Table 20. Soil Temperatures in Winter Field Cage, 1956-57.

Date of readings*		Temperature in °F**	Date of readings*		Temperature in °F**
1956: Oct.	18	66	1957: Feb.	8	54
	22	64		9	53
	24	65		11	41
	29	61		12	31
				13	34
Nov.	5	63		14	34
	7	63		15	29
	9	51		16	40
				18	27
1957: Jan.	5	43		19	41
	7	45		20	29
	8	41		21	29
	9	49		22	32
	10	48		23	32
	11	41		25	38
	14	43		26	50
	15	40		27	48
	16	38			
	17	32	Mar	1	37
	18	21		2	34
	19	21		4	30
	21	25		5	40
	22	38		6	40
	23	35		8	32
	24	31		9	30
	25	37		11	30
	28	39		12	50
	29	53		13	42
	30	42		14	45
	31	44		15	50
				16	34
Feb.	2	38		18	36
	4	40		19	49
	5	48		20	42
	6	51		21	31
	7	54		22	42

* Readings at midday
** At the soil surface just below mat of covering vegetation

March 11, 1957, with the adult emerging on or before March 21, 1957. A total of 128 days had been spent as a mature larvae and prepupa, as compared to an average of about ten days for other members of the same batch under the same conditions. This exception might be due to the specimen's doing little or no feeding, with consequently an arresting development long enough for later low temperatures to produce their effect.

The first five instars, released during the first week of January, 1957, had varying degrees of success in overwintering, and a portion of all of these instars successfully withstood the winter and emerged as adults during March, April, and May, 1957, the

normal months for the first flight moths each spring, as indicated by light trap collections. Of the 100 larvae in the first five instars released in early January, 1957, 55 became pupae between early March and mid-May, 1957, and 50 successfully emerged. Adults of all groups were successfully mated and produced offspring. It might be added that the coldest temperatures of the winter came in January after all larvae had been released (see table 20). A summary of the foregoing data is given in table 21.

Winter Study Number Two

To augment the study discussed above and to prove that the armyworm not only can, but does overwinter in Tennessee, field searches were made for overwintering larvae at various intervals throughout the winter months from October, 1956, through February 1957. Overwintering larvae were found at three localities; namely, the Cherokee peach orchard on the University of Tennessee farm, where the field tests already described were conducted, thus enhancing the value of that area as a testing site; the Highland Rim Experiment Station, Springfield, Tennessee; and the Lee Price farm, near Dandridge, Tennessee. The latter locality provided the majority of the specimens and served as a collecting area throughout the winter.

In all cases, the larvae were found only after diligent searching beneath thick mats of grassy vegetation. Forty-two specimens in various stadia from five collections, one collection for each month from October, 1956, through February, 1957, were used in the study. The specimens were collected alive in the field, taken to the insectary immediately, and isolated in two-ounce metal salve boxes which in turn were placed in a one-gallon syrup can with a tight-fitting lid. This larger can was sunk in the ground outside the insectary in an effort to match as nearly as possible prevailing soil temperatures, at the same time affording the specimens protection from excess moisture, predaceous ground beetles, etc. Observations were made at frequent intervals, usually daily, of each specimen concerning its stadium, physical condition, and amount of feeding. At each observation, the larvae were given grass for food in surplus quantities and the temperature in the large container and in the surrounding soil just below the mat of covering vegetation was recorded (table 22).

Of the forty-two specimens used in this study, fifteen completed development to the adult stage. Three of these fifteen moths proved not to be *P. unipuncta,* but a closely related species, *Leucania pragmatidicola.* Because of the presence of *L. phragmatidicola,* the records on all specimens which failed to produce adult moths are unreliable. Consequently, only those twelve specimens positively known to be *P. unipuncta* are

Table 21. Records of all Instars of *Pseudaletia unipuncta* Larvae Released into Field Cages During the Fall and Winter of 1956-57, Knoxville, Tennessee.

