxis americalis (Guen.)	June														1			
E. lubricalis Gey	June–July													1	1			
Total		3,674	7,265	37,090	21,094	28,874	5,723	16,703	10,963	113,256	111,686	70,847	11,213	21,957	43,711	5,455	9,599	6,437
Number of species		76	70	139	151	41	42	73	37	76	88	29	69	113	126	86	157	112

Although the response to light varies with different species, it is probable that the number of individuals recorded is a fairly reliable estimate of the relative abundance of the species. Approximately 90 percent of the total catch was referable to species of economic importance.

PROPORTION OF THE SEXES

During the course of this study an attempt was made to determine the proportion of the sexes in representative samples of the various species taken. In many cases, however, insufficient material was examined or captured for a reliable estimate to be obtained. The results are presented in table 2. Only those species represented by 25 or more specimens are tabulated, all others being included in one group at the end of the table. Altogether, 36,692 specimens were examined, and of this number 12,902, or 35 percent, were females. It will be seen that the proportion of females varied greatly with different species, ranging from 3 to 60 percent.

TABLE 2.—*Proportion of females among various species of phalaenid moths caught*

Species	Moths examined	Females	Species	Moths examined	Females
	Number	*Percent*		*Number*	*Percent*
Acronicta lepusculina Guen.	28	36	*Nephelodes emmedonia* (Cram.)	32	3
A. parallela (Grt.)	34	35	*Protoleucania albilinea* (Hbn.)	918	21
Euroa siccata (Sm.)	256	10	*Leucania phragmatidicola* Guen.	170	46
E. niveilinea (Grt.)	292	14	*L. unipuncta* (Haw.)	4,160	36
E. immixta (Grt.)	50	22	*Cucullia laetifica* Lint	28	25
E. scandens (Riley)	40	30	*Oncocnemis sanina* Sm.	79	19
E. messoria (Harr.)	31	33	*O. augustus* Harv.	31	35
E. recticincta (Sm.)	83	29	*O. occata* (Grt.)	25	60
E. tessellata (Harr.)	32	44	*Psaphidia grotei* (Morr.)	26	23
Chorizagrotis auxiliaris (Grt.)	10,672	51	*Crymodes burgessi* (Morr.)	502	6
Loxagrotis apicalis (Grt.)	32	31	*Platyperigea extima* (Walk.)	30	7
Onychagrotis rileyana (Morr.)	262	13	*Prodenia ornithogalli* Guen.	1,501	25
Agrotis vetusta Walk.	293	28	*Laphygma frugiperda* (A. and S.)	44	48
A. daedalus (Sm.)	62	15	*L. exigua* (Hbn.)	510	32
A. orthogonia Morr.	233	18	*Selicanis cinereola* (Guen.)	67	27
A. gladiaria Morr.	185	27	*Heliothis paradoxa* (Grt.)	32	56
A. venerabilis Walk.	984	3	*H. armigera* (Hbn.)	3,149	45
A. malefida Guen.	35	43	*Schinia mortua packardii* (Grt.)	29	21
A. ypsilon (Rott.)	1,012	32	*Autographa falcifera simplex* (Guen.)	59	8
Feltia subgothica (Haw.)	2,767	7	*A. brassicae* (Riley)	528	39
F. annexa (Treit.)	138	17	*Caenurgina crassiuscula* (Haw.) and *C. erechtea* (Cram.) mixed	1,019	33
Peridroma margaritosa saucia (Hbn.)	936	36	All other species	1,133	33
Amathes c-nigrum (L.)	44	52	Total	36,692	35
A. badinodis (Grt.)	27	11			
Scotogramma trifolii (Rott.)	3,550	35			
Lacinipolia meditata (Grt.)	74	12			
L. vicina (Grt.)	272	13			
L. renigera (Steph.)	51	12			
Orthodes incincta (Morr.)	145	17			

SEASONAL FLIGHT RECORDS

Taken as a group, the light-trap records show that Phalaenidae are in flight from early in March to late in November, with periods of heavy flight and scarcity interspersed irregularly throughout the season. The nightly flight of Phalaenidae in the different localities is shown graphically in figures 3, 4, and 5. The nightly flight at Garden City was much greater than at any of the other localities, owing chiefly to the enormous numbers of adults of *Scotogramma trifolii* captured. The numbers of moths taken varied greatly in the different localities, and from year to year, and also as to the time of the year when the

