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EFFECT OF INSECT PREDATORS AND PARASITES
ON GRASS FEEDING INSECTS, PAWNEE SITE

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GRASSLANDS BIOME
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ABSTRACT

The predators included in this study are the robber flies (*Asilidae*), tiger beetles (*Cicindelidae*), wolf spiders (*Lycosidae*), jumping spiders (*Salticidae*), mantids (*Mantidae*), sphecid wasps (*Sphacidae*) and western harvester ants (*Pogonomyrmex occidentalis*). Data presented here are related to the population densities of these predators. An effort also was made to determine type of prey selected, amount consumed and general predatory behavior in relation to the environmental factors present at the study site. A food web is included with this report, showing some of the predator-prey relationships.

INTRODUCTION

Much of the past year's work has centered on the attempt to determine what insect predators are present and their relative abundance in the grassland biome. A start also has been made in the study of the inter-relationships of the predators and their prey.

The particular predators under investigation are the robber flies (Asilidae), tiger beetles (Cicindelidae), wolf spiders (Lycosidae), jumping spiders (Salticidae), mantids (Mantidae) and sphecoid wasps (Sphecidae).

In addition, western harvester ant (*Pogonomyrmex occidentalis*) and grasshopper parasite studies were initiated.

The population density studies were all conducted on the differentially grazed pastures. Table 1 shows the grazing intensities and terms commonly used in reference to these pastures.

The density determinations and other work in the differentially grazed pastures were conducted in such a manner as to minimize the effect of conducting the research in these areas. Generally speaking, insects collected for identification were released near their point of capture. There was, of course, extensive collecting conducted at other points within the Pawnee Grassland borders.

METHODS

Predator Population Determination

The goal in determining population density was not to determine the absolute number of predator insects in each pasture but rather to determine if there was a significant difference in the populations in the different areas. With this in mind, plus other considerations such as cost and the behavior of the predatory families involved, it was decided that perhaps the best sampling method would be the transect method.

The transect consisted of an area two feet wide and a mile long. The location of the transect was varied at random on a weekly basis so that different portions of the range would be covered. Each week the transects were walked, and the number and identity of insect predators were recorded. It normally took five or six hours to walk the four transects.

Western Harvester Ant Density

The method used to estimate the colonies per pasture consisted of counting the colonies in a sample area and then extrapolating this data to the entire pasture. The sample areas were 1,464 ft by 2,653 ft. The colonies were counted by walking back and forth across the sample area. Each colony counted was marked by spraying a spot of paint near the mound. This method permitted the verification that all colonies had been counted.

General Behavior and Prey Selection

The methods used to investigate general behavior and prey selection consisted of either walking through an area and recording the types of activities being engaged in or watching one individual and recording its activities. Recording was accomplished by making notes at the time of the observation or by recording the events on a portable tape recorder for later transcribing.

Prey records were obtained by one of two methods. If the attack and initiation of feeding had been observed, the predator and its prey would be kept under observation until the prey was discarded. At that time the remains would be collected and compared to the average weight of live specimens of comparable size to determine the amount consumed. If the start of feeding had not been observed, the prey was immediately collected and recorded as a feeding record only.

Parasitism

A weekly collection of grasshoppers was made to determine the percentage of grasshoppers parasitized.

The grasshoppers were collected by net and immediately immersed in alcohol for dissection at a later time.

PRELIMINARY RESULTS

Table 2 shows a tabulation of the insects observed, on the transects, in the differentially-grazed areas. These data are analyzed in Tables 3-8.

Percent Distribution by Range

Table 3 reflects the percentage distribution of the predatory families between the four differentially-grazed ranges. N equals the number of individuals observed. The percent distribution probably does not have any great analytical value, but is included here as general information. The table seems to show that the Lycosid and Salticid spiders are fairly evenly distributed while the Asilids and Sphecids wasps seem to be more heavily concentrated in the winter use area.

There are probably not enough observations of Mantids to make their percent distribution meaningful, although this may be more of a reflection on the sampling technique than on their actual abundance.

Percent Distribution by Month

Table 4 shows the distribution of the predatory families expressed as a percent distribution by month. It would appear from this table that the Asilids, Mantids and Sphecids wasps have a rapid population buildup during July and August, while the spiders have a more constant density during these months.

Predator Distribution

Table 5 reflects the analysis of the distribution of each predatory family between the four differentially-grazed pastures. The only significant difference in distribution seems to occur with the Asilids and Sphecids wasps.

Table 6 is another approach to the analysis of predator distribution. Here the hypothesis would be that there is no significant difference in the proportions of predatory families. The CHI SQ value would suggest that this hypothesis should be rejected, indicating that there is a significant difference in their distribution.

Examination of the distribution of a particular family (Table 7) shows that there is also a difference in species distribution. The distribution of *Proctacanthus* sp. and *Stenopogon platycornis* appears to be significantly different, while the others do not.

Table 8 shows an analysis of the proportional distribution of the robber fly species. There does not appear to be any significant difference in the proportional distribution of the robber fly species. The proportional distribution may well prove to be the most important.

Western Harvester Ant

The analysis of western harvester ant distribution is shown in Table 9. The calculated CHI SQ indicates that there is a significant difference in their distribution. An analysis also was made between the winter-, moderate- and light-use areas. This also showed a significant difference. In fact, the only pastures that are not significantly different are the moderate- and light-use pastures.

In addition to density, certain other colony characteristics were measured and analyzed to determine their relational significance. Tables 10 and 11

show these measurements and Table 12 shows the analysis. Basically disk size (denuded area), mound size and mound height all varied significantly. The measurement pertaining to distances between colonies does not appear to be significantly different. This may well be an indication that the colonies are not distributed at random. Sampling procedures presently are being designed to check this possibility.

Table 13 lists western harvester ant activity with respect to time of day and ground surface temperatures. Time of day is listed in Mountain Standard time. Surface temperature was recorded in degrees Fahrenheit as determined by a 6" mercury thermometer.

Table 14 shows a summary of this activity in relation to time and temperature.

Table 15 is a listing of the western harvester ant forage rate. This shows the number of foragers leaving the colony per minute and the number returning with prey per minute. Ground temperature, colony data and time of day also were recorded.

Data relating to the amount of forage brought in per colony per hour are shown in Table 16. Approximately 50% of the forage consisted of seeds, 40% was other plant parts and 10% was animal matter.

There was an average of .0343 gm of forage brought in per colony per hour.

These data were obtained by collecting all returning foraging ants for specific time periods.

Robber flies

Table 17 shows a compilation of data pertaining to robberfly predation. These data are organized into a prey-predator matrix in Table 18. An

analysis of this matrix was attempted, but due to the large numbers of empty cells it was rather difficult to interpret the data in a meaningful manner.

Efferia helonae appears in the area about the middle of August and normally stays until about mid-October. It appears to be euryphagic and does take a large number of grasshoppers (about 40% of its prey).

Efferia staminea is present in the area from approximately the middle of July until the first week of August. It too is euryphagic, but does not appear to be too selective in the prey that it takes.

Proctacanthus sp. This robber fly appears about mid-July and stays until about the first of September. It is the largest robber fly present. It too is euryphagic. So far the study indicates that about 10% of its prey consists of grasshoppers. It also takes beetles, other robberflies and, in addition, has been observed to be cannibalistic.

Stenopogon picticornis is an interesting robberfly. It is stenophagic and also appears to prey almost exclusively on grasshoppers. While the actual number of predation records are not high at the Pawnee site (5), other studies have indicated that about 92% of its prey would be grasshoppers.

SUMMARY

This past year's research resulted in the determination that there is a significant difference in the distribution of the western harvester ant and in the proportional distribution of the predatory families under investigation.

A predator-prey matrix was set up for the robberflies showing the order of prey that they select (Table 18). Prey records of the other predatory families are too sparse to permit much in the way of analysis at this time.

A preliminary food web was established for the Pawnee site (Fig. 1). Western harvester ant colonies also are being excavated to obtain population

and biomass estimates. Data also were presented here pertaining to forage rate, amount of forage collected and ant activities in response to environmental factors.

Table 1.

Grazing Intensity	Range Number	Section	Common Name
None (winter use only)	31	22 East	Winter use area
Medium	18	15 East	Moderate use area
Light	32	23 West	Light use area
Heavy	33	23 East	Heavy use area

Table 2. Transect data.

Predator	June	July	Aug.	Sept.	Total
Wolf Spiders (Lycosidae)					
Heavy Range (33)	15	8	15	10	48
Light Range (32)	13	6	12	3	34
Moderate Range (18)	1	10	19	8	38
Winter Range (31)	--	9	37	7	53
Total	<u>29</u>	<u>33</u>	<u>83</u>	<u>28</u>	<u>173</u>
Jumping Spiders (Salticidae)					
Heavy Range (33)	2	1	--	1	4
Light Range (32)	2	1	--	0	3
Moderate Range (18)	1	3	1	--	5
Winter Range (31)	--	2	--	--	2
Total	<u>5</u>	<u>7</u>	<u>1</u>	<u>1</u>	<u>14</u>
Mantids (Mantidae)					
Heavy Range (33)	--	--	1	1	2
Light Range (32)	--	1	--	--	1
Moderate Range (18)	--	--	--	--	--
Winter Range (31)	--	1	1	1	3
Total	<u>--</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>6</u>
Sphecoid Wasps (Sphecidae)					
Heavy Range (33)	--	--	1	--	1
Light Range (32)	--	--	5	--	4
Moderate Range (18)	--	2	1	--	2
Winter Range (31)	--	1	5	3	11
Total	<u>--</u>	<u>3</u>	<u>12</u>	<u>3</u>	<u>18</u>
Tiger Beetles (Cicindelidae)					
Heavy Range (33)	--	1	1	1	3
Light Range (32)	--	2	--	--	2
Moderate Range (18)	--	--	--	--	--
Winter Range (31)	--	2	--	--	2
Total	<u>--</u>	<u>5</u>	<u>1</u>	<u>1</u>	<u>7</u>
Robberflies (Asilidae)					
Proctacanthella					
Heavy Range (33)	--	1	1	--	2
Light Range (32)	--	7	1	--	8
Moderate Range (18)	--	9	2	--	11
Winter Range (31)	--	8	2	--	10
Total	<u>--</u>	<u>25</u>	<u>6</u>	<u>--</u>	<u>31</u>
Proctacanthus sp.					
Heavy Range (33)	--	1	2	--	3
Light Range (32)	--	2	6	--	8
Moderate Range (18)	--	1	0	--	1
Winter Range (31)	--	1	1	--	2
Total	<u>--</u>	<u>5</u>	<u>9</u>	<u>--</u>	<u>14</u>

Table 2. (continued)

Predator	June	July	Aug.	Sept.	Total
<i>Efferia helinae</i>					
Heavy Range (33)	--	--	8	2	10
Light Range (32)	--	--	8	9	17
Moderate Range (18)	--	--	7	4	11
Winter Range (31)	--	--	19	5	24
Total	--	--	42	20	62
<i>Efferia staminea</i>					
Heavy Range (33)	--	4	2	--	6
Light Range (32)	--	9	1	--	10
Moderate Range (18)	--	4	0	--	4
Winter Range (31)	--	4	0	--	4
Total	--	21	3	--	24
<i>Stenopogon picticornis</i>					
Heavy Range (33)	--	0	1	--	1
Light Range (32)	--	2	8	--	10
Moderate Range (18)	--	1	4	--	5
Winter Range (31)	--	1	3	--	4
Total	--	4	16	--	20
<i>Ospreocorus abdominalis</i>					
Heavy Range (33)	--	--	--	--	--
Light Range (32)	--	--	1	--	1
Moderate Range (18)	--	2	--	--	2
Winter Range (31)	--	1	--	--	1
Total	--	3	1	--	4
GRAND TOTAL					155

Table 3. Distribution of families as expressed as a % distribution by range.