Cage number	Source of specimens	Larval instar	Date released	Number released	Pupating		Adult emergence		Fertile eggs
					No.	Pd.	No.	Pd.	
1*	F.C. 523	VI	Oct. 17, '56	40	26	Oct. 22-29	10	Dec., '56	**
2	F.C. 536c	I	Jan. 3. '57	20	12	Apr. 18-May 1	12	May 13-	Yes
3	F.C. 536b	II	Jan. 3, '57	20	8	Apr. 22-26	6	May 7-11	Yes
4	F.C. 536a	III	Jan. 3, '57	20	11	Apr. 18-21	10	Apr. 21-26	Yes
5	F.C. 536a	IV	Jan. 3, '57	20	7	Apr. 3-18	7	Apr. 26-30	Yes
6	F.C. 536a	V	Jan. 7, '57	20	17	Early March	15	Mid-March Apr. 29	Yes

*Two cages combined
**Moths emerged and dead before discovered

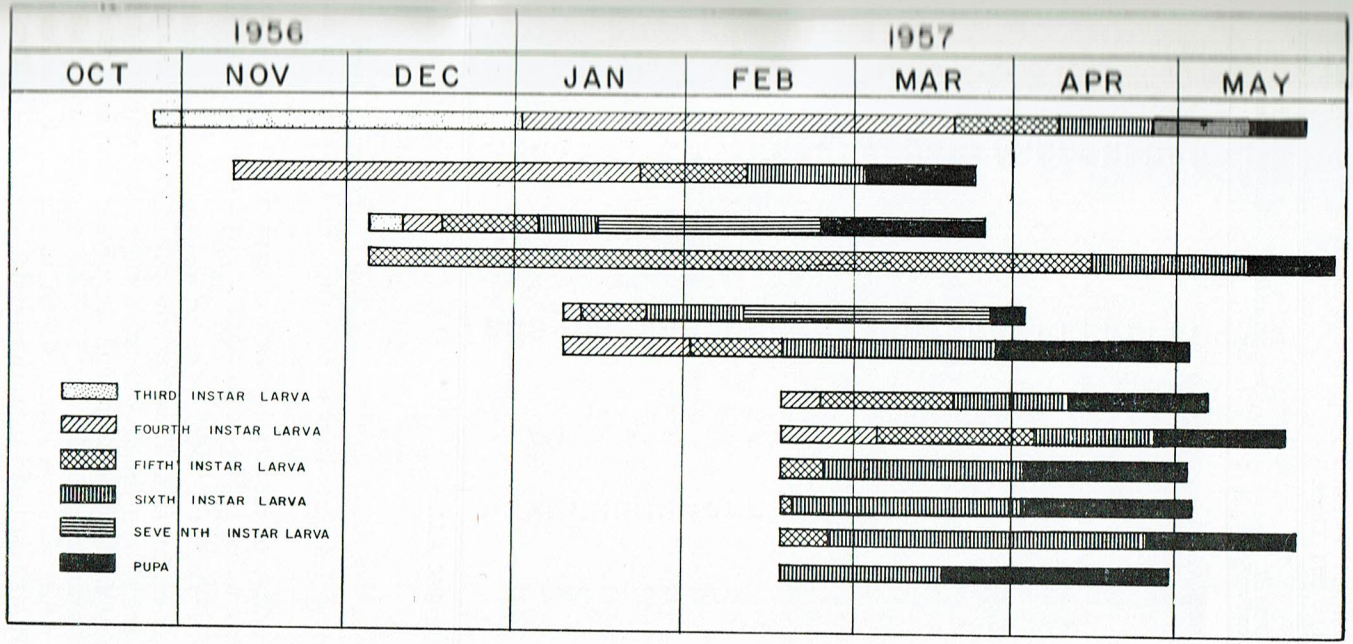

Fig. 14. Graph showing the winter development records of twelve field collected armyworms under natural temperature conditions in Tennessee, 1956-57.

Table 22. Soil and Container Temperatures Associated With Winter Studies Two and Three.

