OBSERVATIONS ON THE CRAB SPIDERS (ARANEAE: THOMISIDAE) AT THE LAKE BIXHOMA RESERVOIR AND ADJACENT TULSA COUNTY

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Observations and distribution records for 16 species of crab spiders (Araneae: Thomisidae) representing six genera from Lake Bixhoma Reservoir in Wagoner County and adjacent areas in Tulsa County are reported. Five species, *Philodromus keyserlingi* Marx, *Philodromus praelustris* Keyserling, *Philodromus rufus* Walckenaer, *Tmarus angulatus* (Walckenaer), and *Xysticus pellax* O. P. Cambridge, are submitted as new state records.

INTRODUCTION

Since the original list of spiders in Oklahoma was published (1), most observations and reports on the spider fauna of the state have been from local areas, none of which are in the northeastern part of the state. An exception to this is the list of grassland spiders by Branson and Drew (2), who provided some records from this area. According to their report the current list of spiders from the state is nearing 300. Because of the size, physiographic variety, and climatic diversity in the state, we can assume that this is only about half the number of species that actually are resident in the state. The problems of collecting all species in an area may be demonstrated by the fact that only 11 of the previously reported 35 species of crab spiders were taken during this study although an additional five species are recorded. Our study covered a period of 13 months, from September 1974 through October 1975, and past experience indicates a minimum of five to ten years of consistent collecting in an area is required before a complete list can be approached. Consequently a great deal of work remains to be done on spider distribution in Oklahoma.

Lake Bixhoma Reservoir was chosen as the primary study area because of its accessibility and diversity of habitat. The lake serves as the city water supply for Bixby. It was formed in 1968 when an earthen dam 40 ft high was built on Mt. Ford Creek at the western edge of Wagoner County just a few hundred yards south of the Tulsa County line. The lake has 125 surface acres of water and the city of Bixby owns an additional 200 acres of land surrounding it. Other than the dam and spillways, the area may be characterized as a rocky, hilly, scrub oak forest. The woods slope down to the edge of the lake and in some areas, dead trees still stand in the water. Because of the fluctuating level of the water, there is a short zone of herbs and grasses around the edge of the water. On the back side of the lake there is a typical marsh with cattails and other marshy vegetation. The dam is covered by tall grasses with numerous flowering forbs scattered throughout. The dam is covered with large rocks on the lake side.

There is a great amount of human activity in the area, as it is a public fishing spot. It is rare to visit any time during the year without finding someone there. The wooded area is used for picnicking and hiking by various groups. A public park is currently proposed for the site. Part of the woods and dam cover was burned over in early spring of 1965, but none of these activities should have any great effect on the spider population.

During our study, representatives of most families of Oklahoma spiders were taken, but we concentrated on the crab spiders. Thomisids are wandering spiders that capture their prey by stealth. They do not construct snares, retreats, molting webs, nor hibernating webs. They may be found on and under the bark and leaves of trees, wandering over the forest floor, under rocks and in crevices, and on all types of foliage, particularly flowering plants and shrubs. Camouflage and protective coloration are highly developed in the family. Those species that are flower-dwelling are mostly white or yellow with red spotting patterns, while those living on tree bark or on the ground tend to be dark. Most species in this

family are colored so that they blend almost invisibly into the background, both giving them protection and enabling them to capture their prey.

METHODS

The common methods of collecting spiders (3) were used during the study. The most productive methods were sweeping with a muslin net and hand collecting. These techniques were used on each trip. Some Berlese samples were taken but no crab spiders were obtained by this method. Pitfall traps were set from mid-September to mid-December and checked weekly, but, because 1974 had a very wet fall, the results were not as good as expected. All spiders were preserved in 70% ethyl alcohol. Monthly visits were made to the area during the study with weekly or biweekly collections also made in summer and fall months.

Some time was also spent in observing the behavior of spiders associated with flowers. Notes on concealment, camouflage, and behavior were made and documented with color photographs.

DISCUSSION

A list of the species of Thomisidae collected during the study is given in Table 1. New state records are indicated by an asterisk. Large numbers of immature specimens were taken but not identified. All specimens were collected by the authors and are housed at Oral Roberts University except for a few specimens retained by Dr. Daniel Jennings.