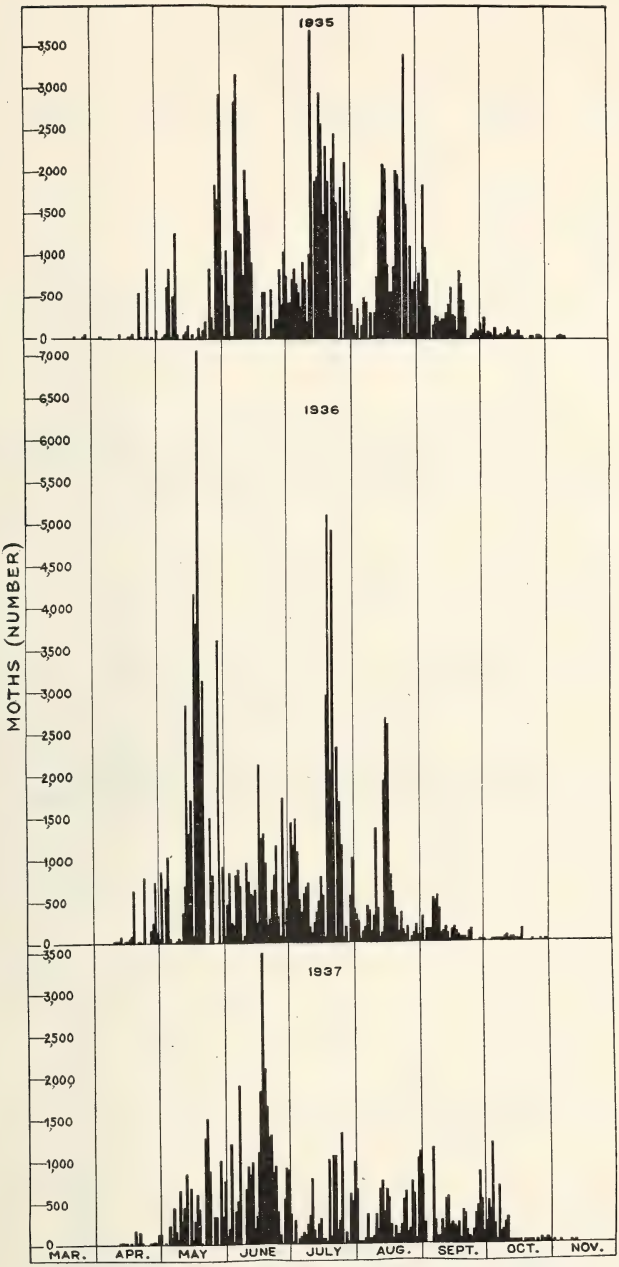

FIGURE 3.—Nightly flight of Phalaenidae at Garden City, Kans., 1935–37.

