

Seasonal Diversity and Relative Abundance of Herbaceous Dwelling Crab Spiders in Smith County, Texas

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Introduction

Gertsch and Mulaik, in 1940, published the results of an eight year study of spiders in more than one hundred counties of Texas, finding that 38 of the 43 families known at that time to exist in America north of Mexico were represented in Texas. Vogel, collecting her bibliography in 1970, noted that most studies of spiders in Texas were made in the Big Bend area, the Lower Rio Grande area (especially Hidalgo and Cameron counties), and the areas immediately around Austin and Dallas. For many other regions, such as northeastern Texas, there is a complete void in the literature, and an overall paucity of faunistic studies of Texas spiders. A list of jumping spiders (Salticidae) from Wichita county (north central) was published by Carpenter in 1972. K. M. Brown (1974) reported a preliminary study of the spiders of Nacogdoches (eastern) and Woods and Harrel (1976) published on the spider populations of a southeast Texas rice field.

Of the 12 genera and 43 species of crab spiders (Families Thomisidae and Philodromidae) listed in Vogel's bibliography of Texas spiders, Brown's (1974) preliminary checklist of the spiders of Nacogdoches includes only 6 genera and 14 species of crab spiders. But two species of crab spiders are additions to Vogel's list. In 1977, Salmon and Horner, reporting on the aerial dispersion of spiders in North Central Texas, listed fourteen families of spiders. Of the ballooning spiders captured, the thomisids and philodromids were together the second most common of the family groupings; their immatures being most numerous in September and October. It is apparent from these studies that there is room for much more information on the spiders of Texas.

Several authors have reported phenologies for spiders. Hatley and MacMahon (1980) examined seasonal variation in spider community organization. They found that the number of spider species and the species diversity (H') had midsummer peaks; however, evenness (J') remained relatively constant through the seasons. Peck and Whitcomb (1978) found that the temporal distribution of adult activity demonstrated a shifting numerical dominance from species to

species through the seasons, as the adults of one species displaced those of another closely related species. Whether this is the pattern with crab spiders in northeastern Texas has not been examined. In this study we have identified crab spiders dwelling on herbaceous plants, collected in Smith County, Texas, and report a partial phenology with respect to their relative abundance and diversity.

Study Area

Tyler, which is in Smith County, Texas, is roughly halfway between Dallas, TX and Shreveport, LA. The county, in northeastern Texas, lies in the western part of the Austroriparian biotic province, very near the edge of the Texan biotic province (Blair, 1950). This is also the western boundary of the pine and hardwood forests of the eastern Gulf coastal plain (Dice, 1943). Bordered on the north by the upper Sabine River, the entire county is relatively flat and has an elevation of approximately 450 feet above sea level. The collecting sites were roadside fields, typically near wooded areas, that were not grazed. The flora of these fields was mostly comprised of plants in the families Gramineae and Compositae.

Materials and Methods

Sampling was done each season from 9 different sites throughout the county, one site being near the center of the county and the other 8 being distributed throughout. At each site 3 samples were taken with a sweep net for a total of 75 sweeps each season. Sampling began in the autumn of 1979 and ended in the summer of 1980. Samples were sorted and stored in 70% ethanol. Individual crab spiders were then identified with the aid of several taxonomic references (Dondale and Redner, 1978; Fitch, 1963; Gertsch, 1939; Kaston, 1948; Kaston, 1972; Levi *et al.*, 1968 and Shick, 1965). Those specimens that could not be identified to species were grouped according to morphological similarities and were numbered for each genus as species 1, species 2, etc. Juveniles and adults were grouped together, and though confidence in the identification of juveniles is low, the correspondence between juveniles and adults was treated alike for all samples. Relative abundance for each species during a particular season was calculated as the number of individuals of a species divided by the total number of individual crab spiders. Diversity was calculated using the Shannon-Weiner diversity index (H'). Evenness (J'), one aspect of diversity, was also determined. The indices were calculated after Brower and Zar (1977).

Results

Twenty-seven species representing eight genera of thomisids and philodromids were found to occur in Smith County. Figure 1 shows

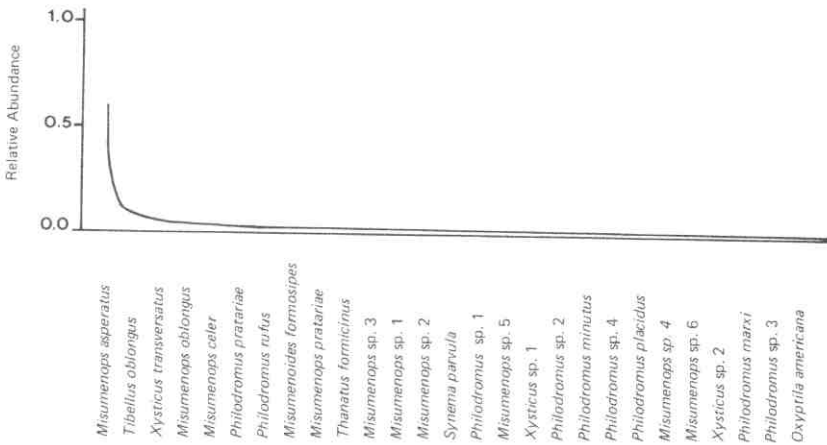


Fig. 1. Relative abundance curve over all seasons by species.

that there are few species represented by a large number of individuals and many species with a relatively small number of individuals. It was found that relative abundance varied considerably through the seasons (Table 1). The two most abundant crab spiders were *Misumenops asperatus* and *Tibellus oblongus*; a total of 387 and 54