Of the 13 genera of crab spiders in the U.S. (3), all but two (*Apollophanes* and *Ozyptila*) have now been recorded in Oklahoma. *Ozyptila,* because of its habit of living on the ground under dry leaves, may be more difficult to find by the general collector, but is almost certainly present in the state. It will be necessary to check all records and work out synonymies before an accurate count can be made, but there are now about 40 species of crab spiders reported from the state. Based on records from adjacent states and other distribution records, this is about 60-80% of the total that will eventually be reported.

It is difficult to explain why members of such common, flower-dwelling genera as *Misumena* and *Synema,* and the grass-dwelling genera *Tibellus* and *Ebo,* were not collected at the site in over a year. This is particularly true when *Tibellus duttoni* has been taken by sweeping grass within five miles of the lake (4, 5). Whether this is because of poor sampling techniques, spotty distribution, or variation in seasonal populations can only be guessed at this time. We would expect the more secretive *Coriarachne* and *Ozyptila* to be difficult to find.

TABLE 1. *Thomisid spiders collected during study.* (New state records are indicated by an asterisk.)

Species	Collection site[a]	Dates[b]	Frequency[c]
Misumenoides formosipes (Walckenaer)	1,2,3	27 July-29 Sept.	A
Misumenops celer (Hentz)	1,2,4	21 June-4 Oct.	A
Misumenops oblongus (Keyserling)	1	6 Aug.	R
**Philodromus keyserlingi* Marx	1,2	9-11 June	C
Philodromus marxi Keyserling	1,2,3	20 May-27 July	A
**Philodromus praelustris* Keyserling	2,3	27 Feb.-4 June	R
Philodromus pratariae (Scheffer)	1,2	21 Sept.-15 Oct.	A
**Philodromus rufus* Walckenaer	2	6 Apr.	R
Philodromus vulgaris (Hentz)	2	9 Mar.-14 Apr.	R
Thanatus rubicellus Mello-Leitao	2	21 June	R
**Tmarus angulatus* (Walckenaer)	1	24 May	R
Xysticus auctificus Keyserling	2	7 June	R
Xysticus ferox (Hentz)	1,2,3	21 Apr.-24 May	C
Xysticus funestus Keyserling	1,2	22 Sept.-2 Nov.	C
**Xysticus pellax* O.P. Cambridge	1,3	28 Sept.-11 Nov.	R
Xysticus texanus Banks	1,2	19-22 July	C

[a]—Collection sites are: 1—Lake Bixhoma, Wagoner Co.; 2—Bixby, Tulsa Co.; 3—Tulsa, Tulsa Co.; 4—Lake Keystone State Park, Tulsa Co.
[b]—Dates given are earliest and latest that mature specimens were taken during the year.
[c]—Frequency is designated as: A—abundant, more than 20 specimens collected; C—common, 3-19 specimens collected; R—rare, 1 or 2 specimens taken.

The flower-dwelling spiders were extremely abundant in late summer and early fall when the yellow and white flowers were in full bloom. Members of the genera *Misumena, Misumenoides,* and perhaps some *Misumenops* reportedly are able to change color (3, 5) depending on the color of the flower they are on. Their color pattern is also quite variable within the species. Most of our observations were of spiders on sunflowers. They were seen using mimicry, camouflage, and protective coloration in catching prey. When the color of the spider did not match that of the flower, the spider hid beneath a petal that was folded over and just the legs were visible. This was the characteristic attack position.

Some *Misumenoides formosipes* individuals depended on concealment for prey capture. Here the spider would be hidden down among the petals with the front two pairs of legs sticking up. To the human observer, the legs resemble the sepals of the flower. Other individuals with a red-spotted color pattern blended right in with the color of the flower. In this case, the spider sits on top of the flower with the legs in the attack position. After the spider has captured its prey, it moves back out of sight, either underneath the petals or on the lower side of the flower.

While field observations of behavior are very time consuming, they are extremely interesting. A great deal is yet to be learned about the activity of crab spiders resulting from the color, color patterns, and substrate upon which they are located. Some means of marking and relocating the spiders in different plots should give some interesting data on the behavior of flower-dwelling crab spiders. It is hoped that we will be able to make some of these observations later.

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