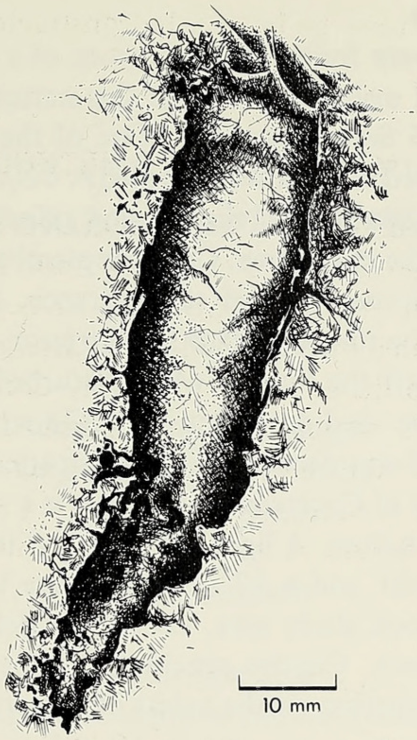

Fig. 1.–Burrow of captive male *Cyclocosmia truncata.*

Three *C. Truncata* burrows were found on 25 August 1974 in the Johnson Crook study area. The air temperature at 11:30 was 29°C while the average burrow temperature at a depth of 40 mm was 26°C. No trap doors were seen. Even when the leaf cover over the burrows was removed by hand, the delicate trapdoors were brushed away and destroyed. One *C. truncata* burrow with an entrance diameter of 8 mm was north and down slope 42 cm from the base of a 35 cm diameter *Quercus prinus.* The 1 m^2 area surrounding the entrance was on a slope of 23°. The two other burrows were 43 cm apart on a slope of 19° from the horizontal and were northeast and down slope 68 cm from the base of a 50 cm diameter *Q. prinus.* A heavy layer of dead leaves covered the ground for a distance of 1 m up slope from the bases of the two large trees but the 1 m area down slope was only covered lightly by leaf litter. Two burrows containing *C. truncata* were marked for future field observations but one week later no trace of them was found.

The larger of the two 19° burrows was excavated and the living female *C. truncata* collected for captive observations. The field burrow was 15 mm in diameter at the entrance and 73 mm deep. At a depth of 57 mm the spider's truncated abdomen was wedged tightly into a burrow diameter of 7 mm. The wall of this silk-lined burrow was 1.5 mm thick at the entrance. Soil at the site was placed in a 22.7 liter plastic insulated cooler to a depth of 330 mm. Light entered the cooler through a transparent top. On her first night in this container she built a burrow and attached a silk-leaf trapdoor which she held closed if distrubed at the entrance. On 1 September the captive male *C. truncata* was introduced to this female. On 6 September 1974 he was found dead with the first pair of legs missing at the coxae. The female *C. truncata* sealed the entrance to her burrow on 7 September 1974 by attaching a silk plug at a point 7 mm below the entrance to the burrow. On 9 September 1974 and 11 October 1974 a legless field cricket *Acheta domestica* was left over the seal. On each occasion the female ate the cricket at night and resealed the burrow. She left the undigested part of a cricket outside the entrance to her burrow on 12 October 1974.

Four male *C. truncata* were found at the bottom of a 6.4 m pit in the study area. On 23 September 1973 a dead male was found in this natural trap. Two dead and one live male were discovered on 15 September 1974. One of the two dead specimens was badly decomposed and disintegrated when it was touched.

The live specimen was taken from the pit and released into an unoccupied *Cyclocosmia truncata* burrow in the study area. On 22 September 1974 I found this male in the same burrow with his abdomen toward the entrance. His abdomen did not seal the bottom of the burrow and he turned to face my intrusion with his fangs. Excavation was not necessary because he left the burrow when disturbed. The author isolated him in a 3.7 liter container where he died on 2 October 1974 with his first leg separated at the coxa. This male *C. truncata* was deposited in the American Museum of Natural History.

Perhaps the alleged rarity of *Cyclocosmia truncata* is a result of its microenvironmental requirements and secretive nature. A light cover of leaf litter to keep the straw colored, sandy-clay soil slightly moist and a 17°-23° slope are indicators for the discovery of burrows at the Johnson Crook study area. Locating a field burrow is very difficult when *C. truncata* seals the entrance. Captive specimens maintained under natural conditions can provide additional information on the habits of this cryptic spider.

ACKNOWLEDGMENTS

I wish to thank Denton Bragg and Tom Watson for their advice and assistance.

LITERATURE CITED

Coyle, F. A. 1971. Systematics and natural history of the mygalomorph spider genus *Antrodiaetus* and related genera. Bull. Mus. Comp. Zool. 141:269-402.

