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COMPARISON OF SPIDER POPULATIONS OF
GROUND STRATUM IN ARKANSAS PASTURE AND
ADJACENT CULTIVATED FIELD ^{1,2}

W. H. Whitcomb³, Harriet Exline⁴, and Maxine Hite⁵

ABSTRACT. Of 64 species of spiders taken from the ground stratum of an Arkansas pasture and adjoining cotton field, only 26 were common to both. Twenty-two were collected only in the cotton field; 16, only in the pasture. Many of the 18 species of lycosids were taken in greater numbers in the cultivated field, especially *Pardosa milvina* and *Lycosa helluo*. Eight species of lycosids were found only in the cotton field; two, only in the pasture. Only *Schizocosa avida*, of the better represented lycosids, appeared to show no preference. Similar relationships are given for dictynids, erigonids, linyphiids, oxyopids, gnaphosids, clubionids, thomisids, and salticids.

No one in North America, as well as can be learned, has compared the spider population of a natural or nearly natural plant community with that of an adjacent cultivated field. Of the numerous recent surveys of particular habitats, many include comparisons of populations of spiders in various strata, and a few deal with faunal changes following plant succession: deciduous forest succession by Smith-Davidson (1932); plant associations, Presque Isle, Lake Erie, by Truman (1942); Chicago area dunes by Lowrie (1948); virgin prairie near Lincoln, Nebraska, by Muma and Muma (1949); and maritime plant communities by Barnes (1953).

A pasture and adjacent cotton field were selected for study, situated on bottom land and river terrace on the south side of the Arkansas River, near Morrilton, Conway County, Arkansas. The pasture undulates and slopes toward the nearly flat cotton field below, its highest point being about 20 feet above the field. The pasture is essentially a Bermuda grass, *Cynodon dactylon* (Linn.), community; but other plants, such as dog fennel, *Anthemis* spp., and bitterweed, *Helenium tenuifolium* Nutt., are present. Cattle graze it, disturbing and destroying some of the spider population, especially that of the herbaceous stratum. The cotton field, once part of the pasture,

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has been plowed and planted for two years. It lies fallow during the winter and is thoroughly disked and cultivated. Such cultivation destroys many spiders each winter, so that much of the summer fauna apparently originates in outside sources after each spring planting.

The objective in selecting the ground stratum in these environments was chiefly to investigate the incidence of wolf spiders (Lycosidae) that, in the preliminary surveys of 1960 and 1961, had appeared to be more numerous on cultivated than uncultivated land. The authors hoped to learn, by sampling the ground stratum of adjoining field and pasture, whether certain lycosid species show a distinct preference for one environment or the other.

Methods

Pitfall traps were used, a modification of the type employed by Hensley and associates (1961). Each consists of a buried metal sleeve supporting a quart jar; the jar ring is soldered to a quarter-inch rim, that rests on the sleeve. A metal shield above excludes rain and debris. This construction permits emptying the trap with minor disturbance to the soil and prevents spiders from falling between jar and sleeve. These small traps were used in preference to the larger models of Fichter (1941) and Rhoades (1962), because they could be set in drill rows of the cotton field, without curtailing current farm practices, and in the pasture they were less liable to disturbance by livestock.

Thirty traps were emplaced, 10 in the cotton field and 20 in the pasture, and collections were made weekly from June 10 to September 1, 1962. Jars were filled a quarter to a third their depth with 70 per cent alcohol. When specimens were removed, they were transferred to 95 per cent alcohol for storage.

In computing relative numbers of specimens in collections from the two environments, a base of 10 traps was used. Therefore, actual counts for the 20 traps of the pasture have been divided by two in Table 1.

Results

Sixty-four species of spiders were collected, during the summer of 1962, from the ground stratum in the pasture and adjacent cotton field. Twenty-six were common to both areas; 22 were taken only in the cotton field; and 16, only in the pasture. More wolf spiders (Lycosidae) were taken than members of any other family, and there were more species represented. Distribution of all species is shown in Table 1.

Preference for field or pasture was strikingly demonstrated by most species of lycosids. Only *Schizocosa avida* and *Pardosa saxatilis* "var. *atlantica*" were collected in approximately equal numbers in both environments. *Arctosa funerea* and *Lycosa antelucana* were taken only in the pasture. *Pardosa paucilla* and *Lycosa rabida* were taken somewhat more frequently in the pasture. *Lycosa punctulata*, *L. belluo* "var. *annexa*," *Pardosa saxatilis* s. s., *Pirata minutus*, P. n. sp. A, P. aff. *inularis*, and P. *sedentarius*, were collected only in the cotton field. *Pardosa milvina*, *Pirata sylvanus*, *Pirata* n. sp. B, and *Lycosa belluo* s.s. were many times more numerous in traps in the cotton field than in the pasture.