Date of reading*		Soil Temperature in °F.	Container Temperature in °F.
1956: Oct.	26	—	60
	29	—	60
Nov.	5	—	55
	12	—	65
	15	—	56
	23	—	41
Dec.	3	—	51
	10	—	50
	17	—	56
1957: Jan.	4	42	41
	5	42	42
	7	44	44
	8	40	40
	9	51	51
	10	49	48
	11	36	36
	12	40	40
	14	37	36
	15	34	35
	16	32	33
	17	21	24
	18	25	30
	19	23	27
	21	40	41
	22	46	46
	23	44	44
	24	34	36
	25	40	40
	26	41	41
	28	48	49
	29	62	60
	30	42	44
	31	46	47

*Readings at 8:00 A.M.

included in this analysis. This mistaken identity of field collected larvae led the writer to construct the key given on page 304.

A summary of the development of each of the twelve specimens culminating in the adult stage is given in table 23 and is shown graphically in figure 14.

Data from this study show that the development of the armyworm is arrested in the several larval stages thus extending the duration of development through the winter months. Consider specimen number one of table 23. This specimen spent virtually the entire fall and winter season in the third and fourth instars. It was captured as a third-instar larva on October 26

Table 22– (Continued)

Date of reading*		Soil Temperature in °F.	Container Temperature in °F.
1957: Feb.	1	53	54
	2	40	42
	4	57	56
	5	50	51
	6	54	54
	7	56	56
	8	56	55
	9	55	55
	11	46	48
	12	37	40
	13	40	44
	14	40	44
	15	35	38
	16	44	47
	18	36	40
	19	42	45
	20	30	33
	21	34	36
	22	38	41
	23	40	40
	25	52	52
	26	54	54
	27	52	52
	28	50	50
Mar.	1	44	44
	2	45	46
	4	38	42
	5	45	46
	6	46	46
	7	48	48
	8	41	42
	9	37	39
	11	42	44
	12	52	54
	13	48	50
	14	52	52
	15	53	53
	16	45	47
	18	50	51
	19	52	54
	20	46	46

1956, and remained in that stage until January 4, 1957, when it molted to the fourth instar in which it remained until March 18, 1957, for a total of 143 days in these two instars. The same specimen required a total of 209 days, nearly seven months, to complete its development from the third instar to adult. The greatest length of time spent in any one instar was by specimen number four which remained in the fifth instar for a total of 130 days after its capture in that stage.

Table 23. Development Records of the Twelve Specimens of Winter Study Number Two Completing Growth to Adult.

Specimen number	Date of collection	Instar isolated	Date molted to stadium						
			III	IV	V	VI	VII	P	AD
1	Oct. 26, '56	Third	-	1-4	3-18	4-8	4-25	5-13	5-23
			70*	73	21	17	18	10	
2	Nov. 9, '56	Fourth	-	-	1-23	2-11	-	3-2	3-22
				75	19	21	-	20	
3	Dec. 4, '56	Third		12-10	12-17	1-4	1-15	2-25	3-24
			6	7	18	11	41	28	
4	Dec. 4, '56	Fifth	-	-	-	4-14	-	5-13	5-29
			-	-	130	29	-	16	
5	Jan. 9, '57	Fourth	-	-	1-12	1-24	2-11	3-25	5-2
				3	12	18	43	40	
6	Jan. 9, '57	Fourth	-	-	2-1	2-18	-	3-26	5-3
				23	17	37	-	38	
7	Feb. 18, '57	Fourth	-	-	2-25	3-18	-	4-10	5-6
				7	22	23	-	26	
8	Feb. 18, '57	Fourth	-	-	3-4	4-4	-	4-26	5-20
				15	31	22	-	24	
9	Feb. 18, '57	Fifth	-	-	-	2-26	-	4-2	5-2
					8	36	-	30	
10	Feb. 18, '57	Fifth	-	-	-	2-20	-	4-1	5-3
					2	41	-	32	
11	Feb. 18, '57	Fifth	-	-	-	2-27	-	4-24	5-22
					9	57	-	28	
12	Feb. 18, '57	Sixth	-	-	-	-	-	3-16	4-29
						27	-	44	

*Number of days in instar

Winter Study Number Three

This study was conducted in order to obtain records of the relative abilities of the various larval instars to withstand Tennessee winter temperatures, to provide information on the developmental time of the armyworm when released under natural temperature conditions, and to supplement data of winter studies one and two.