Gertsch, W. J., and H. K. Wallace. 1936. Notes on new and rare American mygalomorph spiders. Amer. Mus. Novitates 884:1-12.

Allred, D. M., and W. J. Gertsch. 1976. Spiders and scorpions from northern Arizona and southern Utah. J. Arachnol. 3:87-99.

SPIDERS AND SCORPIONS FROM NORTHERN ARIZONA AND SOUTHERN UTAH

Dorald M. Allred

Department of Zoology
Brigham Young University
Provo, Utah 84602

Willis J. Gertsch[1]

Curator Emeritus
American Museum of Natural History
New York, New York

ABSTRACT

During three summers of environmental monitoring studies in northern Arizona and southern Utah, spiders of 40 species and scorpions of 5 species were collected in pit traps placed on 16 study sites representing 12 vegetative types. Study sites differed in species composition and populations, and seasonal and annual differences are noted.

INTRODUCTION

In June 1971, an environmental monitoring study was initiated by members of the Center for Health and Environmental Studies, Brigham Young University, to establish baselines to determine the impact of the Navajo Generating Station near Page in Coconino County in northern Arizona, and the Kaiparowits Generating Station in Kane County in southern Utah (Fig. 1).[2] Field studies of animals were conducted from July to September in 1971, and May to August in 1972 and 1973.

Can pit-traps–an outer galvanized metal sleeve 18 cm in diameter and 36 cm long with a stainless steel, flanged inner can of slightly smaller size–were used to capture ground-dwelling arthropods. Five traps, 30 m apart, were placed on each of two transects which were 45 m apart. These were left open, dry and unbaited, for a 72 hour period once each summer month. Arachnids, other arthropods, small rodents and lizards were collected from the cans daily while they were open for collection purposes. The spiders and scorpions were identified by Dr. Willis J. Gertsch.

[1] Mailing address: P. O. Box 157, Portal, Arizona 85632.

[2] These studies were funded cooperatively by Salt River Project, Arizona Resources Corporation, and Southern California Edison.