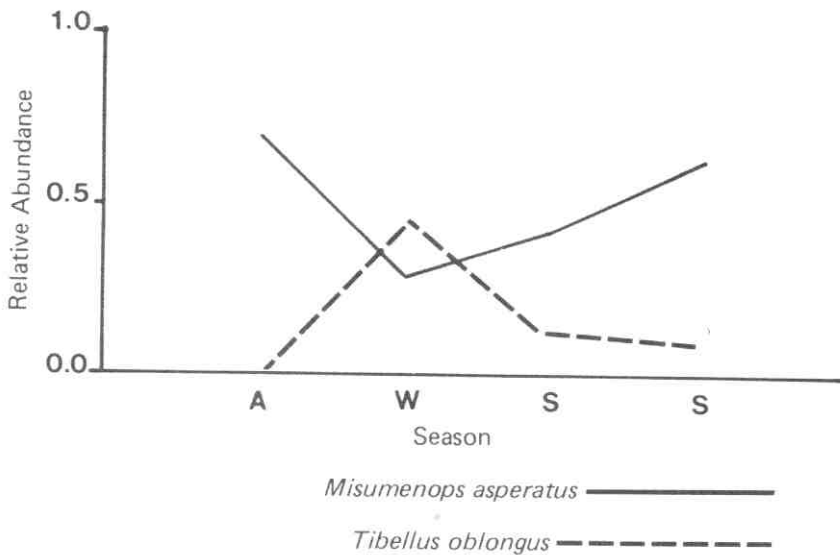


Fig. 2. Relative abundance of the two most frequently occurring species during the period between autumn 1979 and summer 1980.

Table 1. Relative abundance data for all species taken in Smith County, Texas, in the period between autumn 1979 and summer 1980.

	Season							
	A		W		S		S	
<i>Misumenops asperatus</i>	0.680	*(185)	0.282	(11)	0.419	(49)	0.617	(142)
<i>Misumenops celer</i>	0.015	(4)	0.000	(0)	0.154	(18)	0.009	(2)
<i>Misumenops oblongus</i>	0.088	(24)	0.026	(1)	0.026	(3)	0.022	(5)
<i>Misumenops pratariae</i>	0.022	(6)	0.000	(0)	0.026	(3)	0.009	(2)
<i>Misumenops</i> sp. 1	0.007	(2)	0.000	(0)	0.017	(2)	0.004	(1)
<i>Misumenops</i> sp. 2	0.015	(4)	0.000	(0)	0.009	(1)	0.000	(0)
<i>Misumenops</i> sp. 3	0.004	(1)	0.000	(0)	0.034	(4)	0.004	(1)
<i>Misumenops</i> sp. 4	0.000	(0)	0.000	(0)	0.000	(0)	0.004	(1)
<i>Misumenops</i> sp. 5	0.000	(0)	0.000	(0)	0.000	(0)	0.017	(4)
<i>Misumenops</i> sp. 6	0.000	(0)	0.000	(0)	0.009	(1)	0.000	(0)
<i>Misumenoides formosipes</i>	0.026	(7)	0.000	(0)	0.000	(0)	0.030	(7)
<i>Oxyptila americana</i>	0.000	(0)	0.000	(0)	0.009	(1)	0.000	(0)
<i>Philodromus marxi</i>	0.000	(0)	0.000	(0)	0.000	(0)	0.004	(1)
<i>Philodromus minutus</i>	0.000	(0)	0.000	(0)	0.017	(2)	0.000	(0)
<i>Philodromus placidus</i>	0.004	(1)	0.000	(0)	0.009	(1)	0.000	(0)
<i>Philodromus pratariae</i>	0.015	(4)	0.000	(0)	0.068	(8)	0.039	(9)
<i>Philodromus rufus</i>	0.026	(7)	0.128	(5)	0.017	(2)	0.009	(2)
<i>Philodromus</i> sp. 1	0.015	(4)	0.026	(1)	0.000	(0)	0.000	(0)
<i>Philodromus</i> sp. 2	0.004	(1)	0.026	(1)	0.000	(0)	0.004	(1)
<i>Philodromus</i> sp. 3	0.000	(0)	0.026	(1)	0.000	(0)	0.000	(0)
<i>Philodromus</i> sp. 4	0.000	(0)	0.051	(2)	0.000	(0)	0.000	(0)
<i>Synema parvula</i>	0.011	(3)	0.000	(0)	0.017	(2)	0.000	(0)
<i>Thanatus formicinus</i>	0.000	(0)	0.000	(0)	0.000	(0)	0.028	(9)
<i>Tibellus oblongus</i>	0.000	(0)	0.436	(17)	0.128	(15)	0.096	(22)
<i>Xysticus</i> sp. 1	0.000	(0)	0.000	(0)	0.000	(0)	0.017	(4)
<i>Xysticus</i> sp. 2	0.000	(0)	0.000	(0)	0.009	(1)	0.000	(0)
<i>Xysticus transversatus</i>	0.070	(19)	0.000	(0)	0.034	(4)	0.074	(11)

* (actual number of individuals collected per season)

individuals, respectively, were collected. These two species serve to illustrate the change that occurred during the study period. *M. asperatus* was most abundant in the summer, while *T. oblongus* peaked in the winter (Figure 2). This change in relative abundance is shown also in Figure 3, which indicates the relative abundance of only those crab spiders with 5% or more of a seasonal population. Crab spider diversity was greatest in the spring and least in the autumn (Figure 4). Evenness tended to be relatively constant throughout the seasons with autumn samples being only somewhat less even (Figure 5). Eight species were collected that had not been reported before in Texas: *Misumenops pratariae*, *Misumenoides formosipes*, *Oxyptila americana*, *Philodromus pratariae*, *P. rufus*, *Synema parvula*, *Tibellus oblongus*, and *Xysticus transversatus*.