During the early part of January, 1957, a total of 96 larvae was isolated, one each according to instar into metal salve boxes. These boxes were in turn placed in larger syrup cans as already described. Further procedure was identical to that of winter study two. This study differs from winter study one in that larvae of that study were grouped and exposed to natural field conditions, while those of this study were isolated and exposed only to natural temperatures. It differs from winter study two in that larvae of that study were collected in the field from natural overwintering areas before being isolated whereas these larvae were insectary reared before being isolated. Specimens in this study were isolated as follows: January 2, 1957, 10 third-instar specimens; January 3, 1957, 50 first-instar specimens; January 5, 1957, 10 second-instar specimens and 10 fourth-instar specimens; January 7, 1957, 10 fifth-instar specimens; and January 12, 1957, 6 sixth-instar specimens.

The data of table 24 show that first instar larvae had little success in surviving the winter temperatures. Only one specimen of the original fifty completed development and only three lived for as long as the third instar. It seems that the species is destined to failure if eggs are deposited and hatch immediately preceding a killing frost. The remaining five instars were able to survive the cold temperatures satisfactorily.

As this study progressed, it became apparent that the armyworm was capable of adding extra instars to its normal developmental stages. The one first-stage larva which succeeded in developing to the adult stage had seven larval instars; nine of those released as thirds had seven instars, six had eight in-

Table 24. Survival Records of *Pseudaletia unipuncta* Larvae of Various Instars During the Winter of 1957 in Tennessee.

Group number	Date isolated	Instar	Number in group	Number reaching stadium							
				I	II	III	IV	V	VI	P	AD
1	Jan. 3	First	50	50	3	3	1	1	1	1	1
2	Jan. 5	Second	10	—	10	9	9	9	9	9	9
3	Jan. 2	Third	10	—	—	10	10	10	10	9	9
4	Jan. 5	Fourth	10	—	—	—	10	10	10	8	7
5	Jan. 7	Fifth	10	—	—	—	—	10	10	10	10
6	Jan. 12	Sixth	6	—	—	—	—	—	6	6	5

Table 25. Gross Development Records of Armyworm Larvae of Various Instars Reared During the Winter of 1957 in Tennessee.

Instar isolated	Date isolated	No. of specimens	No. days to complete larval development		Number reaching		Period of emergence
			Range	Ave.	Pupae	Adult	
First	Jan. 3	50	123	123	1	1	May 22
Second	Jan. 5	10	94-101	98	9	9	May 8-13
Third	Jan. 2	10	93-111	97	9	9	May 6-14
Fourth	Jan. 5	10	84-87	85	8	7	May 3-6
Fifth	Jan. 7	10	64-69	66	10	10	Apr. 29-May 1
Sixth	Jan. 12	6	33-46	42	6	5	Apr. 23-26