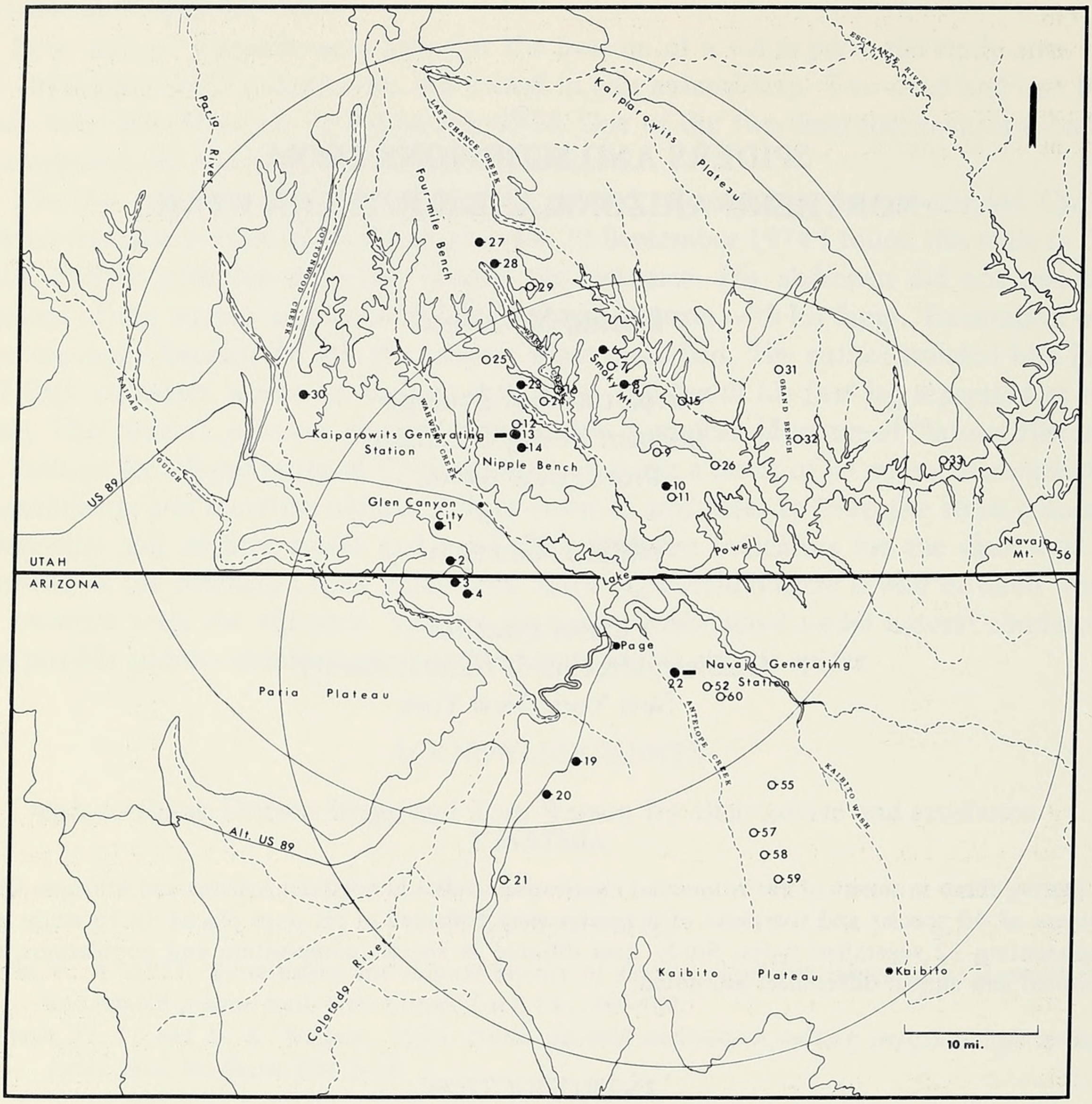

Fig. 1.—Study sites around the Kaiparowits and Navajo generating stations. Solid dots are sites of arachnid collections reported in this paper.

Sixteen sites were studied—12 in 1971, 16 in 1972, and 12 in 1973. Some were studied one year, others two, and some all three years. The sites were established in the major vegetative types in a perimeter within a 30 mile radius of the electric generating stations to determine the species and relative abundance of organisms that could be used as indicators to monitor environmental changes. Some sites operated for only one season were eliminated for study because of insufficient kinds and numbers of animals present, problems of logistics, lack of potential correlation with other investigators and continuity of vegetative analyses, and inavailability of specific climatic and edaphic data.

In order to make comparisons of populations and seasonal changes, the numbers of specimens collected were adjusted by the number of and times that traps were operated (Table 1). For example, in July 1972, 482 trapping attempts yielded 140 spiders, whereas in July 1973, 241 trapping attempts yielded 25 spiders (Table 4). By applying an adjustment factor of 2.0 to the July 1973 figure (2.0 X 241) to standardize the number of trapping attempts, the assumption is made that if as many trapping attempts were made

Table 1.–Adjustment factors for the number of trapping attempts for extrapolation of arachnid populations during comparative months in three successive years. (Data are included only for those months where comparisons can be made with the same month of another years. Adjustment factor = greatest number of trapping attempts in a month–July 1972–divided by the number of trapping attempts for a given month.)

Year and Month	No. Trapping Attempts	Adjustment Factor
1971		
July	121	4.0
August	284	1.7
September	60	8.0
1972		
May	301	1.6
June	402	1.2
July	482	1.0
August	402	1.2
September	151	3.2
1973		
May	371	1.3
June	201	2.4
July	241	2.0
August	241	2.0

in July 1973 as in July 1972, then the number collected in 1973 would have been 50 instead of 25. The normal variability in seasonal and annual populations, slightly different trapping periods within the same month, and the influence of seasonal and daily climatic changes on the activity of the arachnids during the trapping periods were ignored. Pit traps are effective primarily for ground-dwelling arthropods that move more frequently by running on the ground than by flying. The method involves a minimum of effort and time and can be used effectively for such species, although the results must be considered as relative rather than absolute with reference to species and their abundance. For selected groups, it is judged to be adequate to determine relative abundance and distribution where there are limitations of time, economy, and logistics. The numbers of trapping attempts are shown in Table 2.

PREDOMINANT VEGETATION AND LOCATION OF STUDY SITES

Site 1. *Ephedra-Vanclevea-Sporobolus-Oryzopsis-Hilaria*. Base N slope Cedar Mountain, 5 km W Glen Canyon City, Utah.

Site 2. *Juniperus-Ephedra-Muhlenbergia-Bouteloua-Hilaria-Oryzopsis*. Cedar Mountain, 6.5 km S site 1.

Site 3. *Ephedra-Hilaria-Bouteloua-Oryzopsis*. Cedar Mountain, 2 km S site 2.

Site 4. *Coleogyne-Ephedra-Atriplex-Chrysothamnus*. Cedar Mountain, 1.3 km SE site 3.

Site 6. *Artemisia-Hilaria-Aristida-Oryzopsis*. Smokey Mountain, 23 km from Last Chance Junction, Kane Co., Utah.

Site 8. *Grayia-Ephedra-Coleogyne-Hilaria-Bouteloua-Oryzopsis-Descurainia*. Smokey Mountain, 14.5 km from Last Chance Junction, Kane Co., Utah.

Site 10. *Ephedra-Yucca-Eurotia-Vanclevea-Oryzopsis-Streptanthella*. Ahlstrom Point Road, 7.5 km S jnct., Kane Co., Utah.