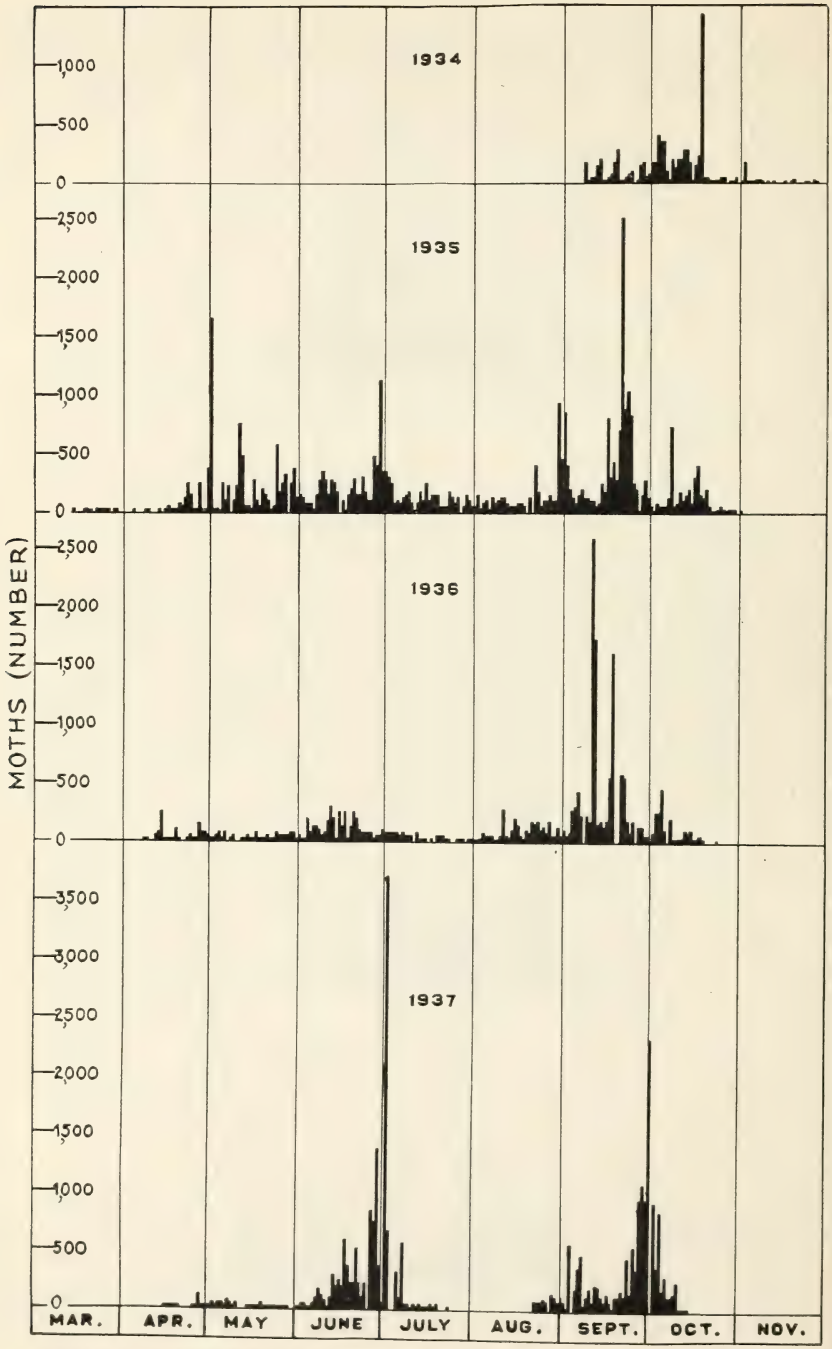

FIGURE 4.—Nightly flight of Phalaenidae at Manhattan, Kans., 1934–37.

period of greatest flight occurs. For example, at Garden City in 1935 the peak flight occurred in July, in 1936 in May, and in 1937 in June.

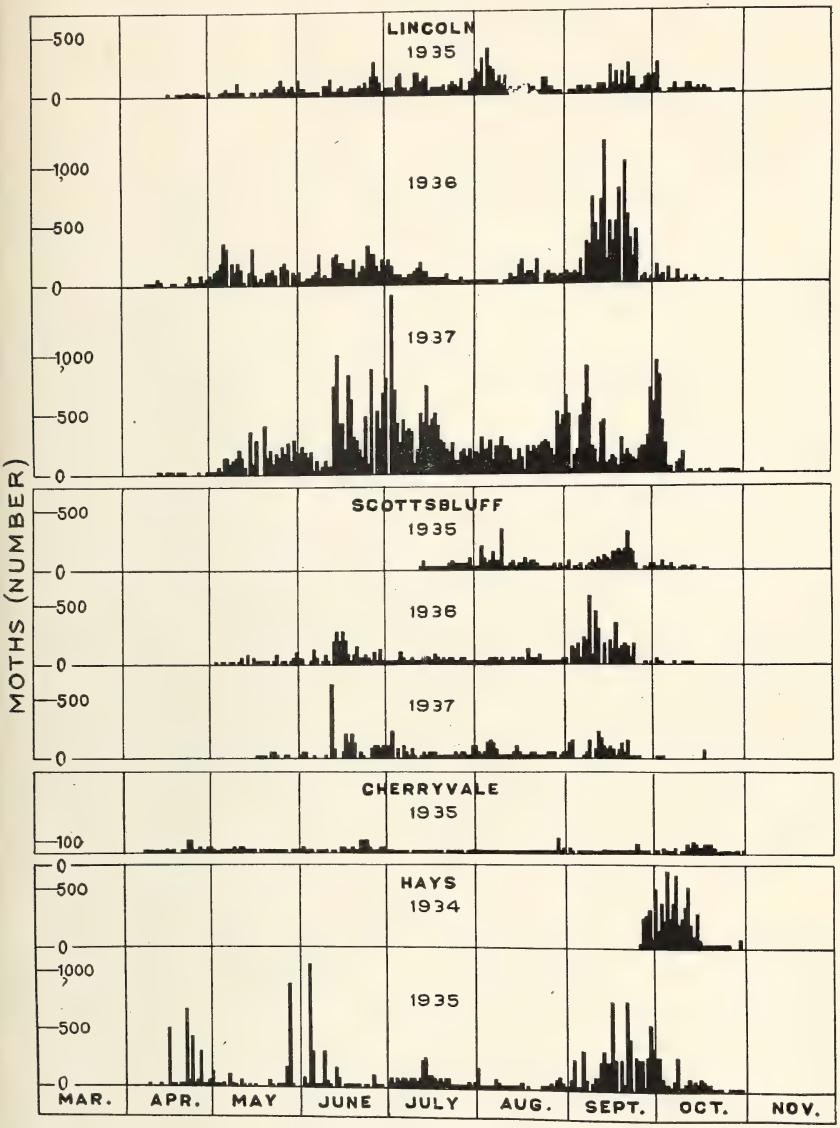

FIGURE 5.—Nightly flight of Phalaenidae at Lincoln and Scottsbluff, Nebr., and at Hays and Cherryvale, Kans., 1934–37.