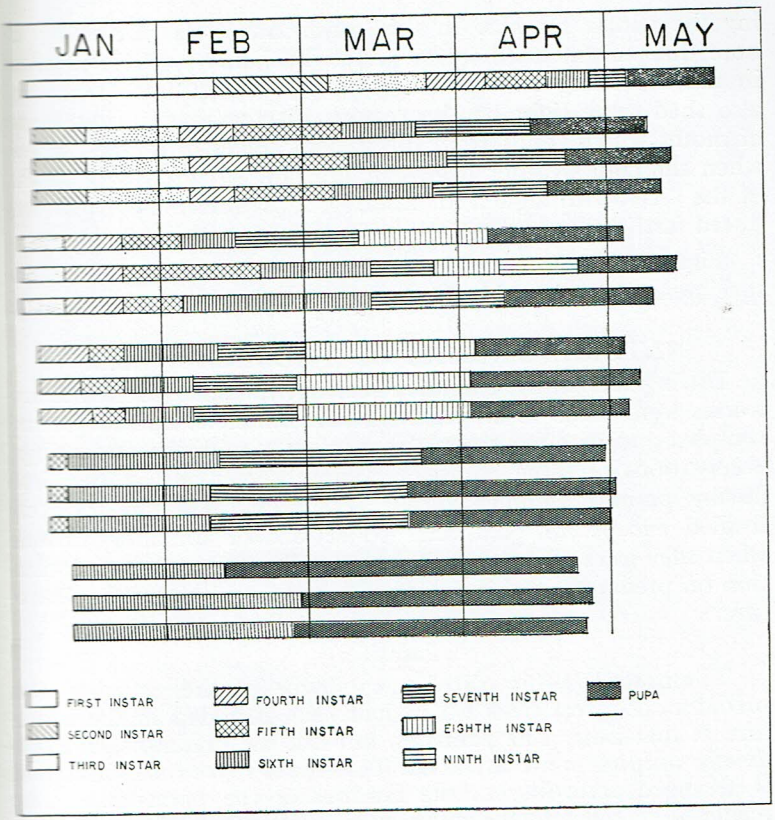

Fig. 15. Graph showing the winter development records of the various larval instars of *Pseudaletia unipuncta*.

stars, and one had nine instars; of those released as fourths, nine had seven instars and nine had eight instars; of those released as sixths, none had additional instars. This adding of extra instars could be a valuable mechanism for the armyworm for the survival of a long winter.

Table 25 gives the gross developmental time of all specimen which reached the pupal stage in this study. It also shows the number completing development in each group and the periods of adult emergence. From these data it can be seen that duration of development from the starting point of the various instars occurs in an orderly manner, taking the shortest time from the sixth instar and the longest from the first, with all intermediate instars in between. These data offer convincing evidence of the ability of the armyworm to extend developmental time by alternate periods of activity and inanition dur-

ing the winter months. In this connection it is interesting to note that an extended warm period in January, 1957, resulted in much feeding and molting in all instar groups. The data also shed some light on the reasons for the long spring flight of moths which result from the various stages of larvae present when the cold weather begins in the fall. All groups of moths of the second through sixth instar groups were mated and produced fertile eggs.

Figure 15 shows graphically the development records of the specimens given in table 25.

NATURAL ENEMIES OF THE ARMYWORM

During this study, extensive rearings of field-collected armyworms were made in an effort to determine the natural enemy complex and its effect upon the species. In addition to rearings, observations of those parasites present were made in the field during periods of abundance. Predators were not seriously studied except for occasional collections of predatory insects when they were conspicuously present. For this reason, information on predators in this section is taken largely from the literature.

Parasites

Thompson (1945) edited a catalogue of the parasites and predators of insect pests which had been recorded in the literature at that time. The parasites, but not the predators, of *Pseudaletia unipuncta* are included. This list is reproduced here and is arranged according to the families of the parasites. The reader is referred to the citation for authorities of the entries. Those species which have been reared from the armyworm by the writer are denoted with an asterisk (*).

Diptera: Tachinidae

**Achaetoneura aletiae* Riley — U. S. A.
**Achaetoneura archippivora* Will. — Hawaii
Actia nigritula Mall. — Australia
Archytas analis F. — U. S. A.
Archytas piliventris Wulp — U. S. A.
**Belvosia unifasciata* R. -D. — Canada, U .S. A.
Carcelia kockiana Tns. — Siam
Chaetogaedia monticola Big. — Hawaii
Compsilura concinnata Mg. — U. S. A.
Compsilura concinnata sumatrensis Tns. — Australia
Cuphocera pilosa Mall. — Australia
Cuphocera varia F. — Australia
Exorista civiloides Bar. — Siam
Gaediogonia jacobsoni Tns. — Siam
Linnaemyia nigripalpus Tyron — Australia
Nemorilla anomala Vill. — Siam
Peletieria robusta Wd. — U. S. A.
Phorocera claripennis Macq. — Canada, U. S. A.
Phorocera leucaniae Coq. — U. S. A.