Table 2.—Number of trap-days (number of traps multiplied by number of days operated) for pit traps on 16 major study sites, 1971-1973. Where values are missing, traps were not operated on those sites during those years.

Site	1971	1972	1973	Total
1	60	120	90	270
2	60	180	90	330
3	60	180	90	330
4	60	120		180
6	60	90	90	240
8	60	90	90	240
10	60	120	90	240
13	60	150	90	300
14	60	150	90	300
19		90		90
20		90		90
22		150		150
23		120	90	210
27		120	70	190
28		120	70	190
30		150	90	240
Total	510	2,040	1,040	3,590

Site 13. *Grayia-Ephedra-Oryzopsis-Bouteloua-Hilaria*. Nipple Bench, 6.5 km SE Tibbet Spring, Kane Co., Utah.

Site 14. *Coleogyne-Grayia-Ephedra-Chrysothamnus-Hilaria*. 3 km S site 13.

Site 19. *Coleogyne*. 15 km S Page, Arizona, alongside Hwy 89.

Site 20. *Muhlenbergia-Bouteloua-Hilaria*. 19 km S Page, Arizona, alongside Hwy 89.

Site 22. *Coleogyne-Ephedra-Hilaria*. E of Navajo Generating Station, SE Page, Arizona.

Site 23. *Ephedra-Coleogyne-Grayia-Hilaria*. Cathys Flat, 2 km N Tibbet Spring, thence 2.5 km E, Kane Co., Utah.

Site 27. *Juniperus-Pinus*. Four-mile Bench, 5 km SE cow camp, head Wesses Canyon, Kane Co., Utah.

Site 28. *Artemisia-Bouteloua-Plantago*. 3 km E site 27.

Site 30. *Ephedra-Bouteloua-Hilaria-Sporobolus-Salsola*. Brigham Plains Flat, Kane Co., Utah.

RESULTS AND DISCUSSION

Spiders

The spiders of 40 species that were found are not the best indicators of ecological disturbance, as a group, to be studied by the pit-trap method because they do not roam over the ground as much as some other arthropods. However, the normally sedentary *Psilochorus utahensis*, which was relatively abundant and widespread over the study areas, apparently wanders sufficiently to be considered as a good indicator species in this group of arachnids (Table 3).

The largest numbers of spiders were taken in July and August of 1971 and 1972, and June and August of 1973 (Table 4). The numbers of species found on some sites differed significantly between the three years, whereas on other sites they were more constant

Table 3.–Relative abundance and distribution of spiders (of which more than 10 specimens were taken) on 16 major study sites, 1971-1973.

Species	Total No. Taken	No. Sites Where Found
Psilochorus utahensis	581	15
Schizocosa avida	46	5
Neoanagraphis pearcei	45	13
Psilochorus imitatus	42	3
Steatoda fulva	16	8
Metacyrba arizonensis	14	6

Table 4.–Actual and estimated relative populations of spiders of all species at 16 major study sites, 1971-1973. (Estimated numbers were obtained by multiplying the actual number collected by the appropriate adjustment factor–Table 2–to standardize the number of trapping attempts. Numbers are omitted where data were not comparable.)

	Relative Population					
	1971		1972		1973	
Month	Actual	Estimated	Actual	Estimated	Actual	Estimated
May			9	14	39	51
June			91	109	33	79
July	80	320	140	140	25	50
August	152	258	142	170	57	114
September	11	88	42	134		

Table 5.–Number of species of spiders captured in pit traps on 16 major study sites, 1971-1973. Traps were not operated where numbers are omitted.

Site	Predominant Vegetation	1971	1972	1973	Total
1	*Ephedra-Vanclevea*-Grass	4	3	4	9
2	*Juniper-Ephedra*-Grass	2	5	9	12
3	*Ephedra*-Grass	6	6	5	9
4	*Coleogyne*	2	3		4
6	*Artemisia*	2	3	3	5
8	*Grayia*-Grass	2	3	4	7
10	*Ephedra*-Grass	1	4	3	6
13	*Grayia-Ephedra*-Grass	3	3	3	6
14	*Coleogyne-Grayia-Ephedra*-Grass	2	6	7	11
19	*Coleogyne*		6		6
20	Grass		5		5
22	*Coleogyne*		3		3
23	*Ephedra-Coleogyne-Grayia*		2	5	6
27	*Juniper-Pinyon*		4	2	5
28	*Artemisia*-Grass		5	4	6
30	*Ephedra*-Grass		8	3	8
	Total	11	29	19	38

(Table 5). On the eight sites where data are available for all three years, site 1 in 1972 decreased in the number of species present compared to 1971, sites 3 and 13 in 1972 remained the same as in 1971, and sites 2, 3, 6, 8, 10, and 14 increased in 1972 over

1971. In 1973, sites 3 and 10 decreased in number of species compared to 1972, sites 6 and 13 remained the same as 1972, and sites 1, 2 8, and 14 increased in the number of species. Where only two year's data are available for five sites, site 4 increased in 1972 over 1971, site 23 increased in 1973 over 1972, and sites 27, 28, and 30 in 1973 decreased from 1972.