In other words, there is no definite pattern in the flight periods of the Phalaenidae as a group, largely because individual species vary greatly in numbers from year to year.

FLIGHT RECORDS OF INDIVIDUAL SPECIES

The species of Phalaenidae fall into two main groups based on their seasonal history, namely, those species producing a single generation annually and those producing more than one generation annually.

As noted previously, species of economic importance comprised 90 percent of the total number of individuals captured. The seasonal flight of several single-generation species of economic importance is shown in figures 6 and 7.

In general, the flight of individual species showed the same trend at all the localities, the chief difference being in numbers taken. Where no striking differences were noted only one locality was plotted on the charts. It will be seen that the species producing a single generation annually have a rather short flight period, usually late in August, extending through September and into the early part of October. The notable exception is *Chorizagrotis auxiliaris*. The enormous flight of this species in May and June suddenly subsides and the species reappears again in September, after an estivation period of about 2 months. The fall flight is greatly reduced in numbers. This species is normally confined to the semiarid regions, but occasionally occurs in abundance at Manhattan (fig. 6, *B*) and at Lincoln. The records for the individual species show the same trend, namely, years of abundance usually followed by years of scarcity.

The seasonal flight of several species producing multiple generations annually is shown in figures 8, 9, 10, and 11. The flight records alone do not delineate clearly the various generations owing to overlapping as the season progresses. The charts, however, bring out some points of interest with reference to the seasonal abundance of multiple-generation species. *Heliothis armigera* (fig. 10, *A*) is shown to be scarce early in the season, with a marked increase in abundance in the fall. With *Prodenia ornithogalli* (fig. 10, *B*) and *Peridroma margaritosa saucia* (fig. 11, *A*) the peak of abundance is reached in midseason, followed by comparative scarcity in the fall. *Protoleucania albilinea* (fig. 11, *B*) shows two distinct flight periods, one early in May and the other late in August or early in September.

SUMMARY

Light traps were operated for various periods in six localities in Kansas and Nebraska during the period 1934–37, in order to obtain information on the flight periods and abundance of owlet moths (Phalaenidae). An attempt was made to operate the traps each night during the flight season, which extended from March to November. A total of 2,719 nightly records were made.

During the 4-year period 305 species of Phalaenidae were taken, totaling more than 525,000 individuals. Approximately 90 percent of the specimens taken were species of economic importance. The different species taken in each locality are shown, together with the total yearly flight, the flight period, and the proportion of the sexes. More than 36,000 individuals were examined for sex, and it was found that 35 percent were females. The sex ratio varied greatly with the species.

The seasonal flight records are presented graphically for the Phalaenidae as a group and for several species of economic importance. The numbers of moths taken differed greatly in the different localities,