Phryxe vulgaris Fall. — Canada, U. S. A.
Plagiomima spinosula Big. — U. S. A.
Prosopaea paradoxa B. B. — Siam
Sturmia albifrons Walk. — Canada
Sturmia inconspicua Mg. — Fiji
Sturmia inconspicuoides Bar. — Australia
Tritaxys heterocera Macq. — Australia
Wagneria carbonaria Panz. — U. S. A.
Wagneria sequax Will. — Canada
Winthemia quadripustulata F. — N. America
**Winthemia rufopicta* Big. — U. S. A.

Hymenoptera: Braconidae

Apanteles sp. — Fiji, Canada, U. S. A., Australia
Apanteles belliger Wilkn. — Mauritius
Apanteles flaviconchae Riley — U. S. A.
Apanteles forbesi Vier. — U. S. A.
Apanteles laeviceps Ashm. — N. America
Apanteles limenitidis Riley — Canada
Apanteles marginiventris Cress. — U. S. A.
**Apanteles militaris* Walsh — Argentina, N. America
Apanteles ruficrus Hal. — China, Australia
Apanteles rufocoxalis Riley — N. America
**Meteorus autographae* Mues. — U. S. A.
Meteorus communis Cress. — Canada, U. S. A.
Meteorus laphygmae Vier. — U. S. A.
Microplitis melianae Vier. — N. America
Microplitis varicolor Vier. — N. America
Rogas atricornis Cress. — U. S. A.
**Rogas terminalis* Cress. — U. S. A.

Hymenoptera: Ichneumonidae

Amblyteles brevipennis Cress. — U. S. A.
**Enicospilus* sp. — Australia
Enicospilus purgatus Say — Canada, U. S. A.
Enicospilus skeltoni Kirby — Australia
Exephanes leucaniae Tryon — Australia
Hyposoter exiguae Vier. — Hawaii
Ichneumon brevipennis Cress. — U. S. A.
Ichneumon jucundus Br. — Canada
Ichneumon koebelei Sw. — Hawaii
Ichneumon laetus Brulle — Canada
Ichneumon leucaniae Fitch — Canada
Lissopimpla semipunctata Kirby — New Zealand
Melanichneumon leucaniae Uch. — Japan
Mesochorus vitreus Walsh — Canada
Mesostenus albopictus Smith — New Zealand
Paniscus sp. — Australia
Paniscus geminatus Say — Canada
Paniscus productus Brulle — Australia
Pimpla pedalis Cress. — N. America
Theronia rufipes Tryon — Australia

Hymenoptera: Eulophidae

**Euplectrus plathypenae* How. — Hawaii

Hymenoptera: Eurytomidae

Eurytoma striatifacios Cir. — Australia

Hymenoptera: Pteromalidae

Eupteromalus sp. — Canada

Hymenoptera: Scelionidae

Telenomus sp. — U. S. A.

Table 26. Summary of Parasite Conditions Associated With Six Clusters of Wheat Stubble in an Armyworm Infested Field, Monroe County, Tennessee, June 1, 1956

Cluster number	Armyworm pupae	Masses of Apanteles Cocoons	Parasitized armyworms (Tachinid eggs)	Tachinid puparia	Enicospilus Cocoons
1	5	3	2	4	0
2	9	5	0	7	0
3	4	2	3	3	1
4	10	1	1	8	0
5	3	6	0	6	3
6	8	3	1	6	0
Total	39	20	7	34	4

The effect of parasitism on a population of armyworms may be shown by an observation made in a heavily infested nine-acre field of wheat by the author in Monroe County, Tennessee, June 1, 1956. On this day, armyworms were at their peak and pupation had already begun. The field of wheat had virtually been destroyed and the armyworms had begun their march toward a field of oats. The writer, with the help of Mr. Ray Stamey, Monroe County Agricultural Agent, pulled up six clusters of wheat stubble and made counts of organisms under each. The results are given in table 26. Assuming an average of two fly puparia to represent one armyworm, only 39 of 87 original armyworms would reach maturity in this sample. This would be a conservative estimate, since the pupa were not necessarily free of parasites and certainly not free of predatory attack.