Table 6.–Percentage composition (to nearest whole percentage for those which constitute at least 10% of the total collected; less than 10% is indicated by an asterisk) of predominant spiders on 16 major study sites, 1971-1973. Numbers in parentheses indicate numbers of other species each constituting less than 10%.

Site	Species of Spider								
	Met ari	Neo pea	Psi imi	Psi uta	Sch avi	Ste alb	Ste ful	Xys las	Other
1		*		75			*	10	(5)
2		*		75	*			*	(8)
3	*	*		88	*		*		(4)
4	*	*		82					(1)
6	13	*		71					(2)
8		*		77	*			*	(3)
10	*	*		78			*		(2)
13		*		87			*		(3)
14	*	20	*	64			*		(6)
19		16		42			16		(3)
20		17	47			17			(2)
22				86					(2)
23	21			48			10		(3)
27		*		71					(3)
28			33	29	34				(3)
30		*		64	*		11		(4)

Table 6 shows the variation in composition of the predominant spiders for each of the study sites. *Psilochorus utahensis* was relatively abundant on 15 of the 20 sites. Apparently it was absent on site 20. *Neoanagraphis pearcei* was present on 13 of the sites, but only in abundance on three. *Steatoda fulva* was present on eight sites, but abundant only on three. Other species were not represented on more than a few sites. No two sites had the same species composition of spiders.

Comparisons of sites which were most closely alike with reference to the predominant plant species showed some significant differences. *Coleogyne* sites 4, 19, and 22 had only one species in common. One species was common to sites 4 and 19. Two species were found only on site 4, four only on site 19, and two only on site 22. Comparison of sites 14 and 23 which also contained significant amounts of *Coleogyne* showed both sites with one species common to sites 4, 19, and 22, and both sites with one species common to site 4 and one common to site 19. Site 14 had one species common to sites 4 and 19, site 23 one species common to site 4, site 14 one species common to site 22, site 14 with seven unique species, and site 23 with two unique species.

Comparison of *Ephedra*-grass sites 3, 10, and 30 showed three species common to the three sites. One species was common to sites 3 and 10, and one species to 10 and 30. Sites 3 and 30 had two species in common. Three species were unique to site 3, one species to site 10, and two species to site 30. Comparison of sites 1 and 20 which also had significant amounts of *Ephedra* and grass showed both sites with one species in common with sites 3, 10, and 30. Site 1 had two species in common with sites 3, 10, and 30, one species in common with site 3, and five unique species. Site 20 had five unique species.

Artemisa sites 6 and 28 had only one species in common. Site 6 had four unique species, and site 28 five.

Grayia-Ephedra-grass sites 8 and 13 had four species in common; site 8 had three unique species, and site 13 two.

Juniper woodland sites 2 and 27 had only two species in common. Site 2 had ten unique species, and site 27 three.

Annual differences in species composition differed between the years. Seven species that were present in 1972 and 1973 were not taken in 1971. Two species present in 1971 were not found in 1972 and 1973. Ten species present in 1972 were not taken during the other years, five species not taken in 1973 were present other years, one species in 1973 was not found in other years, and only four species were found all three years.

Only two species were taken in sufficient abundance at comparative times in different years for yearly comparisons. *Psilochorus utahensis* was twice as abundant in 1972 than in 1973, whereas *Shizocosa avida* was seven times as abundant in 1973 than in 1972. *Psilochorus utahensis* was also six times as abundant in 1971 than in 1973, and two times as abundant in 1971 than in 1972. In 1973, *S. avida* was 17 times as abundant than in other years.

Scorpions

The scorpions of five species were not found in abundance on the study sites, and are of secondary importance as indicators (Table 7). Largest numbers were found in July in all three years (Table 8).

Table 7.–Numbers and distribution of scorpions on 16 major study sites, 1971-1973.

Species	Total No. Taken	No. Sites Where Found
Paruroctonus boreus	113	15
Vaejovis confusus	51	13
Paruroctonus utahensis	31	8
Hadrurus spadix	2	1
Vaejovis wupatkiensis	1	1

Table 8.–Actual and estimated relative populations of scorpions of all species at 16 major study sites, 1971-1973. (Estimated numbers were obtained by multiplying the actual number collected by the appropriate adjustment factor–Table 2–to standardize the number of trapping attempts. Numbers are omitted where data were not comparable.)