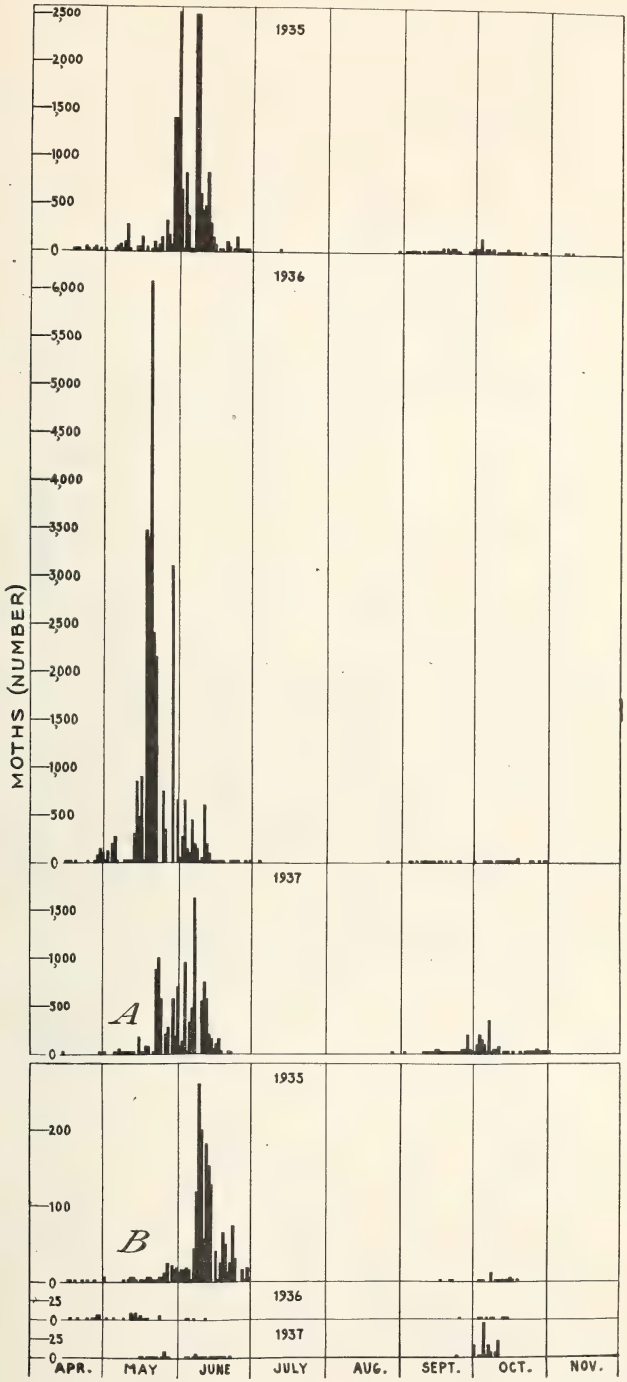

FIGURE 6.—Seasonal flight of *Chorizagrotis auxiliaris* at Garden City, Kans. (*A*), and at Manhattan, Kans. (*B*), 1935–37.

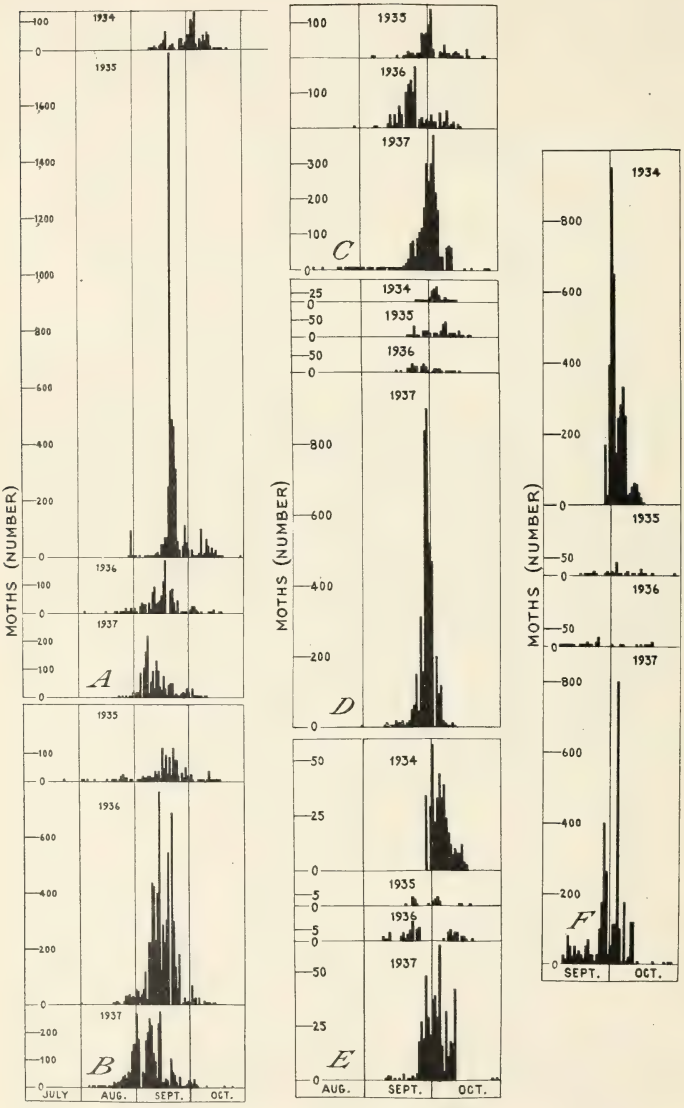

FIGURE 7.—Seasonal flight of *Feltia subgothica* at Manhattan, Kans. (*A*), and at Lincoln, Nebr. (*B*), *Agrotis venerabilis* at Lincoln (*C*), *A. gladiaria* at Manhattan (*D*), *A. orthogonia* at Garden City, Kans. (*E*), and *Euxoa niveilinea* at Garden City (*F*), 1934–37.