FAMILY	WINTER USE	LIGHT USE	MODERATE USE	HEAVY USE	N
	Range 31	Range 32	Range 18	Range 33	
Lycosidae (Wolf spider)	31	20	22	27	173
Salticidae (Jumping spider)	14	21	36	29	14
Asilidae (Robber flies)	38	29	21	12	155
Mantidae (Mantids)	50	17	--	33	6
Sphecidae (Sphecid wasps)	61	22	11	6	18

Table 4. Distribution of families as expressed as a % distribution by month.

FAMILY	June	July	Aug.	Sept.
Lycosidae (Wolf spiders)	16	11	35	38
Salticidae (Jumping spiders)	39	29	8	24
Asilidae (Robberflies)	--	33	32	35
Mantidae (Mantids)	--	33	45	22
Sphecidae (Sphecid wasp)	--	13	35	52

Table 5. Predator distribution 1.

Range	LYCOSIDAE (Wolf spider)	SALTICIDAE (Jumping spider)	ASILIDAE (Robberfly)	MANTIDAE (Mantids)	SPHECIDAE (Sphecid wasps)	CICINDELLIDAE (Tiger beetles)
Winter Range 31	53	2	45	3	11	2
Light Range 32	34	3	54	1	4	2
Moderate Range 18	38	5	34	-	2	-
Heavy Range 33	48	4	22	2	1	3
Total	173	14	155	6	18	7
	5.328	1.428	14.850	3.36	13.556	2.644
	not significant	not significant	significant	not significant	significant	not significant

 $\alpha.05 = 7.815$

Table 6. Predator distribution II.

Range	LYCOSIDAE (Wolf spider)	SALTICIDAE (Jumping spider)	ASILIDAE (Robberfly)	SPHECIDAE (Sphexid wasps)	TOTAL
Winter Range 31	53	2	45	11	111
Light Range 32	38	5	34	2	79
Moderate Range 18	34	3	54	4	95
Heavy Range 35	48	4	22	1	75
Total	173	14	155	18	360

$$\alpha.05 = 16.919$$

$$\chi^2 = 22.415$$

Significant

Table 7. ASILIDAE (Robberfly) distribution 1.

Range	<i>Proctacanthella</i>	<i>Proctanthus</i>	<i>Elyria helena</i>	<i>Elyria staminea</i>	<i>Stenopogon platycornis</i>	<i>Onychomyia americana</i>
Winter Range 31	10	2	24	4	4	1
Light Range 32	11	1	11	4	5	2
Moderate Range 18	8	8	17	10	10	1
Heavy Range 33	2	3	10	6	1	0
Total	31	14	62	24	20	4
	6.29	8.29	7.55	4.01	8.45	2.00
	not significant	significant	not significant	not significant	significant	not significant

$$\alpha.05 = 7.815$$

Table 8. ASILIDAE (Robberfly) distribution II.

Range	<i>Proctacanthella</i>	<i>Proctanthus</i>	<i>Elyria helena</i>	<i>Elyria staminea</i>	<i>Stenopogon platycornis</i>
Winter Range 31	10	2	24	4	4
Light Range 32	11	1	11	4	5
Moderate Range 18	8	8	17	10	10
Heavy Range 33	2	3	10	6	1
Total	31	14	62	24	20

$$\alpha.05 = 21.026$$

$$IX^2 = 20.359$$

Not significant

Table 9. Distribution of western harvester ant *Pogonomyrmex occidentalis*

WINTER USE Range 31	LIGHT USE Range 32	MODERATE USE Range 18	HEAVY USE Range 33
798	597	600	245

$$\alpha.05 = 7.815$$

$$\Sigma x^2 = 283.63$$

significant

Table 10. Ant colony characteristics.

Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height	Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height
1	1	76.	24.	7.00	1	51	60.	18.	3.00
1	2	66.	25.	5.00	1	52	66.	13.	0.50
1	3	24.	13.	3.00	1	53	30.	7.	0.50
1	4	52.	15.	3.00	1	54	36.	17.	5.00
1	5	45.	17.	4.00	1	55	45.	14.	5.00
1	6	56.	13.	3.00	1	56	36.	12.	3.50
1	7	36.	11.	2.00	1	57	51.	11.	3.50
1	8	30.	11.	1.00	1	58	51.	13.	1.00
1	9	51.	11.	2.50	1	59	56.	19.	6.00
1	10	48.	18.	3.00	1	60	59.	12.	3.00
1	11	56.	13.	3.00	1	61	26.	9.	1.00
1	12	72.	22.	5.50	1	62	56.	11.	2.00
1	13	56.	18.	5.00	1	63	44.	9.	2.50
1	14	32.	12.	4.00	1	64	33.	10.	3.50
1	15	36.	13.	2.00	1	65	48.	10.	2.50
1	16	36.	12.	1.50	1	66	32.	11.	3.00
1	17	48.	16.	1.00	1	67	42.	12.	3.50
1	18	46.	20.	3.00	1	68	40.	16.	5.00
1	19	39.	14.	3.00	1	69	44.	17.	5.00
1	20	36.	10.	1.50	1	70	37.	13.	3.00
1	21	48.	15.	4.00	1	71	46.	13.	4.00
1	22	52.	20.	3.50	1	72	46.	12.	4.00
1	23	56.	19.	4.00	1	73	48.	10.	2.50
1	24	58.	12.	0.50	1	74	42.	13.	4.00
1	25	48.	8.	1.00	1	75	36.	12.	2.50
1	26	40.	16.	4.00	1	76	39.	11.	5.00
1	27	48.	14.	2.00	1	77	52.	11.	2.00
1	28	44.	11.	1.00	1	78	65.	19.	4.00
1	29	34.	7.	0.50	1	79	44.	11.	2.00
1	30	44.	10.	3.00	1	80	56.	12.	4.00
1	31	33.	13.	3.00	1	81	27.	6.	0.50
1	32	24.	7.	0.50	1	82	36.	8.	1.50
1	33	45.	11.	1.50	1	83	72.	20.	5.00
1	34	29.	10.	2.00	1	84	36.	0.	0.
1	35	38.	9.	2.50	1	85	34.	8.	2.00
1	36	36.	9.	0.75	1	86	33.	7.	2.00
1	37	26.	7.	1.00	1	87	44.	16.	0.50
1	38	24.	7.	1.50	1	88	30.	8.	0.50
1	39	27.	6.	0.25	1	89	37.	12.	1.00
1	40	42.	16.	6.00	1	90	28.	10.	2.00
1	41	53.	16.	4.00	1	91	71.	14.	5.00
1	42	36.	15.	2.50	1	92	57.	20.	5.00
1	43	36.	9.	1.50	1	93	57.	14.	4.00
1	44	22.	7.	0.25	1	94	56.	16.	3.00
1	45	53.	16.	3.00	1	95	38.	18.	3.00
1	46	61.	21.	1.00	1	96	57.	16.	4.50
1	47	31.	9.	0.25	1	97	44.	8.	1.00
1	48	36.	11.	3.00	1	98	27.	8.	2.00
1	49	60.	16.	4.00	1	99	48.	13.	4.00
1	50	56.	20.	1.50	1	100	51.	14.	6.00

Table 10. (continued)

Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height	Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height
1	101	47.	13.	1.50	1	151	36.	12.	1.50
1	102	60.	16.	3.50	1	152	33.	5.	0.25
1	103	44.	11.	2.50	1	153	26.	9.	3.00
1	104	66.	20.	4.00	1	154	10.	8.	3.00
1	105	37.	10.	1.00	1	155	39.	14.	4.50
1	106	32.	14.	1.50	1	156	16.	9.	1.50
1	107	27.	6.	0.50	1	157	22.	9.	0.50
1	108	30.	6.	0.50	1	158	20.	9.	1.00
1	109	27.	15.	0.75	1	159	25.	9.	1.00
1	110	25.	9.	2.00	1	160	30.	12.	1.00
1	111	46.	14.	3.00	1	161	30.	7.	0.50
1	112	21.	8.	2.00	1	162	23.	7.	1.00
1	113	39.	9.	0.75	1	163	19.	12.	0.75
1	114	48.	12.	3.00	1	164	30.	7.	1.75
1	115	26.	7.	0.50	1	165	25.	9.	2.25
1	116	42.	12.	3.00	1	166	42.	9.	1.00
1	117	42.	12.	2.50	1	167	26.	7.	1.00
1	118	36.	11.	3.00	1	168	38.	13.	3.00
1	119	47.	11.	3.50	1	169	37.	12.	1.00
1	120	38.	10.	2.00	1	170	39.	14.	2.00
1	121	56.	13.	3.00	1	171	15.	6.	1.50
1	122	62.	25.	5.00	1	172	16.	7.	1.00
1	123	48.	10.	3.00	1	173	39.	13.	3.00
1	124	36.	11.	3.00	1	174	8.	7.	1.50
1	125	50.	23.	4.00	1	175	37.	16.	1.50
1	126	46.	19.	4.00	1	176	36.	5.	0.50
1	127	28.	11.	1.00	1	177	22.	10.	0.50
1	128	46.	10.	2.50	1	178	27.	8.	1.00
1	129	46.	9.	1.50	1	179	46.	17.	1.50
1	130	38.	7.	0.50	1	180	36.	13.	1.00
1	131	48.	14.	2.00	1	181	39.	13.	1.50
1	132	28.	11.	0.50	1	182	72.	18.	2.00
1	133	17.	6.	1.50	1	183	33.	12.	3.50
1	134	24.	12.	0.50	1	184	34.	13.	4.00
1	135	19.	7.	0.50	1	185	24.	7.	0.50
1	136	47.	17.	3.00	1	186	24.	11.	0.50
1	137	46.	16.	3.00	1	187	36.	5.	0.50
1	138	56.	12.	2.00	1	188	16.	7.	0.25
1	139	35.	13.	3.00	1	189	32.	13.	2.00
1	140	31.	7.	1.00	1	190	29.	10.	1.00
1	141	38.	9.	1.00	1	191	17.	7.	1.00
1	142	24.	8.	2.00	1	192	29.	10.	0.75
1	143	24.	9.	2.00	1	193	18.	10.	0.50
1	144	34.	8.	2.50	1	194	27.	9.	0.25
1	145	24.	8.	0.50	1	195	56.	11.	1.50
1	146	26.	15.	2.00	1	196	21.	7.	2.00
1	147	24.	10.	0.25	1	197	38.	11.	1.00
1	148	23.	11.	2.00	1	198	32.	15.	2.00
1	149	22.	11.	2.00	1	199	23.	10.	1.50
1	150	41.	9.	1.00	1	200	25.	11.	1.00

Table 10. (continued)

Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height	Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height
2	1	46.	9.	1.00	2	51	34.	8.	1.00
2	2	15.	12.	3.00	2	52	45.	7.	0.25
2	3	30.	7.	0.50	2	53	14.	11.	3.00
2	4	30.	9.	1.50	2	54	27.	11.	3.00
2	5	38.	5.	0.25	2	55	36.	7.	1.00
2	6	39.	11.	2.00	2	56	25.	7.	1.50
2	7	56.	13.	3.50	2	57	30.	8.	1.50
2	8	70.	10.	3.00	2	58	33.	6.	1.50
2	9	45.	9.	1.50	2	59	48.	13.	1.50
2	10	32.	5.	1.00	2	60	37.	7.	1.50
2	11	33.	5.	0.50	2	61	50.	17.	4.00
2	12	29.	10.	2.00	2	62	26.	11.	3.00
2	13	57.	10.	3.50	2	63	39.	7.	0.25
2	14	39.	9.	2.00	2	64	37.	7.	0.50
2	15	27.	7.	1.00	2	65	66.	14.	4.00
2	16	30.	8.	2.00	2	66	34.	8.	0.50
2	17	29.	12.	3.00	2	67	27.	7.	1.50
2	18	42.	9.	1.50	2	68	56.	19.	6.00
2	19	23.	5.	0.50	2	69	35.	10.	2.00
2	20	27.	4.	0.	2	70	53.	11.	3.00
2	21	33.	8.	1.00	2	71	36.	8.	1.00
2	22	46.	13.	4.00	2	72	46.	14.	4.00
2	23	44.	16.	5.00	2	73	37.	10.	2.00
2	24	45.	18.	5.00	2	74	36.	12.	2.50
2	25	32.	17.	4.00	2	75	57.	16.	4.00
2	26	32.	18.	5.00	2	76	23.	9.	1.50
2	27	55.	17.	6.00	2	77	32.	9.	1.50
2	28	36.	13.	3.00	2	78	42.	8.	0.75
2	29	13.	11.	3.00	2	79	36.	11.	3.00
2	30	33.	11.	2.00	2	80	62.	11.	2.00
2	31	47.	19.	5.00	2	81	37.	6.	0.50
2	32	47.	13.	3.00	2	82	19.	9.	0.25
2	33	44.	21.	6.00	2	83	46.	11.	2.00
2	34	28.	15.	3.50	2	84	25.	5.	0.50
2	35	13.	13.	2.00	2	85	65.	14.	3.00
2	36	38.	13.	3.00	2	86	56.	10.	2.00
2	37	37.	18.	5.00	2	87	42.	15.	4.00
2	38	23.	13.	4.00	2	88	30.	7.	1.00
2	39	34.	10.	3.00	2	89	44.	8.	0.25
2	40	15.	7.	2.00	2	90	36.	7.	1.00
2	41	29.	7.	1.50	2	91	28.	11.	2.00
2	42	20.	5.	0.50	2	92	49.	11.	2.00
2	43	31.	7.	0.75	2	93	54.	17.	5.00
2	44	41.	10.	3.50	2	94	47.	18.	3.00
2	45	15.	14.	2.00	2	95	48.	18.	6.00
2	46	45.	11.	2.00	2	96	28.	13.	3.00
2	47	38.	6.	0.50	2	97	51.	11.	3.00
2	48	23.	11.	1.50	2	98	30.	10.	2.00
2	49	32.	12.	4.00	2	99	45.	9.	1.00
2	50	32.	10.	1.50	2	100	18.	9.	2.50

Table 10. (continued)

Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height	Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height
3	1	36.	9.	0.25	3	51	19.	5.	0.50
3	2	36.	4.	1.50	3	52	22.	7.	0.50
3	3	33.	6.	1.50	3	53	19.	11.	1.50
3	4	37.	12.	4.00	3	54	35.	11.	3.00
3	5	24.	9.	4.00	3	55	33.	9.	3.00
3	6	56.	15.	3.00	3	56	34.	9.	2.00
3	7	44.	9.	1.00	3	57	20.	9.	0.50
3	8	47.	29.	6.00	3	58	35.	9.	2.00
3	9	28.	11.	4.00	3	59	41.	11.	2.50
3	10	28.	9.	2.00	3	60	32.	9.	1.00
3	11	19.	7.	2.00	3	61	15.	11.	3.00
3	12	50.	0.	0.	3	62	23.	4.	0.50
3	13	24.	6.	1.50	3	63	35.	10.	2.00
3	14	46.	8.	3.00	3	64	27.	9.	3.00
3	15	35.	8.	1.50	4	1	64.	0.	0.
3	16	37.	7.	1.50	4	2	72.	19.	2.00
3	17	56.	9.	2.00	4	3	29.	13.	1.50
3	18	46.	8.	3.50	4	4	64.	14.	2.25
3	19	54.	14.	5.00	4	5	37.	16.	1.00
3	20	31.	6.	1.50	4	6	51.	8.	1.75
3	21	38.	12.	2.50	4	7	41.	11.	0.50
3	22	66.	12.	5.00	4	8	27.	5.	1.50
3	23	51.	13.	4.00	4	9	39.	11.	2.00
3	24	33.	9.	0.50	4	10	60.	9.	0.75
3	25	27.	6.	1.00	4	11	48.	10.	0.50
3	26	47.	7.	1.50	4	12	49.	10.	0.25
3	27	39.	12.	4.00	4	13	43.	11.	1.50
3	28	17.	11.	2.00	4	14	24.	8.	1.25
3	29	38.	9.	1.00	4	15	47.	22.	3.25
3	30	44.	13.	3.00	4	16	28.	9.	1.50
3	31	41.	5.	1.00	4	17	48.	10.	2.25
3	32	50.	8.	0.50	4	18	27.	9.	0.25
3	33	36.	11.	2.50	4	19	31.	6.	0.75
3	34	29.	9.	3.00	4	20	24.	8.	0.
3	35	43.	6.	0.25	4	21	26.	12.	0.
3	36	37.	6.	0.50	4	22	33.	10.	0.25
3	37	27.	8.	2.50	4	23	50.	12.	0.50
3	38	40.	12.	2.00	4	24	26.	12.	0.25
3	39	31.	0.	0.	4	25	37.	8.	1.00
3	40	39.	9.	2.00	4	26	35.	5.	0.06
3	41	34.	0.	0.	4	27	39.	7.	0.50
3	42	38.	9.	1.00	4	28	36.	9.	1.00
3	43	21.	6.	1.50	4	29	37.	7.	0.25
3	44	45.	4.	0.25	4	30	35.	13.	2.00
3	45	27.	4.	0.50	4	31	17.	7.	1.00
3	46	36.	8.	2.50	4	32	45.	13.	2.25
3	47	44.	8.	2.00	4	33	19.	7.	0.25
3	48	38.	0.	0.	4	34	34.	6.	0.50
3	49	36.	6.	0.25	4	35	45.	9.	1.00
3	50	14.	7.	1.50	4	36	43.	14.	2.00

Table 10. (continued)

Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height	Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height
4	37	48.	13.	4.00	4	87	34.	10.	2.00
4	38	29.	7.	0.25	4	88	33.	12.	1.25
4	39	56.	12.	2.50	4	89	36.	10.	1.50
4	40	42.	10.	2.00	4	90	24.	4.	0.
4	41	56.	10.	3.00	4	91	46.	12.	1.50
4	42	52.	6.	0.25	4	92	37.	13.	1.75
4	43	27.	8.	0.50	4	93	28.	5.	0.25
4	44	17.	5.	0.50	4	94	33.	10.	0.25
4	45	43.	9.	1.00	4	95	37.	18.	0.50
4	46	17.	7.	0.75	4	96	31.	13.	2.00
4	47	22.	9.	1.00	4	97	27.	10.	0.50
4	48	35.	12.	0.75	4	98	30.	5.	0.75
4	49	23.	10.	1.25	4	99	34.	4.	0.06
4	50	34.	12.	0.50	4	100	20.	6.	0.75
4	51	10.	5.	1.00	4	101	24.	8.	0.50
4	52	25.	10.	0.	4	102	36.	9.	0.25
4	53	20.	8.	0.50	4	103	38.	6.	0.25
4	54	17.	8.	0.50	4	104	38.	12.	0.50
4	55	27.	4.	0.06	4	105	39.	8.	0.25
4	56	22.	9.	0.25	4	106	53.	8.	0.74
4	57	21.	7.	0.50	4	107	35.	10.	0.50
4	48	20.	5.	0.25	4	108	38.	11.	2.25
4	59	21.	9.	1.50	4	109	75.	10.	0.50
4	60	22.	10.	0.25	4	110	48.	10.	0.75
4	61	21.	6.	0.75	4	111	46.	8.	0.50
4	62	15.	6.	0.25	4	112	62.	16.	3.00
4	63	23.	4.	0.25	4	113	52.	12.	3.50
4	64	41.	10.	0.50	4	114	25.	4.	0.25
4	65	18.	5.	0.50	4	115	44.	10.	0.25
4	66	27.	4.	0.25	4	116	49.	6.	0.25
4	67	23.	8.	1.00	4	117	48.	11.	0.50
4	68	27.	9.	1.25	4	118	15.	6.	0.25
4	69	23.	8.	0.25	4	119	39.	8.	0.25
4	70	18.	9.	2.50	4	120	31.	9.	0.25
4	71	33.	9.	1.00	4	121	24.	6.	1.50
4	72	37.	10.	0.75	4	122	31.	4.	0.50
4	73	37.	7.	1.00	4	123	32.	6.	0.75
4	74	40.	16.	2.50	4	124	18.	8.	0.25
4	75	24.	10.	0.25	4	125	35.	17.	0.75
4	76	36.	12.	0.50	4	126	36.	13.	0.75
4	77	34.	12.	0.25	4	127	22.	6.	0.06
4	78	23.	6.	0.50	4	128	36.	12.	0.25
4	79	32.	6.	0.25	4	129	17.	10.	0.75
4	80	26.	8.	1.50	4	120	27.	6.	0.25
4	81	23.	7.	0.25	4	131	31.	12.	0.50
4	82	30.	7.	0.50	4	132	30.	13.	0.25
4	83	27.	10.	0.50	4	133	73.	10.	0.25
4	84	30.	10.	2.00	4	134	36.	6.	0.
4	85	37.	7.	0.25	4	135	37.	8.	0.25
4	86	31.	9.	1.75	4	136	31.	4.	0.

Table 10. (continued)

Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height	Range	Ant Colony	Disk Diam.	Mound Diam.	Mound Height
4	137	51.	11.	0.50	4	185	28.	14.	0.50
4	138	38.	12.	3.50	4	186	58.	12.	2.00
4	139	25.	7.	0.75	4	187	31.	7.	0.25
4	140	32.	13.	0.50	4	188	36.	9.	0.25
4	141	29.	12.	0.50	4	189	37.	17.	3.00
4	142	24.	8.	0.25	4	190	36.	12.	0.50
4	143	17.	3.	0.25	4	191	31.	7.	0.25
4	144	30.	9.	0.25	4	192	23.	9.	0.50
4	145	26.	6.	0.25	4	193	25.	7.	0.50
4	146	34.	9.	0.50	4	194	38.	10.	0.06
4	147	30.	5.	0.25	4	195	26.	7.	0.25
4	148	39.	10.	0.50	4	196	36.	7.	0.25
4	149	32.	9.	0.06	4	197	27.	10.	0.50
4	150	31.	14.	0.50	4	198	36.	11.	0.50
4	151	24.	6.	0.50	4	199	25.	15.	5.50
4	152	37.	11.	0.75	4	200	25.	8.	0.25
4	153	39.	8.	0.25					
4	154	15.	10.	0.25					
4	155	19.	8.	0.25					
4	156	14.	11.	0.25					
4	157	19.	8.	0.25					
4	158	27.	7.	0.50					
4	159	28.	7.	0.75					
4	160	27.	8.	0.25					
4	161	19.	7.	0.06					
4	162	13.	7.	0.50					
4	163	24.	8.	1.00					
4	164	26.	10.	0.25					
4	165	19.	9.	0.25					
4	166	36.	4.	0.25					
4	167	20.	6.	0.25					
4	168	20.	6.	0.50					
4	169	34.	11.	0.50					
4	170	12.	6.	0.75					
4	171	27.	7.	0.25					
4	172	38.	13.	0.50					
4	173	40.	11.	0.50					
4	174	34.	15.	1.50					
4	175	42.	14.	0.75					
4	176	34.	7.	0.50					
4	177	36.	12.	0.75					
4	178	38.	14.	0.50					
4	179	24.	13.	0.75					
4	180	33.	12.	0.75					
4	181	33.	11.	0.50					
4	182	35.	12.	0.25					
4	183	17.	10.	0.50					
4	184	32.	8.	0.75					

Table 11. Distances between ant colonies.

Range	Colony	Distance (Ft.)	Range	Colony	Distance (Ft.)
1	1	45.	3	1	69.
1	2	45.	3	2	66.
1	3	60.	3	3	102.
1	4	60.	3	4	45.
1	5	99.	3	5	135.
1	6	57.	3	6	57.
1	7	42.	3	7	42.
1	8	48.	3	8	33.
1	9	51.	3	9	42.
1	10	36.	3	10	108.
1	11	24.	3	11	30.
1	12	39.	3	12	33.
1	13	54.	1	13	84.
1	14	54.	3	14	126.
1	15	60.	3	15	84.
1	16	54.	3	16	123.
1	17	48.	3	17	39.
1	18	54.	3	18	18.
1	19	45.	3	19	30.
1	20	57.	3	20	84.
1	21	120.	3	21	36.
1	22	30.	3	22	33.
1	23	27.	3	23	63.
1	24	39.	3	24	27.
1	25	48.	3	25	72.
2	1	36.	4	1	63.
2	2	51.	4	2	174.
2	3	69.	4	3	45.
2	4	45.	4	4	36.
2	5	87.	4	5	102.
2	6	60.	4	6	75.
2	7	45.	4	7	51.
2	8	57.	4	8	66.
2	9	48.	4	9	42.
2	10	30.	4	10	45.
2	11	21.	4	11	33.
2	12	51.	4	12	26.
2	13	36.	4	13	45.
2	14	36.	4	14	126.
2	15	30.	4	15	60.
2	16	33.	4	16	63.
2	17	27.	4	17	39.
2	18	75.	4	18	30.
2	19	66.	4	19	42.
2	20	66.	4	20	42.
2	21	54.	4	21	48.
2	22	48.	4	22	45.
2	23	42.	4	23	57.
2	24	24.	4	24	45.
2	25	33.	4	25	57.

Table 12. Western harvester ant *Pogonomyrmex occidentalis* analysis of variation between ranges.

Measurement	F. Ratio	Conclusion
Disk size $F_{.05,3,560} = 2.650$	8.500	Significant diff.
Mound size $F_{.05,3,560} = 2.650$	21.6609	Significant diff.
Mound height $F_{.05,3,560} = 2.650$	53.4227	Significant diff.
Distance between mounds $F_{.05,3,96} = 2.712$	1.7628	No significant diff.

Table 13. Western harvester ant activity.

Date	Range	Colony Data			Time	Temp.	Activity	Forage
		Disk Diameter	Mound Diameter	Mound Height				
		(inches)	(inches)	(inches)				
19 June	41	24	7	.5	1414	--	Foraging	Beetles
19 June	41	24	7	.5	1415	--	Foraging	Beetles
19 June	41	24	7	.5	1416	--	Foraging	Beetles
19 June	41	24	7	.5	1419	--	Foraging	Beetles
19 June	41	24	7	.5	1420	--	Foraging	Beetles
19 June	41	24	7	.5	1421	--	Foraging	Beetles
19 June	41	24	7	.5	1423	--	Foraging	Beetles
19 June	41	24	7	.5	1425	--	Foraging	Beetles
19 June	41	24	7	.5	1426	--	Foraging	Beetles
19 June	41	24	7	.5	1427	--	Foraging	Beetles
19 June	41	24	7	.5	1439	--	Foraging	Beetles
19 June	41	24	7	.5	1431	--	Foraging	Beetles
19 June	41	24	7	.5	1432	--	Foraging	Beetles
19 June	41	24	7	.5	1434	--	Foraging	Beetles
19 June	41	24	7	.5	1438	--	Foraging	Beetles
19 June	41	24	7	.5	1439	--	Foraging	Beetles
19 June	41	24	7	.5	1440	--	Foraging	Beetles
19 June	41	24	7	.5	1441	--	Foraging	Beetles
19 June	41	24	7	.5	1442	--	Foraging	Beetles
19 June	41	24	7	.5	1444	--	Foraging	Beetles
19 June	41	24	7	.5	1447	--	Foraging	Beetles
19 June	41	24	7	.5	1448	--	Foraging	Beetles
19 June	41	24	7	.5	1449	--	Foraging	Beetles
19 June	41	24	7	.5	1453	--	Foraging	Beetles
19 June	41	24	7	.5	1454	--	Foraging	Beetles
19 June	41	24	7	.5	1457	--	Foraging	Beetles
19 June	41	24	7	.5	1458	--	Foraging	Beetles
25 June	34	--	--	--	1211	--	Foraging	Beetles
25 June	34	--	--	--	1225	--	Foraging	Beetles
25 June	34	--	--	--	1227	--	Foraging	Beetles
25 June	34	--	--	--	1228	--	Foraging	Beetles
25 June	34	--	--	--	1230	--	Foraging	Beetles
25 June	34	--	--	--	1243	--	Foraging	Beetles
25 June	34	--	--	--	1245	--	Foraging	Beetles
25 June	34	--	--	--	1255	--	Foraging	Beetles
25 June	34	--	--	--	1258	--	Foraging	Beetles
25 June	34	--	--	--	1259	--	Foraging	Beetles
30 June	10	--	--	--	1730	86	Foraging	--
30 June	10	--	--	--	1735	86	Foraging	--
30 June	10	--	--	--	1740	86	Foraging	Grass
30 June	10	--	--	--	1745	85	Foraging	--
30 June	10	--	--	--	1758	85	Closing	--
30 June	10	--	--	--	1950	82	Closed	--

Table 13. (continued)