Month	Relative Population					
	1971		1972		1973	
	Actual	Estimated	Actual	Estimated	Actual	Estimated
May			2	3	10	13
June			11	13	4	10
July	26	104	37	37	31	62
August	29	49	16	19	20	40
September	6	48	1	3		

The numbers of species present differed slightly between years, and were lowest during 1972 and highest in 1971 (Table 9). Seven of nine sites decreased in number of species in 1972 over what was found in 1971, and two sites decreased in 1973 over the number in 1972. Seven of twelve sites increased in numbers of species in 1973 over what was found in 1972.

Many sites had the same species composition, but the relative percentage of individuals of each species varied between sites (Table 10). *Paruroctonus boreus*, found on 15 of the sites, was a predominant component of the scorpions on 11 of them. *Vaejovis confusus*, present on 13 of the sites, was of significant composition on only two.

Table 9.—Number of species of scorpions captured in pit traps on 16 major study sites, 1971-1973. Traps were not operated where numbers are omitted.

Site	Predominant Vegetation	1971	1972	1973	Total
1	*Ephedra-Vanclevea*-Grass	2	0	2	2
2	*Juniper-Ephedra*-Grass	3	2	3	3
3	*Ephedra*-Grass	3	3	1	3
4	*Coleogyne*	4	1		4
6	*Artemisia*	1	1	1	2
8	*Grayia*-Grass	2	1	0	2
10	*Ephedra*-Grass	2	1	2	3
13	*Grayia-Ephedra*-Grass	2	1	2	2
14	*Coleogyne-Grayia-Ephedra*-Grass	2	0	2	2
19	*Coleogyne*		3		3
20	Grass		1		1
22	*Coleogyne*		3		3
23	*Ephedra-Coleogyne-Grayia*		1	2	2
27	*Juniper-Pinyon*		1	2	2
28	*Artemisia*-Grass		1	1	1
30	*Ephedra*-Grass		2	2	2
	Total	4	3	3	4

Table 10.—Percentage composition (to nearest whole percentage) of scorpions on 16 study sites, 1971-1973.

Site	Species of Scorpion				
	Had spa	Par bor	Par uta	Vae con	Vae wup
1			44	56	
2		83	7	10	
3		76	6	12	6
4	20	15	55	10	
6		92		8	
8		60		40	
10		5	17	78	
13		60		40	
14		75	25		
19		19	51	30	
20		100			
22		11	68	21	
23		68		32	
27		93		7	
28		100			
30		67		33	

Comparison of sites which were most closely alike with reference to the predominant plant species showed significant differences primarily in percentage composition rather than species present (Table 10). *Coleogyne* sites 4, 19, and 22 had three of the four species in common, but one species was unique to site 4. The one predominant species on all three sites was the same. Comparison of sites 14 and 23 which also contained significant amounts of *Coleogyne* showed both sites with a species common to each other and the other three sites, and each site with a unique species common to sites 4, 19 and 22. The predominant species of sites 14 and 23 was different than the predominant one for sites 4, 19, and 22.

Comparison of *Ephedra*-grass sites 3, 10, and 30 showed two species in common for all three, one species common to sites 3 and 10, and one species unique to site 3. The one predominant species was the same only for sites 3 and 30. Comparison of sites 1 and 20, which also had significant amounts of *Ephedra* and grass, showed two species on site 1 in common with sites 3 and 10, and only one species common to sites 1 and 30. The single species on site 20 was common to sites 3, 10, and 30. The predominant species on site 1 was also the predominant species of site 10.

Artemisia sites 6 and 28 had one predominant species in common, and site 6 had one unique species.

Grayia-Ephedra-grass sites 8 and 13 were of similar composition and predominance.

Juniper woodland sites 2 and 27 had two species in common, and site 2 had one unique species. The predominant species was the same for both sites.

Relative abundance of individual species differed between the three years. Comparison of the period of May to August showed *Paruroctonus boreus* to be one and one-half times as abundant in 1973 as in 1972, *P. utahensis* of about equal abundance both years, and *Vaejovis confusus* three times as abundant in 1973 as in 1972. Comparison of July and August for the three years showed *P. boreus* to be twice as abundant in 1971, and one and one-half times as abundant in 1973 as in 1972. In 1971 *P. utahensis* was ten times as abundant as in 1972 and 1973. *Vaejovis confusus* was twice as abundant in 1971, and three times as abundant in 1973 as in 1972.

CONCLUSIONS

Although can pit-traps are selective for sampling purposes, they are an effective method for certain groups and species of ground-dwelling arthropods. The only spider taken in this study which may be considered a good indicator species as measured by the pit trap technique is *Psilochorus utahensis*. It was by far the most abundant and widespread species found, and was the predominant species in all plant communities except the *Muhlenbergia-Bouteloua-Hilaria* community where *Psilochorus imitatus* was predominant, and the *Artemisia-Bouteloua-Plantago* community where *P. imitatus* and *Schizocosa avida* were about equally predominant. Populations of spiders were highest during August, July, and September, respectively. Greatest numbers of species were found in the *Juniperus-Ephedra*-grass and *Coleogyne-Grayia-Ephedra* communities.