Erigonids appeared to prefer the cultivated field. *Grammonota inornata*, *Erigone autumnalis*, and *Walckenaera vigilax*, represented in both areas, were taken in greater numbers in the cotton field; and *Eperigone* aff. *tridentata*, E. *tridentata*, E. *maculata*, and *Floricomus* sp. were found only there.

Species of *Dictyna*, which usually build webs high on herbaceous plants, are not ordinarily taken in pitfall traps. *Dictyna segregata*, however, was fairly numerous in samples from the cotton field, although it was not taken in the pasture.

Several more species were far more common in collections from the pasture. The lynx spider, *Oxyopes* aff. *helius*, is the most unexpected of these, as members of this genus live mostly on foliage of shrubs and are taken by sweeping or plant examination, almost never in pitfall traps. Only very immature specimens of O. aff. *helius* had been taken previously in Arkansas, and then only by sweeping. *Meriola decepta*, a clubionid commonly living in ground litter, was more numerous in the traps in the cotton field, and the gnaphosid, *Drassyllus mephisto*, was more numerous in the traps in the pasture. The atypical linyphiid, *Tennesseellum formicum*, was collected only in the pasture.

Species of several families which might have been expected to give comparative data were useless, because no adults were found, and the immature forms are unidentifiable: *Clubiona*, agelenids, and theridiids. Identification of several species is tentative because of the poverty of taxonomic literature, limited collections, and incomplete knowledge of the fauna.

Discussion

Significant differences in the spider population of the ground stratum of these two concrete and adjacent communities (see Barnes, 1953; Barnes and Barnes, 1955) are apparent. Obviously, the data and collections are too limited to permit generalizations that would apply to similar abstract communities, where populations may be quite different. Also, dif-

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ferent results would be likely if the herbaceous, instead of the ground stratum, were examined. Preliminary sampling of the former by sweeping, showed a more numerous spider population in the pasture. In the ground stratum, the population of the cotton field appeared to be considerably larger. Populations of the two strata reflect a difference in their faunas. Sweepings of the herbaceous stratum collect web-builders, as *Tetragnatha labriciosa* Hentz, and hunting spiders living in foliage, including *Oxyopes salticus*, some salticids, thomisids, and clubionids as reported by Whitcomb, Exline, and Hunter (1963). Pitfall trap collections of the ground stratum, in contrast, contain spiders which live in litter, as *Meriola decepta*, and those which hunt most of their prey on the ground, including most lycosids and some gnaphosids. There is some overlapping: litter-inhabiting spiders are sometimes swept from foliage, and spiders of the herbaceous stratum are sometimes collected in pitfall traps.

Some differences noted in the spiders of the ground stratum of the pasture and cotton field may be explained by physical factors. Species of *Pirata* and the erigonids were found in considerably greater numbers in the cotton field, perhaps because the field is lower, and the soil therefore more moist.

The appreciable number of specimens of *Dictyna segregata* collected from traps in the cotton field was unusual for this genus. Most species of *Dictyna* live high on herbs and shrubs and are not usually trapped on the ground. However, Whitcomb, Exline, and Hunter (1963) reported that *D. segregata* was found close to the ground.

The tremendous quantity of specimens of *Pardosa milvina* collected in the cotton field, 472 specimens per 10 traps, compared to 1.5 specimens in the pasture, is unexplained except in terms of preference or food supply. *Lycosa helluo* also was many times more numerous in the traps in the cultivated field.

An interesting anomaly is noted in the occurrence of *Pardosa saxatilis* s. s. and *P. saxatilis* "var. atlantica," which usually are not separated taxonomically. *P. saxatilis* s. s. was taken only in the cultivated field; *P. saxatilis* "var. atlantica" was collected in approximately equal numbers in both environments.

TABLE 1. Comparison of spiders taken per 10 pitfall traps in ground stratum of pasture and adjacent cotton field near Morilton, Arkansas, 1962.