Date	Range	Colony Data			Time	Temp.	Activity	Forage
		Disk Diameter	Mound Diameter	Mound Height				
		(Inches)	(Inches)	(Inches)				
1 July	Sec. 26	--	--	--	0645	68	None	--
1 July	Sec. 26	--	--	--	0700	69	None	--
1 July	Sec. 26	--	--	--	0707	70	Opening	--
1 July	Sec. 26	--	--	--	0708	70	Opened	--
1 July	Sec. 28	56	30	55	0855	76	Forage	Seed
1 July	Sec. 28	56	30	55	0856	--	Forage	Seed
1 July	Sec. 28	56	30	55	0857	--	Forage	Seed
1 July	Sec. 28	56	30	55	0859	--	Forage	Seed
1 July	Sec. 28	56	30	55	0900	--	Forage	Seed
1 July	Sec. 28	56	30	55	0904	--	Forage	Seed
1 July	Sec. 28	56	30	55	0907	--	Forage	Ant. Abdom.
1 July	Sec. 28	56	30	55	0914	--	Forage	Seed
1 July	Sec. 28	56	30	55	0916	--	Forage	Seed
1 July	Sec. 28	56	30	55	0919	--	Forage	Formica ant
1 July	Sec. 28	56	30	55	0923	--	Forage	Seed
1 July	Sec. 28	56	30	55	0930	--	Forage	Stick
1 July	Sec. 28	56	30	55	0932	--	Forage	Seed
1 July	Sec. 28	56	30	55	0937	--	Forage	Seed
1 July	Sec. 28	56	30	55	0945	--	Forage	Insect
1 July	Sec. 28	56	30	55	0946	--	Forage	Seed
1 July	Sec. 28	56	30	55	0949	--	Forage	Seed
1 July	Sec. 28	56	30	55	0951	--	Forage	Seed
1 July	Sec. 28	56	30	55	0953	--	Forage	Seed
1 July	Sec. 28	56	30	55	0955	--	Forage	Ant
1 July	Sec. 28	56	30	55	0956	--	Forage	Fly
1 July	Sec. 28	56	30	55	1000	--	Forage	Formica ant
1 July	Sec. 28	56	30	55	1006	--	Forage	Ant
1 July	Sec. 28	56	30	55	1007	--	Forage	Ant
1 July	Sec. 28	56	30	55	1011	--	Forage	Seed
1 July	Sec. 28	56	30	55	1034	--	Forage	Seed
1 July	Sec. 28	56	30	55	1035	--	Forage	Seed
1 July	Sec. 28	56	30	55	1043	--	Forage	Seed
1 July	Sec. 28	56	30	55	1044	--	Forage	Seed
1 July	Sec. 28	56	30	55	1053	--	Forage	Ant
8 July	Sec. 28	39	17	5	0650	68	None	--
8 July	Sec. 28	39	17	5	0700	70	None	--
8 July	Sec. 28	39	17	5	0704	72	Open	--
8 July	Sec. 28	39	17	5	0721	78	Forage	Ladybird bti
8 July	Sec. 28	39	17	5	0756	82	Foraging	--
8 July	Sec. 28	39	17	5	0800	84	on Disk	--
8 July	Sec. 28	39	17	5	0818	92	Repair	--
8 July	Sec. 28	39	17	5	0900	102	Forage	Seed
8 July	Sec. 28	39	17	5	0934	103	Repair	--
8 July	Sec. 28	39	17	5	0955	110	None	--

Table 13. (continued)

Date	Range	Colony Data			Time	Temp.	Activity	Forage			
		Disk	Mount	Mound							
		Diameter	Diameter	Height							
		(inches)	(inches)	(inches)							
8 July	Sec. 28	39	17	5	1015	114	None	--			
8 July	Sec. 28	39	17	5	1043	116	None	--			
8 July	Sec. 28	39	17	5	1145	120	None	--			
8 July	Sec. 28	39	17	5	1250	120	None	--			
21 July	34	--	--	--	1345	100	Foraging	Seed			
21 July	34	--	--	--	1415	100	Foraging	Grassblade			
21 July	34	--	--	--	1440	102	Foraging	Seed			
21 July	34	--	--	--	1540	104	Foraging	--			
Date	Range	Colony Data				Time	Temp.	Wind	Cl.	Activity	Forage
		No.	Disk	Dia.	Ht.						
22 July	Sec. 26	1	--	--	--	1205	110	9	--	None	--
22 July	Sec. 26	2	--	--	--	1245	110	--	--	None	--
22 July	Sec. 26	2	--	--	--	1315	110	--	--	None	--
22 July	Sec. 26	3	--	--	--	1407	102	--	--	Foraging	--
22 July	Sec. 26	3	--	--	--	1415	102	--	--	Foraging	Beetle
22 July	Sec. 26	3	--	--	--	1440	100	--	Cl.	Foraging	Insect Part
22 July	Sec. 26	3	--	--	--	1455	98	--	--	Foraging	Ant
22 July	Sec. 26	3	--	--	--	1500	98	--	--	Foraging	Seed
22 July	Sec. 26	3	--	--	--	1505	96	--	--	Foraging	Insect part
22 July	Sec. 26	3	--	--	--	1509	--	--	--	Foraging	Plant stem
22 July	Sec. 26	3	--	--	--	1515	--	--	--	Foraging	Ins. leg
22 July	Sec. 26	3	--	--	--	1530	--	--	--	Foraging	Fly
4 Aug.	38	-	39	9	2.5	1725	78	--	--	On Disk	--
4 Aug.	38	-	28	11	4	1730	78	--	--	Forage	Insect
4 Aug.	38	-	37	9	3	1753	76	--	--	Forage	--
12 Aug.	40	-	--	--	--	1025	112	6	--	None	--
12 Aug.	24	-	--	--	--	1212	120t	10	Cl.	Forage	--
13 Aug.	18	-	39	8	2	1620	104	--	--	(Very active storm approaching) Closing	--
2 Sept.	Sec. 26	1	15	10	1.5	1730	83	--	--	Repair	--
2 Sept.	Sec. 26	2	35	9	1.5	1731	86	--	--	Forage	--
2 Sept.	Sec. 26	3	40	9	2.5	1735	80	--	--	Disk	--
2 Sept.	Sec. 26	4	48	10	2	1736	80	--	--	Disk	--
2 Sept.	Sec. 26	5	53	9	3	1737	80	--	--	Closed	--
2 Sept.	Sec. 26	6	35	6	1	1738	80	--	--	Disk	--
2 Sept.	Sec. 26	7	45	9	3	1740	81	--	--	Disk	--

Table 13. (continued).

Date	Range	Colony Data				Time	Temp.	Wind	Cl.	Activity	Forage
		No.	Disk	Dia.	Ht.						
2 Sept.	Sec. 26	8	50	12	3	1741	80	--	--	Disk	--
2 Sept.	Sec. 26	9	56	15	4.5	1745	80	--	--	Disk	--
2 Sept.	Sec. 26	10	47	12	2.5	1745	80	--	--	Closed	--
2 Sept.	Sec. 26	11	24	8	1	1749	80	--	--	Closed	--
2 Sept.	Sec. 26	12	71	12	3	1747	80	--	--	Disk	--
2 Sept.	Sec. 26	13	37	0	0	1753	79	--	--	Closing	--
2 Sept.	Sec. 26	14	51	17	4	1759	80	--	--	Closed	--
2 Sept.	Sec. 26	15	51	12	2.5	1801	80	--	--	Disk	--
2 Sept.	Sec. 26	16	20	8	1.5	1804	78	--	--	Closed	--
2 Sept.	Sec. 26	17	22	11	2	1805	78	--	--	Disk	--
3 Sept.	Sec. 26	3	40	9	2.5	0723	76	--	--	Open	--
3 Sept.	Sec. 26	17	22	11	2	0736	76	--	--	Open	--
3 Sept.	Sec. 26	9	56	15	4.5	0750	76	--	--	Open	--
3 Sept.	Sec. 26	8	50	12	3	0752	76	--	--	Open	--
3 Sept.	Sec. 26	5	53	9	3	0755	76	--	--	Open	--
3 Sept.	Sec. 26	4	48	10	2	0750	76	--	--	Open	--
3 Sept.	Sec. 26	2	35	9	1.5	0757	76	--	--	Open	--
3 Sept.	Sec. 26	1	15	10	1.5	0757	75	--	--	Open	--
3 Sept.	Sec. 26	7	45	9	3	0800	74	--	--	Open	--
3 Sept.	Sec. 26	11	24	8	1	0814	83	--	--	Open	--
3 Sept.	Sec. 26	13	37	0	0	0814	83	--	--	Open	--
3 Sept.	Sec. 26	13	74	12	3	0815	82	--	--	Open	--
3 Sept.	Sec. 26	15	51	12	2.5	0817	80	--	--	Open	--
3 Sept.	Sec. 26	16	20	8	1.5	0821	86	--	--	Open	--
3 Sept.	Sec. 26	6	35	6	1	0835	90	--	--	Closed	--
3 Sept.	Sec. 26	10	47	12	2.5	0825	80	--	--	Open	--

Table 14

Activity	Time	Temperature (F)
Opening Mound	0700 - 0900	70° - 86°
On Disk	0800-0900, 1700-1800	78° - 84°
Foraging	0800 - 1700	76° - 104°
None	0900 - 1400	110° - 120°
Closing Mound	1700 - 1900	78° - 82°

Table 15. Forage rate.

Date	Range Number	No.	Colony Data			Time	Temp.	Forage Out	Rate In	Forage
			Disk Dia.	Md. Dia.	Md. Ht.					
			-----Inches-----							
13 Aug.	33	--	39	8	2	1600	105	1	3	--
3 Sept.	11	--	24	7	1	1015	107	5	2	--
23 July	Sec. 26	--	39	10	4	0748	86	3	0	--
23 July	Sec. 26	--	39	10	4	0758	86	10	3	--
23 July	Sec. 26	--	39	10	4	0805	88	12	4	--
23 July	Sec. 26	--	39	10	4	0812	89	16	0	--
23 July	Sec. 26	--	39	10	4	0827	90	25	3	--
23 July	Sec. 26	--	39	10	4	0837	90	23	0	--
23 July	Sec. 26	--	39	10	4	1400	106	26	8	--
23 July	Sec. 26	--	39	10	4	1410	106	33	8	--
23 July	Sec. 26	--	39	10	4	1420	106	20	4	--
23 July	Sec. 26	--	39	10	4	1430	107	16	11	--
23 July	Sec. 26	--	39	10	4	1440	106	12	9	--
23 July	Sec. 26	--	39	10	4	1450	106	33	8	--
30 July	45	--	39	12	4	1542	102	4	10	--
30 July	45	--	39	12	4	1546	102	1	8	--
30 July	45	--	39	12	4	1605	100	3	6	--
1 Aug.	32	--	40	11	3	0910	86	8	3	--
1 Aug.	32	--	40	11	3	0915	86	5	2	--
1 Aug.	32	--	40	11	3	0920	86	5	1	--
1 Aug.	32	--	40	11	3	0925	86	5	3	--
1 Aug.	32	--	40	11	3	0930	86	9	3	--
1 Aug.	32	--	40	11	3	0935	87	3	2	--
1 Aug.	33	--	38	7	2	1015	102	1	3	--
1 Aug.	33	--	38	7	2	1020	103	4	2	--
1 Aug.	33	--	38	7	2	1025	104	2	2	--
1 Aug.	33	--	38	7	2	1030	104	2	4	--
1 Aug.	33	--	38	7	2	1035	104	4	2	--
1 Aug.	33	--	38	7	2	1040	105	2	1	--
13 Aug.	18	--	39	8	2	1545	110	8	4	--
13 Aug.	18	--	39	8	2	1550	110	1	2	--
13 Aug.	18	--	39	8	2	1556	108	0	1	--
13 Aug.	18	--	39	8	2	1602	108	3	5	--
13 Aug.	18	--	39	8	2	1608	107	0	0	--
13 Aug.	18	--	39	8	2	1614	106	0	6	--
13 Aug.	18	--	39	8	2	1620	104	0	1	--
13 Aug.	18	--	39	8	2	1632	102	0	3	--
13 Aug.	18	--	39	8	2	1638	102	0	3	--

Table 15. (continued).