Scorpions of *Paruroctonus boreus* were relatively abundant and ecologically widespread, and are considered as good ecological indicators as measured by pit traps. Those of *Vaejovis confusus* were only about half as abundant as *P. boreus*, but were almost as widespread ecologically. *Paruroctonus boreus* was the predominant species in 11 of the 16 communities studies. *Paruroctonus utahensis* was the predominant species in the *Coleogyne-Ephedra-Atriplex*, *Coleogyne*, and *Coleogyne-Ephedra-Hilaria* communities.

Vaejovis confusus was predominant in the *Ephedra-Yucca-Eurotia* and *Ephedra-Vanclevea-Sporobolus* communities. Scorpions were most abundant during July. Greatest numbers of species were found in the *Coleogyne-Ephedra-Atriplex* community.

ANNOTATED LIST OF SPIDERS

Apollophanes texanus Banks. 1 Male, 1 August 1973, site 1–*Ephedra-Vanclevea*-grass; 1 Female, 13 August 1972, site 19–*Coleogyne.* Known distribution: Desert areas of southwestern and western United States, north into Montana.

Calilena restricta Chamberlin and Ivie. 1 Male, 13 August 1972, site 20–grass; 1 Imm, 15 June 1972, site 23–*Ephedra-Coleogyne-Grayia.* Known distribution: Rocky Mountain states from Idaho into Utah and northern Arizona.

Castianeria occidens Reiskind. 1 Male, 21 July 1972, site 28–*Artemisia*-grass; 4 Males, 1 Female, 23 and 24 July 1972, site 30–*Ephedra*-grass. Known distribution: Southwestern United States and northwestern Mexico.

Cesonia sincera Gertsch. 1 Female, 2 August 1971, site 8–*Grayia*-grass; 1 female, 3 August 1971, 1 female, 11 September 1971, site 6–*Artemisia.* Known distribution: Texas to New Mexico, Arizona and southern Utah.

Cicurina deserticola Chamberlin and Ivie. 1 Male, 30 April 1973, site 2-juniper-*Ephedra*-grass, 1 female, 2 May 1973, site 8–*Grayia*-grass; 1 female 9 May 1973, site 13–*Grayia-Ephedra*-grass; 1 Female, 17 June 1972, site 14–*Coleogyne-Grayia-Ephedra*-grass. Known distribution: Utah, Arizona, and New Mexico.

Dictyna personata Gertsch and Mulaik. 1 specimen, 6 July 1972, 1 specimen, 6 August 1972, site 2–juniper-*Ephedra*-grass. Known distribution: Texas, New Mexico, California, Nevada, and Mexico (Chihuahua).

Drassodes gosiutus Chamberlin. 1 Male, 16 October 1971, site 13–*Grayia-Ephedra*-grass; 1 Male, 16 October 1971, 1 Male, 16 October 1971, 1 Male, 12 June 1973, site 14–*Coleogyne-Grayia-Ephedra*-grass. Known distribution: Utah, Arizona, and New Mexico.

Drassodes robinsoni Chamberlin.1 Male, 3 June 1973, site 1–*Ephedra-Vanclevea*-grass; 1 Male, 3 June 1973, site 2–juniper-*Ephedra*-grass; 1 Male, 11 May 1973, site 14–*Coleogyne-Grayia-Ephedra*-grass. Known distribution: Western United States, east to New England; common in Utah, Arizona, and New Mexico.

Drassyllus lamprus Chamberlin. 1 Female, 11 June 1972, site 20–grass. Known distribution: Utah and northern Arizona.

Enoplognatha piuta Chamberlin and Ivie. 1 Male, 24 April 1972, site 30–*Ephedra*-grass. Known distribution: Utah and northern Arizona.

Euryopis scriptipes Banks. 1 Female, 3 June 1973, site 2–juniper-*Ephedra*-grass. Known distribution: Rocky mountain states, from Alberta into Chihuahua, Mexico.

Filistata utahana Chamberlin and Ivie. 1 Female, 22 May 1972, site 30–*Ephedra*-grass; 1 specimen, 5 June 1972, 1 Male, 13 July 1971, site 3–*Ephedra*-grass; 1 Male, 18 July 1971, site 17–grass, 1 Imm., 6 July 1972, site 4–*Coleogyne*; 1 Imm., 14 August 1972, site 20–grass; 1 Female, 16 July 1973, site 23:*Ephedra-Coleogyne-Grayia*; 1 female, 17 July 1971, site 18–*Coleogyne*; 1 Female, 17 August 1971, Glen Canyon City. Known distribution: Utah, northern Arizona, New Mexico, and westward into California.