	Pasture	Cultivated Field
Dictynidae		
<i>Dictyna segregata</i> Gertsch & Mulaik	0.0	21
Linyphiidae		
<i>Meioneta micaria</i> (Em.)	0.0	1
<i>Meioneta</i> sp.	0.5	3

	Pasture	Cultivated Field
<i>Tennesseellum formicum</i> (Em.)	1.5	0
<i>Lepthyphantes</i> sp.	0.5	7
Erigonidae		
<i>Erigone autumnalis</i> Em.	1.5	30
<i>Eperigone tridentata</i> (Em.)	0.0	1
<i>Eperigone</i> aff. <i>tridentata</i> (Em.)	0.0	22
<i>Eperigone maculata</i> (Banks)	0.0	6
<i>Eperigone</i> sp.	0.5	1
<i>Ceraticelus</i> sp.	3.0	1
<i>Floricomus</i> sp.	0.0	1
<i>Grammonota inornata</i> Em.	20.5	32
<i>Walckenaera vigilax</i> (Blackwall)	1.0	6
Theridiidae		
<i>Latrodectus</i> sp.	0.5	0
<i>Theridion</i> sp.	0.0	2
Argiopidae		
<i>Pachygnatha tristriata</i> C. L. Koch	1.0	0
<i>Mimognatha foxi</i> (McCook)	0.5	3
Agelenidae		
<i>Agelenopsis</i> sp.	0.5	0
<i>Cicurina</i> sp.	1.5	0
Lycosidae		
<i>Schizocosa avida</i> (Walck.)	36.0	34
<i>Schizocosa</i> sp.	0.0	2
<i>Arctosa funerea</i> (Hentz)	2.0	0
<i>Lycosa rabida</i> Walck.	4.0	2
<i>Lycosa punctulata</i> Hentz	0.0	3
<i>Lycosa antelucana</i> Montgomery	7.0	0
<i>Lycosa helluo</i> Walck.	4.5	96
<i>Lycosa helluo</i> "var. <i>annexa</i> Ch. & Ivie"	0.0	13
<i>Pardosa saxatilis</i> (Hentz)	0.0	4
<i>Pardosa milvina</i> (Hentz)	1.5	472
<i>Pardosa pauxilla</i> Montgomery	38.0	24
<i>Pardosa saxatilis</i> "var. <i>atlantica</i> Em."	7.0	10
<i>Pirata minutus</i> Em.	0.0	3
<i>Pirata</i> n. sp. A.	0.0	2
<i>Pirata sylvanus</i> Chamb. & Ivie	0.5	22
<i>Pirata</i> aff. <i>insularis</i> Em.	0.0	1
<i>Pirata sedentarius</i> Montgomery	0.0	1
<i>Pirata</i> n. sp. B.	0.5	5
Oxyopidae		
<i>Oxyopes salticus</i> Hentz	1.0	0
<i>Oxyopes</i> aff. <i>helius</i> Chamb.	26.0	0
Gnaphosidae		
<i>Drassyllus creolus</i> Chamb. & Gertsch	0.0	1

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	Pasture	Cultivated Field
<i>Drassyllus mephisto</i> Chamb.	7.0	0
<i>Drassyllus</i> aff. <i>fallens</i> Chamb.	0.0	1
<i>Drassyllus</i> sp.	0.5	4
<i>Geodrassus</i> sp.	1.0	2
<i>Cylphosa sericata</i> (L. Koch)	4.5	0
<i>Zelotes laccus</i> (Barrows)	0.0	2
Clubionidae		
<i>Meriola decepta</i> Banks	2.5	16
<i>Castianeira descripta</i> (Hentz)	1.0	1
<i>Castianeira vulnerea</i> Gertsch	0.5	0
<i>Castianeira longipalpus</i> (Hentz)	0.0	2
<i>Castianeira</i> sp.	0.5	5
<i>Scotinella formica</i> (Banks)	1.5	0
<i>Clubiona abbotii</i> L. Koch	0.5	1
<i>Clubiona</i> sp.	1.0	12
Thomisidae		
<i>Xysticus texanus</i> Banks	1.5	2
<i>Xysticus auctificus</i> Keyserling	0.5	0
<i>Oxyptila</i> sp.	0.0	1
<i>Thanatus</i> sp.	1.0	0
Salticidae		
<i>Eris marginatus</i> (Walck.)	0.5	0
<i>Habronattus coronatus</i> (Hentz)	5.0	2
<i>Habronattus</i> sp.	1.0	2
<i>Sitticus floridanus</i> Gertsch & Mulaik	0.0	1
<i>Phidippus carolinensis</i> Peck. & Peck.	0.0	1

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