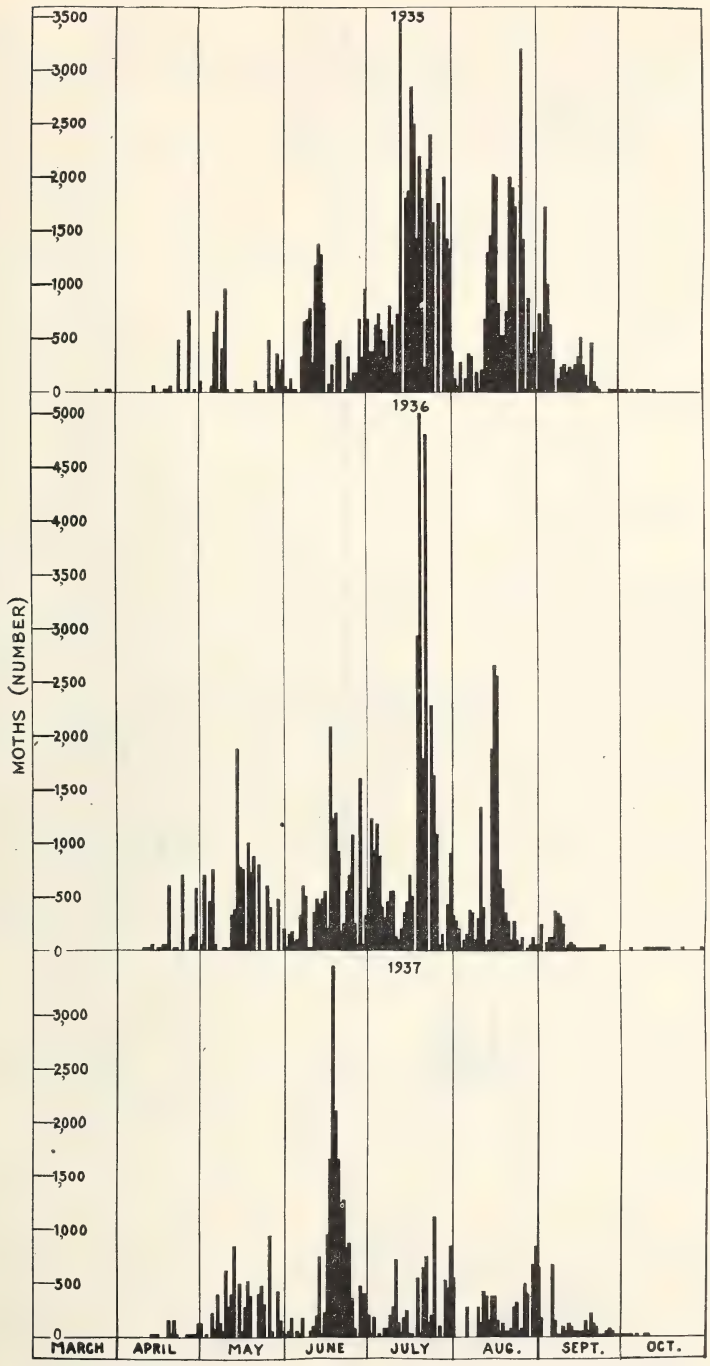

FIGURE 8.—Seasonal flight of *Scotogramma trifolii* at Garden City, Kans., 1935–37.