Geolycosa rafaelana Chamberlin. 1 specimen, 5 May 1972, site 1–*Ephedra-Vanclevea*-grass; 1 specimen, 3 June 1972, 1 Male, 3 June 1973, site 3–*Ephedra*-grass; 1 male, 9

June 1972, site 19–*Coleogyne*; 1 Male, 4 July 1973, site 2–juniper-*Ephedra*-grass. Known distribution: Desert areas of southern Utah, northern Arizona, and New Mexico.

Gnaphosa californica Banks. 1 Female, 21 July 1972, site 27–juniper-pinyon. Known distribution: Utah, Arizona, New Mexico, and west to California.

Haplodrassus eunis Chamberlin. 1 Female, 2 May 1973, site 6–*Artemisia*; 2 Females, 3 May 1973, site 8–*Grayia*-grass; 2 males, 1 Imm., 9 and 10 May 1973, site 14–*Coleogyne-Grayia-Ephedra*-grass; 1 Female, 11 May 1973, site 13–*Grayia-Ephedra*-grass; 1 Imm., 13 July 1972, site 22-*Coleogyne*. Known distribution: Arizona, Utah, and New Mexico.

Herpyllus propinquus (Keyserling). 1 Imm., 18 May 1972, site 28–*Artemisia*-grass. Known distribution: Western United States, mostly west of Rockies.

Latrodectus hesperus Chamberlin and Ivie. 1 Imm., 12 July 1972, site 10–*Ephedra*-grass; 1 Imm., 3 August 1973, site 2–juniper-*Ephedra*-grass; 1 Female, 4 August 1973, site 23–*Ephedra-Coleogyne-Grayia*; 1 Imm., 17 October 1971, Nipple Spring. Known distribution: Western United States, and eastward into west Texas.

Metacyrba arizonensis Barnes. Seven immatures, 2 Males, and 5 Females were taken from seven sites (3, 4, 6, 10, 14, 17, 23). Immatures were found in May, July, and August, males in July, and females in May and July. Known distribution: Southern Utah, Arizona, New Mexico, and California.

Metacybra taeniola (Hentz). 1 Female, 12 June 1973, site 14–*Coleogyne-Grayia-Ephedra*-grass. Known distribution: United States and Canada.

Misumenops asperatus (Hentz). 1 Female, 21 July 1972, *ex Helianthus petrolans*, 1.5 km W Page, Arizona. Known distribution: Mostly eastern species occurring in northwestern states, including Utah, northern Arizona (new record from 1.5 km W Page), and Alberta, Canada.

Misumenops coloradensis Gertsch. 4 Females, 21 July 1972, *ex Chrysothamnus viscidiflorus*, 13 km S Page, Arizona. Known distribution: Southwestern United States.

Neoanagraphis pearcei Gertsch. This species was the second most common one taken. Thirty-six immatures, 7 Males, 3 Females, and 3 specimens not designated by sex or stage were taken from 14 of the 20 study sites (all but nos. 7, 9, 18, 22, 23, and 28). Immatures were taken from May to October, mainly in July and August; males in August and September; and females from June to August. Greatest numbers were found at sites 14 and 20, *Coloegyne-Grayia-Ephedra*-grass and grass communities, respectively. Known distribution: Nevada, southern Utah, Arizona, New Mexico, and west into California.

Nodocion utus (Chamberlin). 1 Male, 1 Female, 14 July 1971, site 3–*Ephedra*-grass. Known distribution: Utah, Arizona, and New Mexico.

Oxyopes tridens Brady: 1 Male, 17 July 1971, 1 specimen, 8 July 1972, site 1–*Ephedra-Vanclevea*-grass; 1 Male, 15 July 1972, site 22–*Coleogyne*; 1 Male, 17 July 1971, site 17–grass. Known distribution: Southwestern United States.

Pardosa uintana Gertsch. 1 Male, 18 June 1972, Navajo Mountain, San Juan Co., Utah. Known distribution: Boreal species of northwestern United States, Canada, New England; mountains of Utah, Colorado, etc.

Pardosa utahensis Chamberlin. 1 Female, 18 June 1972, *ex Artemisia*, Navajo Mountain, San Juan Co., Utah. Known distribution: Utah, Colorado, and Wyoming.

Pholcophora americana Banks. 1 Female, 13 May 1973, site 27–juniper-pinyon. Known distribution: Western United States, especially northern part.

Phrurotimpus alarius (Hentz). 1 Female, 20 August 1972, site 27–juniper-pinyon. Known distribution: Most of United States except Pacific states.