Colony Data										
Date	Range Number	No.	Disk Dia.	Md. Dia.	Md. Ht.	Time	Temp.	Forage Out	Rate In	Forage
-----Inches-----										
20 Aug.	32	--	48	12	3	0839	100	17	11	--
20 Aug.	32	--	48	12	3	0845	103	17	5	--
20 Aug.	32	--	48	12	3	0851	104	12	13	--
20 Aug.	32	--	48	12	3	0857	108	3	10	--
20 Aug.	32	--	48	12	3	0903	108	7	9	--
20 Aug.	32	--	48	12	3	0909	114	2	10	--
26 Aug.	33	--	26	7	1	1515	110	10	1	--
26 Aug.	33	--	26	7	1	1521	112	15	3	--
26 Aug.	33	--	26	7	1	1527	108	16	2	--
26 Aug.	33	--	26	7	1	1533	106	10	7	--
26 Aug.	33	--	26	7	1	1539	104	13	3	--
26 Aug.	33	--	26	7	1	1545	102	8	3	--
26 Aug.	33	--	26	7	1	1551	100	5	5	--
26 Aug.	33	--	26	7	1	1557	98	7	4	--
26 Aug.	33	--	26	7	1	1603	100	10	4	--
26 Aug.	33	--	26	7	1	1609	100	9	6	--
27 Aug.	Sec. 26	1	48	14	4	0840	89	0	5	--
27 Aug.	Sec. 26	1	48	14	4	0850	92	0	1	--
27 Aug.	Sec. 26	1	48	14	4	0900	95	4	0	--
27 Aug.	Sec. 26	1	48	14	4	0910	98	2	1	--
27 Aug.	Sec. 26	1	48	14	4	0920	100	2	2	--
27 Aug.	Sec. 26	1	48	14	4	0930	100	3	3	--
27 Aug.	Sec. 26	1	48	14	4	0940	104	5	2	--
27 Aug.	Sec. 26	1	48	14	4	0950	107	6	1	--
27 Aug.	Sec. 26	1	48	14	4	1000	110	1	1	--
27 Aug.	Sec. 26	1	48	14	4	1010	112	1	0	--
27 Aug.	Sec. 26	1	48	14	4	1020	113	0	1	--
27 Aug.	Sec. 26	1	48	14	4	1030	114	0	0	--
27 Aug.	Sec. 26	1	48	14	4	1040	118	0	0	--
27 Aug.	Sec. 26	1	48	14	4	1445	117	0	0	--
27 Aug.	Sec. 26	1	48	14	4	1455	120	3	0	--
27 Aug.	Sec. 26	1	48	14	4	1505	116	1	1	--
27 Aug.	Sec. 26	1	48	14	4	1515	111	9	3	--
27 Aug.	Sec. 26	1	48	14	4	1525	109	13	0	--
3 Sept.	Sec. 26	11	24	7	1	1000	106	7	0	--
3 Sept.	Sec. 26	11	24	7	1	1012	106	4	3	--
3 Sept.	Sec. 26	11	24	7	1	1024	108	3	2	--
3 Sept.	Sec. 26	11	24	7	1	1034	108	4	1	--
3 Sept.	Sec. 26	11	24	7	1	1046	94	2	1	--

Table 15. (continued).

Date	Range Number	No.	Colony Data			Time	Temp.	Forage Rate		Forage
			Disk Dia.	Md. Dia.	Md. Ht.			Out	In	
-----Inches-----										
3 Sept.	Sec. 26	12	71	12	3	1004	100	7	6	--
3 Sept.	Sec. 26	12	71	12	3	1016	98	10	6	--
3 Sept.	Sec. 26	12	71	12	3	1028	106	10	12	--
3 Sept.	Sec. 26	12	71	12	3	1038	93	8	5	--
3 Sept.	Sec. 26	12	71	12	3	1050	101	9	4	--
3 Sept.	Sec. 26	13	36	--	--	1008	108	4	3	--
3 Sept.	Sec. 26	13	36	--	--	1020	109	3	3	--
3 Sept.	Sec. 26	13	36	--	--	1032	103	4	1	--
3 Sept.	Sec. 26	13	36	--	--	1042	98	10	0	--
3 Sept.	Sec. 26	13	36	--	--	1054	104	2	2	--
3 Sept.	Sec. 26	2	39	9	2	1532	100	2	4	--
3 Sept.	Sec. 26	2	39	9	2	1542	101	3	2	--
3 Sept.	Sec. 26	2	39	9	2	1552	98	0	4	--
3 Sept.	Sec. 26	2	39	9	2	1607	96	7	1	--
3 Sept.	Sec. 26	2	39	9	2	1630	92	3	0	--
3 Sept.	Sec. 26	3	40	9	2	1535	104	1	1	--
3 Sept.	Sec. 26	3	40	9	2	1545	102	0	0	--
3 Sept.	Sec. 26	3	40	9	2	1555	100	0	0	--
3 Sept.	Sec. 26	3	40	9	2	1600	100	0	0	--
3 Sept.	Sec. 26	3	40	9	2	1635	92	0	0	--
3 Sept.	Sec. 26	4	48	10	2	1538	100	0	1	--
3 Sept.	Sec. 26	4	48	10	2	1548	98	0	3	--
3 Sept.	Sec. 26	4	48	10	2	1558	97	0	0	--
3 Sept.	Sec. 26	4	48	10	2	1608	94	0	0	--
3 Sept.	Sec. 26	4	48	10	2	1618	90	1	0	--

Table 16. Western harvester ant forage.

Date (1969)	Time Collected (m.n.)	Range	Total (gm)	Animal Parts (gm)	Seed (gm)	Other Plant Parts (gm)
July 30	18	--	.0167	--	.0154	.0013
July 30	5	--	.0143	--	.0143	--
July 31	5	32	.0229	.0019	.0024	.0186
Aug. 6	10	32	.0054	.0002	.0017	.0035
Aug. 6	10	33	.0017	.0011	.0006	--
Aug. 6	10	33	.0033	00	.0016	.0017
Aug. 20	10	32	.0289	.0072	.0103	.0114
Sept. 13	60	--	.0122	--	.0089	.0033
Sept. 13	60	--	.0021	--	.0021	--
TOTAL	188		.1075	.0104	.0573	.0398
% of Total				10%	53%	37%

Amount of Forage Per Hour Per Colony = .0343 gm

Table 17. Robberfly predation.

Predator & Sex	Prey	Date	Time	Prey Wt. <i>Chrysids</i>	Ant. Consumed	Ratio
				-----gm-----		
<i>Ablautus minus</i>	Hemiptera	5-12-69	--	--	--	--
<i>Ablautus</i> sp. F	Simuliidae	4-19-69	1:30	--	--	--
<i>Ablautus</i> sp. F	Hemiptera	4-21-69	--	--	--	--
<i>Ablautus</i> sp.	Diptera	4-29-69	--	--	--	--
<i>Ablautus</i> sp.	Cicadellidae	4-29-69	--	--	--	--
<i>Ablautus minus</i> F	Tipulidae	6-21-69	--	--	--	--
<i>Proctacanthus</i> sp.	Acrididae	7-21-69	--	--	--	33
<i>Proctacanthus</i> sp. F	Apidae	7-22-69	--	--	--	--
<i>Proctacanthus</i> sp. M	<i>Proctacanthus</i>	7-23-69	--	--	--	--
<i>Proctacanthus wilbertii</i> M	Anthomyiidae	7-30-69	12:59	.0016	--	19
<i>Proctacanthus wilbertii</i>	Hymenoptera	7-30-69	1:30	.0009	--	19
<i>Proctacanthus wilbertii</i>	Bombyliidae	7-30-69	1:09	.0022	.0574	19
<i>Proctacanthus</i> sp. F	Myrmeleontidae	7-31-69	8:10am	.0370	--	33
<i>Proctacanthus</i> sp. F	Lepidoptera	7-31-69	9:30am	.0303	--	32
<i>Proctacanthus</i> sp. M	Lepidoptera	7-31-69	10:00am	.0513	--	32
<i>Proctacanthus wilbertii</i>	Diptera	8- 1-69	9:30am	.0116	--	31
<i>Proctacanthus wilbertii</i> M	Hymenoptera	8- 1-69	12:00	--	--	31
<i>Proctacanthus wilbertii</i> M	Acrididae	8- 1-69	1:20	.0506	--	31
<i>Proctacanthus wilbertii</i> M	Myrmeleontidae	8- 1-69	2:25	--	--	31
<i>Proctacanthus wilbertii</i> M	Acrididae	8- 1-69	3:00	--	--	31
<i>Proctacanthus wilbertii</i> F	Histeridae	8- 1-69	4:40	--	--	31
<i>Proctacanthus</i> sp. M	Asilidae	8- 1-69	--	--	--	28
<i>Proctacanthus</i> sp. F	Acrididae	8- 1-69	2:20	.0338	--	28
<i>Proctacanthus</i> sp. F	<i>Proctacanthus</i> sp.	8- 1-69	2:30	--	--	28
<i>Proctacanthus</i> sp. M	Asilidae	8- 1-69	2:35	--	--	28
<i>Proctacanthus</i> sp. M	Cicadellidae	8- 1-69	3:15	--	--	28
<i>Proctacanthus</i> sp. F	Asilidae	8- 4-69	9:00	.0489	--	28
<i>Proctacanthus</i> sp. M	Carabidae	8- 4-69	9:45	.0515	--	32
<i>Proctacanthus</i> sp. M	Formicidae	8- 6-69	8:50	--	--	24
<i>Proctacanthus</i> sp. M	Asilidae	8- 6-69	8:05	--	--	24
<i>Proctacanthus</i> sp. F	Hesperiidae	8- 6-69	2:50	--	--	33
<i>Proctacanthus</i> sp. F	<i>S. platycornis</i>	8-13-69	1:28	.0248	--	--
<i>Proctacanthus</i> sp. F	Asilidae	8-14-69	--	--	--	41
<i>Proctacanthus</i> sp. M	Asilidae	8-14-69	12:10	--	--	41
<i>Proctacanthus</i> sp. F	Acrididae	8-14-69	3:30	--	--	24
<i>Proctacanthus</i> sp. F	Bombyliidae	8-13-69	4:45	--	--	--
<i>Proctacanthus</i> sp. F	Acrididae	8-12-69	2:30	--	--	--
<i>Proctacanthus</i> sp. F	Asilidae	8-19-69	2:00	--	--	28
<i>Proctacanthus</i> sp. M	Bombyliidae	8-19-69	2:15	.0895	--	28
<i>Proctacanthus</i> sp. F	Asilidae	8-21-69	12:46	.0617	--	28
<i>Proctacanthus</i> sp. F	Acrididae	8-21-69	1:26	.0794	.0864	28
<i>Proctacanthus</i> sp. F	Apidae	8-21-69	--	--	--	28
<i>Proctacanthus</i> sp. F	Acrididae	8-29-69	11:30	--	--	28