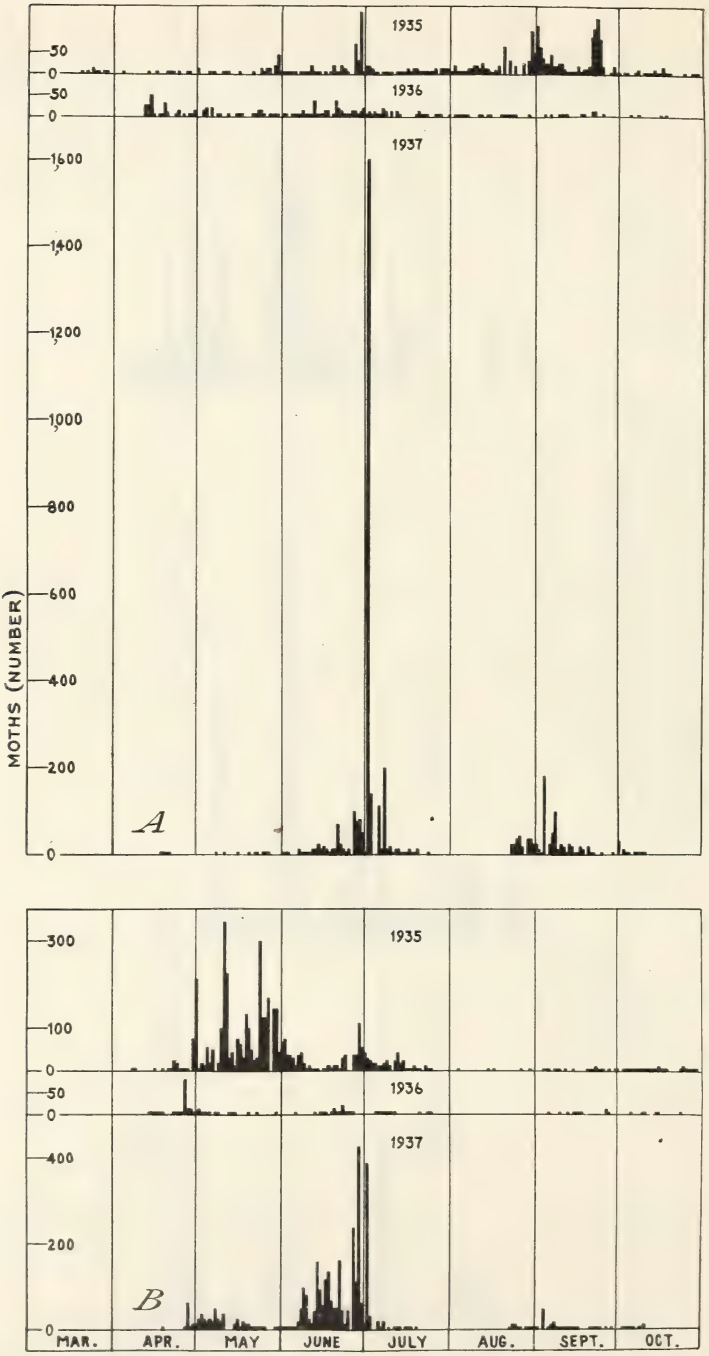

FIGURE 9.—Seasonal flight of *Caenurgina erechtea* and *C. crassiuscula* (*A*), and *Leucania unipuncta* (*B*), at Manhattan, Kans., 1935–37.

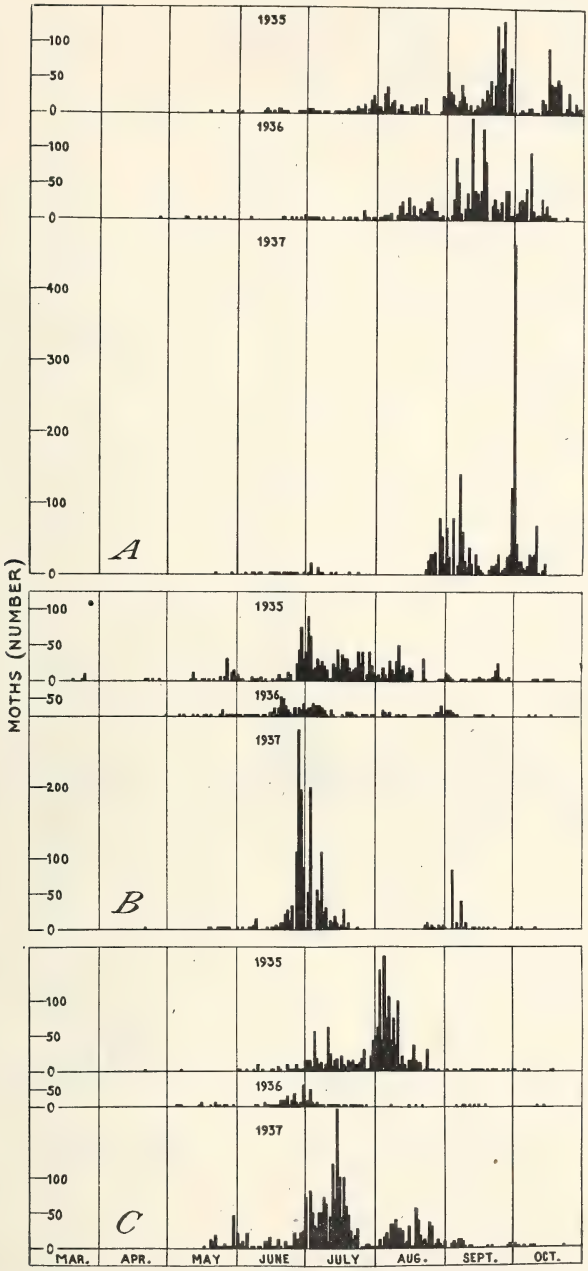

FIGURE 10.—Seasonal flight of *Heliothis armigera* at Manhattan, Kans. (*A*), and of *Prodenia ornithogalli* at Manhattan (*B*), and at Lincoln, Nebr. (*C*). 1935–37.