More than one thousand armyworms from twenty-five field collections over a two-season period (1956-57) were individually

Table 27. Summary of Extent of Parasitism in Eleven Groups of Field-Collected Armyworms, *Pseudaletia unipuncta*, 1956.

Collection number	Date	Location	Number of host specimens	Number parasitized	Percent parasitized
508	May 21	Monroe Co., Tenn.	18	3	16.7
509	May 21	Monroe Co., Tenn.	296	95	32.1
510	May 22	Blount Co., Tenn.	28	6	21.4
511	May 30	Blount Co., Tenn.	31	11	35.4
512	May 30	Blount Co., Tenn.	29	18	62.3
513	June 1	Monroe Co., Tenn.	24	10	41.7
514	June 1	Monroe Co., Tenn.	21	8	38.2
515	June 1	Monroe Co., Tenn.	29	9	31.0
516	June 1	Monroe Co., Tenn.	24	3	12.6
521	July 20	Hamblen Co., Tenn.	6	4	66.6
526*	Aug. 9	Lincoln, Nebraska	63	17	27.0
Total, All collections			569	184	32.3

*Collection sent to writer by L. W. Anderson, University of Nebraska

Table 28. Relative Numbers and Percentages of Parasites Reared From the Armyworm During 1956.

Species	Number of armyworms parasitized by	Per cent of total
Diptera:		
Larvaevoridae		
Undetermined Larvaevorida	56	30.44
Winthemia rufopicta	22	11.96
Archytas apicifer	7	3.80
Achaetoneura aletia	3	1.63
Wagneria laevigata	3	1.63
Belvosia unifasciata	2	1.09
Achaetoneura archippivora	1	.54
Blepharigena cineria	1	.54
Encelatoria rubentis	1	.54
Total Larvaevoridae	96	52.17
Total Diptera	96	52.17
Hymenoptera:		
Braconidae		
*Apanteles militaris**	50	27.17
Rogas terminalis	10	5.44
Meteorus autographae	6	3.26
Total Braconidae	66	35.87
Eulophidae		
Euplectrus plathypenae	4	2.18
Total Eulophidae	4	2.18
Ichneumonidae		
Eniscospilus sp.	17	9.24
Campoletis oxylus	1	.54
Total Ichneumonidae	18	9.78
Total Hymenoptera	88	47.83
Total Diptera and Hymenoptera	184	100.00

*Two groups of *Apanteles militaris* were parasitized by the hyper-parasite *Mesochorus discitergus*.

reared by the writer and parasite data recorded (see tables 27 through 30). During 1956, 184 of 569 armyworms were parasitized (table 27), and in 1957, 199 of 479 showed parasitism (table 29). Populations for the two seasons were 32.3 and 41.5 per cent parasitized respectively (tables 27 and 29). A total of sixteen species of parasites were reared (see tables 28 and 30), eight of which were dipterous and a like number hymenopterous. The two orders were nearly equally represented in 1956, 52.17 per cent of all parasites being Diptera and 47.83 per cent Hymenoptera (table 28); however, in 1957 hymenopterous parasites made up nearly 92 per cent of the total (table 30). Flies were numerous in the field during 1957, and many eggs were seen on larvae of the armyworm; but a virus disease took a heavy toll of the "worms," and the earlier development of the hymenopterous parasites, before the "worms" died of disease, undoubtedly accounted for this great difference, since the flies had insufficient time to develop.

Table 29. Summary of Extent of Parasitism in Fourteen Groups of Field Collected Armyworms, *Pseudaletia unipuncta*, 1957.