Predator & Sex	Prey	Date	Time	Prey Wt.	Amt. Consumed	Range
				-----gm-----		
<i>Efferia staminea</i>	Odonata	7-15-69	--	--	--	Sec. 27
<i>Efferia staminea</i>	Hymenoptera	7-15-69	--	--	--	18
<i>Efferia staminea</i>	Acrididae	7-21-69	12:00	--	--	32
<i>Efferia staminea</i>	Coleoptera	7-22-69	--	--	--	Sec. 26
<i>Efferia staminea</i>	Hymenoptera	7-31-69	12:00	.0072	--	31
<i>Efferia</i> sp. F	Acrididae	8- 1-69	12:40	--	--	31
<i>Efferia</i> sp.	Tachinidae	8- 1-69	9:50	.0092	--	32
<i>Efferia</i> sp.	<i>Mallaphorina</i> sp.	8- 5-69	12:45	.0442	--	20
<i>Efferia</i> sp.	<i>Mallaphorina</i> sp.	8- 5-69	2:10	.0155	--	20
<i>Efferia</i> sp. F	Lepidoptera	8- 6-69	8:40	--	--	24
<i>Efferia helenae</i> M	Myrmeleontidae	8-12-69	--	.0118	.0263	28
<i>Efferia helenae</i> M	Bombyliidae	8-13-69	8:50	.0293	--	--
<i>Efferia helenae</i> M	Acrididae	8-13-69	9:05	--	--	18
<i>Efferia</i> sp. F	Bombyliidae	8-13-69	3:00	.0035	--	41
<i>Efferia helenae</i> M	Diptera	8-14-69	12:35	.0014	--	--
<i>Efferia helenae</i> M	Acrididae	8-14-69	2:10	--	--	--
<i>Efferia</i> sp. F	Acrididae	8-14-69	2:60	--	--	24
<i>Efferia helenae</i> F	Cicadellidae	8-14-69	2:55	--	--	28
<i>Efferia helenae</i> M	Acrididae	8-13-69	--	--	--	--
<i>Efferia helenae</i> M	Hymenoptera	8-14-69	12:08	--	--	--
<i>Efferia helenae</i> M	Acrididae	8-19-69	2:26	.0109	.0430	28
<i>Efferia helenae</i> F	Acrididae	8-21-69	--	.0232	--	28
<i>Efferia helenae</i> F	Diptera	8-21-69	10:10	--	--	28
<i>Efferia helenae</i> M	Cicadellidae	8-21-69	10:30	--	--	28
<i>Efferia helenae</i> M	Bombyliidae	8-21-69	10:35	--	--	28
<i>Efferia helenae</i> F	Bombyliidae	8-21-69	10:45	--	--	28
<i>Efferia helenae</i> F	Formicidae	8-21-69	10:50	--	--	28
<i>Efferia helenae</i> F	Syrphidae	8-21-69	12:11	--	--	28
<i>Efferia helenae</i> M	Acrididae	8-21-69	12:25	--	--	28
<i>Efferia helenae</i> F	Acrididae	8-21-69	12:45	--	--	28
<i>Efferia helenae</i> F	Bombyliidae	8-21-69	12:45	--	--	28
<i>Efferia helenae</i> F	Formicidae	8-21-69	12:54	--	--	28
<i>Efferia helenae</i> F	Acrididae	8-21-69	1:00	--	--	28
<i>Efferia helenae</i> F	Acrididae	8-21-69	1:15	.0388	.0303	28
<i>Efferia helenae</i> F	Acrididae	8-21-69	2:00	.0840	--	28
<i>Efferia helenae</i> M	Acrididae	8-25-69	9:30	--	--	31
<i>Efferia helenae</i> F	Hymenoptera	8-25-69	9:50	--	--	31
<i>Efferia helenae</i> F	Acrididae	8-25-69	10:30	--	--	18
<i>Efferia helenae</i> M	Acrididae	8-25-69	--	--	--	31
<i>Efferia helenae</i> H	Bombyliidae	8-25-69	2:00	--	--	15
<i>Efferia helenae</i> M	Lepidoptera	8-26-69	10:30	--	--	24
<i>Efferia helenae</i> M	Hemiptera	8-26-69	2:00	--	--	24
<i>Efferia helenae</i> F	Acrididae	8-26-69	2:15	.0700	--	24
<i>Efferia helenae</i> F	Bombyliidae	8-27-69	10:05	--	--	Sec. 26
<i>Efferia helenae</i> F	Bombyliidae	8-27-69	10:10	--	--	5. 26
<i>Efferia helenae</i> F	Bombyliidae	8-27-69	10:15	--	--	Sec. 26

Table 17. (continued)

Predator & Sex	Prey	Date	Time	Prey Wt.	Ant. Consumed	Range
				-----gm-----		
<i>Effigia helena</i> M	Bombyliidae	8-27-69	10:35	--	--	Sec. 2
<i>Effigia helena</i> F	Acrididae	8-27-69	11:50	--	--	24
<i>Effigia helena</i> F	Acrididae	8-27-69	12:00	--	--	24
<i>Effigia helena</i> F	Acrididae	8-27-69	12:00	--	--	24
<i>Effigia helena</i> F	Lepidoptera	8-27-69	12:00	--	--	24
<i>Effigia helena</i> M	Acrididae	8-27-69	12:15	--	--	24
<i>Effigia helena</i> M	Noctuidae	8-27-69	12:20	--	--	24
<i>Lasiopogon quadrivittatus</i>		5-15-69	--	--	--	34
<i>Lasiopogon quadrivittatus</i>	Homoptera	5-15-69	--	--	--	34
<i>Lasiopogon</i> sp. F	Diptera	5-13-69	--	--	--	34
<i>Lasiopogon</i> sp. F	Diptera	5-13-69	--	--	--	34
<i>Lasiopogon</i> sp. F	Culicidae	5-17-69	3:45pm	--	--	--
<i>Lasiopogon</i> sp. F	Diptera	5-18-69	10:30	--	--	--
<i>Lasiopogon</i> sp. F	Diptera	5-18-69	1:05	--	--	--
<i>Lasiopogon</i> sp. F	Diptera	5-18-69	2:40	--	--	--
<i>Lasiopogon</i> sp. M	Diptera	5-17-69	--	--	--	--
<i>Lasiopogon</i> sp. F	Diptera	5-17-69	--	--	--	--
<i>Lasiopogon</i> sp. F	Diptera	5-18-69	11:00	--	--	--
<i>Lasiopogon</i> sp. M	Diptera	5-18-69	11:45	--	--	--
<i>Lasiopogon</i> sp. M	Diptera	5-18-69	12:33	--	--	--
<i>Lasiopogon</i> sp. F	Diptera	5-18-69	1:37	--	--	--
<i>Lasiopogon</i> sp. M	Diptera	5-18-69	--	--	--	--
<i>Ospriocerus latipennis</i>	Meloidae	7-22-69	--	--	--	Sec. 21
<i>Ospriocerus abdominalis</i>	Meloidae	8- 5-69	1:00	--	--	20
<i>Ospriocerus abdominalis</i> F	Meloidae	8-13-69	4:02	--	--	--
<i>Ospriocerus abdominalis</i>	Meloidae	8-12-69	2:25	--	--	24
<i>Stenopogon picticornis</i>	Acrididae	8- 5-69	--	.2872	--	18
<i>Stenopogon picticornis</i>	Acrididae	8-13-69	2:00	--	--	41
<i>Stenopogon picticornis</i>	Acrididae	8-20-69	11:00	.0764	--	--
<i>Stenopogon picticornis</i> F	Acrididae	8-21-69	2:00	--	--	28
<i>Stenopogon picticornis</i>	Acrididae	8-25-69	--	.0089	--	18
<i>Proctacanthella leucopogon</i> F	Diptera	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Tephritidae	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Diptera	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Phoridae	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Diptera	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Cicadellidae	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Cicadellidae	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Diptera	7- 8-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Cicadellidae	7- 8-69	--	--	--	--

Table 17. (continued)