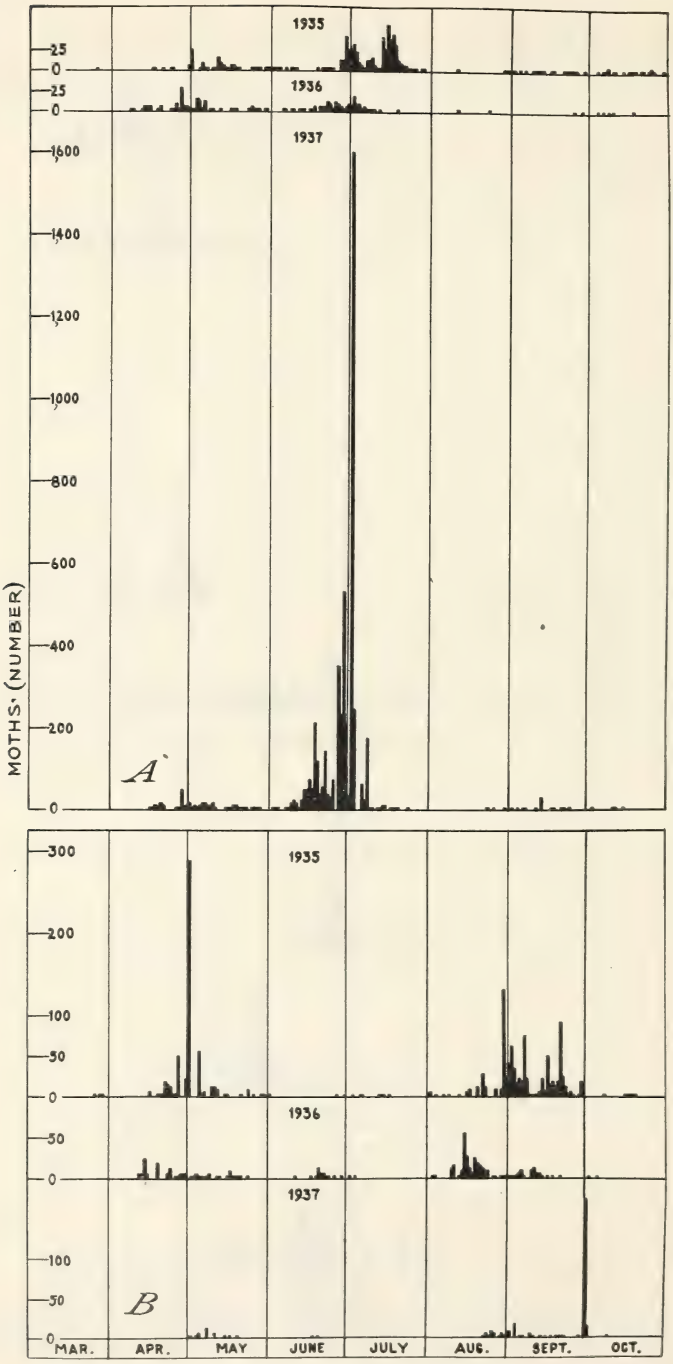

FIGURE 11.—Seasonal flight of *Peridroma margaritosa saucia* (*A*) and *Protoleucania albilinea* (*B*) at Manhattan, Kans., 1935–37.

and from year to year, and also as to the time of year when the greatest period of flight occurred. In general, however, flights of individual species showed the same trend in all the localities.

Species having a single generation annually had a rather short flight period, usually from late August to early October. *Chorizagrotis auxiliaris*, an exception to this rule, had an enormous flight in May and June and a much lighter flight in the fall.

Owing to overlapping of broods, the flights of the different generations of multiple-generation species were not clearly defined. *Heliothis armigera* was scarce early in the season, with a marked increase in abundance in the fall. Peak abundance of *Prodenia ornithogalli* and *Peridroma margaritosa saucia* occurred in midseason, followed by comparative scarcity in the fall. *Protoleucania albilinea* showed two distinct flight periods, one early in May and the other late in August or early in September.

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