Collection No.	Date	Location	Number of host larvae	Number parasitized	Per cent parasitized
581	May 3	Blount Co., Tenn.	28	12	42.9
582	May 3	Lincoln Co.	30	9	30.0
583*	May 3	Lincoln-Franklin Co.	100	60	60.0
584	May 6	Monroe Co.	22	15	68.2
585	May 6	Monroe Co.	45	27	60.0
586	May 6	Monroe Co.	27	7	26.0
587	May 9	Monroe Co.	20	5	25.0
589	May 9	Monroe Co.	14	6	42.9
590	May 7	Rutherford Co.	35	19	54.3
591	May 16	Blount Co.	25	6	24.0
592	May 17	Monroe Co.	25	14	56.0
593*	May 21	Monroe Co.	38	5	13.2
594*	May 21	Monroe Co.	30	8	26.7
595	May 21	Monroe Co.	40	6	15.0
Total of All Collections			479	199	41.5

* Collections 100 per cent infected with a virus disease. Parasites listed emerged before the virus produced death of the host. All non-parasitized armyworms in these collections died from the virus as mature larvae.

The braconid, *Apanteles militaris* Walsh, was the predominant species among the hymenopterous insects, accounting for 27 per cent of all parasitism in 1956 and 36 per cent in 1957. Among the flies, *Winthemia rufopicta* Big., a larvaevorid (Tachinidae), dominated with 12 per cent of the total 1956 parasites, and was heavily represented among armyworm populations in 1957, though records indicated only 7.1 per cent. The low percentage of Diptera in 1957 was undoubtedly due to the early death of armyworm hosts from a virus infection.

A discussion of each parasite reared from the armyworm by the writer follows.

Hymenoptera: *Braconidae*

Apanteles militaris Walsh. Of all the parasites of *P. unipuncta*, the most effective, as previously stated, is *Apanteles militaris* Walsh (figures 16, 17, and 18), which was reared from 11.7 per cent of all armyworms collected over a two-season period and which accounted for approximately 32 per cent of total parasites reared from the armyworm during the same period.

Tower (1916) states that armyworms parasitized by *A. militaris* eat approximately half as much as do non-parasitized larvae during the same period, and that it seems conclusive that parasitism by this species is beneficial in the generation attacked. The parasite ultimately kills its host, thereby being beneficial

Table 30. Relative Numbers and Percentages of Parasites Reared From the Armyworm During 1957.

Species	Number of armyworms parasitized by	Per cent of total
Diptera:		
Larvaevoridae		
Undetermined Larvaevoridae	11	5.6
Winthemia rufopicta	3	1.5
Archytas apicifer	2	1.0
Total Larvavoridae	16	8.1
Total Diptera	16	8.1
Hymenoptera:		
Braconidae		
Apanteles militaris	72	36.1
*Rogas terminalis**	45	22.6
Meteorus autographae	11	5.6
Rogas aciculatus	1	0.5
Total Braconidae	129	64.8
Ichneumonidae		
Hyposoter sp.	39	19.6
Enicospilus sp.	9	4.5
Campoletes sp.	6	3.0
Total Ichneumonidae	54	27.1
Total Hymenoptera	183	91.9
Total Diptera and Hymenoptera	199	100.0

* One specimen of *Rogas terminalis* was parasitized by the hyper-parasite, *Mesochorus* sp.

also in preventing many worms from maturing and beginning a new generation.

Armyworms parasitized by *A. militaris* show no signs of their plight until nearly mature when they become sluggish, and death comes only after the parasite larvae have emerged and spun their cocoons. Emergence of the *A. militaris* larvae from the armyworm host takes place with all larvae coming out at essentially the same time (figure 17). Cocoon spinning begins immediately after emergence from the host and is completed within a few hours time. The parasites emerge in large numbers from full grown or nearly full grown armyworms and spin white silken cocoons in a mass side by side. The cocoons average about 3.0 mm. in length and 1.3 mm. in width. Figure 18 shows a typical mass of cocoons. The number of cocoons spun from each of 49 armyworm larvae during 1956 ranged from 6 to 101 and averaged 49.

In the presence of adults of *A. militaris,* armyworms exhibit a nervous behavior. The female parasite attacks the armyworm almost immediately upon contact, and is capable of depositing several scores of eggs with one quick thrust of the ovipositor in any available part of the armyworm host. The whole act of oviposition is a matter of seconds. The victim turns upon being attacked and spits, sometimes drowning the assailant in a large bubble of dark green fluid. The writer has observed a large