Predator & Sex	Prey	Date	Time	Prey Wt.	Amt. Consumed	Range
				-----gm-----		
<i>Proctacanthella leucopogon</i> F	Diptera	7-15-69	--	--	--	--
<i>Proctacanthella leucopogon</i> F	Hymenoptera	7-15-69	12:47	--	--	--
<i>Proctacanthella leucopogon</i> M	Diptera	7-15-69	2:06	--	--	--
<i>Proctacanthella leucopogon</i> M	Hymenoptera	7-15-69	3:04	--	--	--
<i>Proctacanthella leucopogon</i> F	Hymenoptera	7-15-69	4:07	--	--	--
<i>Proctacanthella leucopogon</i> F	Hymenoptera	7-15-69	4:30	--	--	--
<i>Proctacanthella</i> sp. F	Acrididae	7-22-69	--	--	--	--
<i>Proctacanthella</i> sp. F	Acrididae	7-22-69	--	--	--	--
<i>Proctacanthella</i> sp.	Miridae	7- 7-69	--	--	--	17
<i>Proctacanthella</i> sp.	Tachinidae	7-23-69	--	--	--	Sec. 26
<i>Proctacanthella vacopilega</i> F	Cicadellidae	7-30-69	--	--	--	19
<i>Proctacanthella vacopilega</i> F	Formicidae	8- 6-69	1:00	--	--	47
<i>Efferia helenae</i> M	Bombyliidae	8-27-69	12:50	--	--	24
<i>Efferia helenae</i> M	Acrididae	8-27-69	12:55	--	--	24
<i>Efferia helenae</i> M	Acrididae	8-29-69	12:40	--	--	24
<i>Efferia helenae</i> F	Acrididae	8-29-69	12:50	--	--	24
<i>Efferia helenae</i> M	Lepidoptera	8-29-69	--	--	--	Sec. 26
<i>Efferia helenae</i> F	Acrididae	8-29-69	12:45	--	--	24
<i>Efferia</i> sp. F	Acrididae	8-29-69	11:55	--	--	24
<i>Efferia helenae</i> M	Diptera	9- 5-69	--	--	--	24

Table 18. Robberfly prey-predator matrix

PREY	<i>Asilatus</i>	<i>Efferia helena</i>	<i>Efferia staminea</i>	<i>Lasiopterus</i>	<i>Proctosiphella</i>	<i>Proctosiphus</i>	<i>Stenopogon platypterus</i>	TOTAL
COLEOPTERA	0	3	1	0	0	4	0	8
DIPTERA	3	15	1	13	12	16	1	61
HEMIPTERA	2	1	1	0	3	0	0	7
HOMOPTERA	1	2	1	1	10	0	0	15
HYMENOPTERA	0	4	5	0	5	3	0	19
LEPIDOPTERA	0	12	0	0	0	0	0	15
ODONATA	0	0	1	0	0	0	0	1
ORTHOPTERA	0	24	1	0	2	9	4	40
NEUROPTERA	0	1	0	0	0	3	0	4
TOTAL	6	62	11	14	32	40	5	170

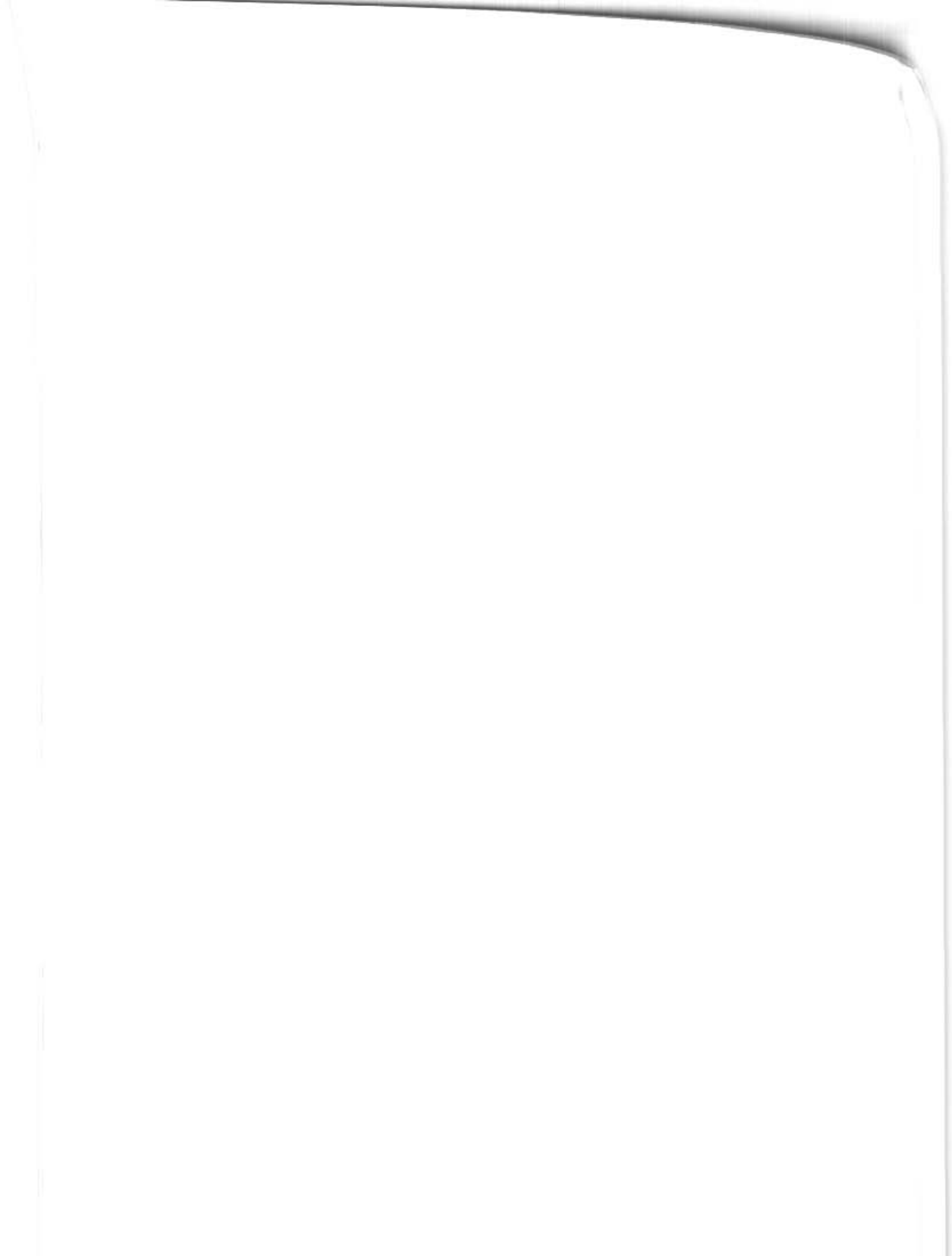
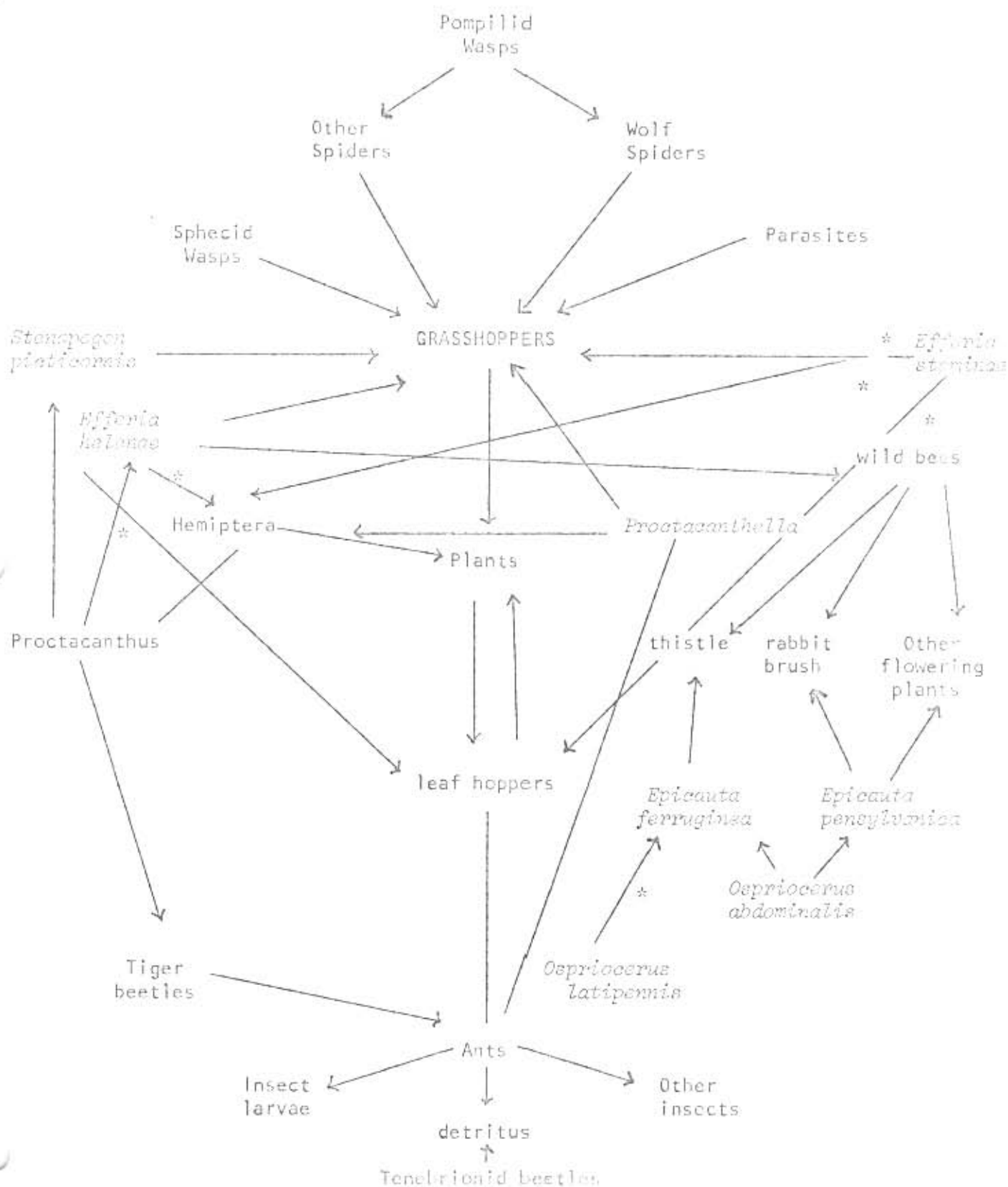


Fig. 1. Rangeland insect food web (preliminary 1969) IBP Site, Colorado



*New addition to food web