

# Survey of Spiders within Eastern Kentucky

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## ABSTRACT

Biodiversity is known to be the variation of living organisms comprising several levels, beginning from genes, then species, communities, then finally ecosystems. Biodiversity is crucial in maintaining ecological balance, boosting ecosystem productivity, and determining the quality of ecosystem services such as pest management in agriculture. Being aware of biodiversity's importance can also help with the prevention of continuous threats to biodiversity and be best prepared to manage conservation challenges. Typically, mammals, birds, and plants are used to assess biodiversity. However, spiders may be effective in indicating environmental change because they are taxonomically quite diverse, species fill a variety of ecological niches, and they are easy to trap. Spiders can also be very numerous and reflect the heterogeneity of their environment. We assessed spider biodiversity within Eastern Kentucky using pan traps, net hunting, and sifting leaf litter. We have collected a couple thousand spiders so far and identified spiders from 20 families, including Agelenidae (grass spiders), Antrodiaetidae (Folding door Spiders), Anyphaenidae (ghost spiders), Araneidae (orb-weaver spiders), Atypidae (pursue-web spiders), Clubionidae (sac spiders), Ctenizidae (trapdoor spiders), Dictynidae (mesh web spiders), Dysderidae (Woodlouse Spiders), Hahniidae (dwarf sheet spiders), Linyphiidae (money spiders), Lycosidae (wolf spiders), Oxyopidae (lynx spiders), Philodromidae (running crab spiders), Pholcidae (cellar spiders), Pisauridae (nursery-web spiders), Salticidae (jumping spiders), Tetragnathidae (long-jawed orb weaver spiders), Theridiidae (tangle-web spiders), and Thomisidae (crab spiders). Most spiders that were found are Wolf Spiders (Lycosidae) whereas Antrodiaetidae (folding door spiders) and Atypidae (pursue-web spiders) were very rare. We have also discovered 3 genera of tarantula cousins.

## INTRODUCTION

Biodiversity can most simply be defined as the assessment of species richness in a particular area. Taking a sample of a species from one area to represent the larger whole then identifying and numerating these organisms is precisely how biodiversity can be quantified. Sampling methods such as pan traps, net hunting, and leaf litter collections are keys to achieving this. Gathering these spiders and leafing through them to sort and identify begins the process of quantifying biodiversity. Logging biodiversity allows us to quantify the species that we already know, enabling us to acknowledge new species when they arise. Biodiversity provides us with insight into long term changes of species diversity, ecosystem constructs, and organismal existence. Spider biodiversity is crucial to an ecosystem because of the role that spiders play in their ecosystems. Spider biodiversity provides many benefits in an ecosystem, with the most documented benefit coming in the form of the mutualistic relationship they share. A spider's environment provides it with an ever-present food source and the spider provides the environment with ecosystem quality through pest control. The importance of biodiversity can be expressed in many ways as the definition of biodiversity changes; however, one fact remains true in all cases: biodiversity is important.

## MATERIALS AND METHODS

Our methods of collection included pan trapping, net hunting, and leaf litter sampling. We utilized both brown and yellow pan traps in order to collect spiders roaming on the ground. Insect nets were used to capture spiders that were unlikely to go into the pan traps or to be found in leaf litter samples. Finally, leaf litter, a mixture consisting of leaves, twigs, and pieces of bark that have fallen to the ground, was collected and sifted through. In identifying spiders by family, we utilized microscopes and forceps.

## RESULTS

Although only 13 are pictured below, we found 20 spider families. We did not include the least common families of: Agelenidae, Antrodiaetidae, Anyphaenidae, Araneidae, Clubionidae, Ctenizidae, Dictynidae. All pictures of spiders are from Bugguide.net

### Atypidae (Purse-web spiders)

These include 8 species within the United States. They can be up to 30 mm long with tarantula-like mygalomorph abdominal tergites and six spinnerets. They are named for the large "purse web" they build.



### Dysderidae (woodlouse spider)

These include only one species located in the US. Females are larger than males with a size ranging from 11–15 mm, in contrast to males that are 9–10 mm. The color of their abdomen is a shiny pale beige to yellow-green while their cephalothorax and legs are usually orange to dark-green colored. These spiders are known to have long fangs which they use for piercing and always hang out where woodlice might appear and hunt at night rather than spinning their webs to catch prey.



### Hahniidae (Dwarf Sheet/ Comb-tailed spider)

These include 19 species located in the US. Their size range is 1-4 mm. Its 6 spinnerets are arranged in a transverse row where the last segment is longer than the others. They are known to build very delicate webs to the point of being difficult to spot unless they have few.



### Linyphiidae (Sheet/ Money Spiders)

These boast over 1000 species within the United States. These spiders are typically identified by their black bodies, and their long, slender brown legs. These spiders are expert web weavers.



### Lycosidae (wolf spiders)

These include more than 200 species within the United States. They range 10-40 mm in size and are typically identified by their hairy brown and gray bodies. They hunt using small, hidden holes they attack their prey from.



### Oxyopidae (lynx spiders)

These include 20 species within the United States. They have high carapaces, distinctive eyes, and are bright in color. They are diurnal and nocturnal hunters where some species are active during both day and night.



### Philodromidae (running crab spiders)

These include 92 species within the United States. They range from 4.5-10 mm in size and have flat bodies. They are known to be fast runners; thus, they chase their prey down, bite it to inject venom, and then consume it when it becomes convenient.



### Pholcidae (cellar spiders)

These include 49 species within the United States. Their size range is 6-8 mm, females being larger than the males. They have long and thin legs, with flexible tarsi. They spin large, loose, three-dimensional webs that are not sticky and use them as a prey detection system.



### Pisauridae (nursery-web spiders)

These include only four species within the United States. Their size range is 7-24 mm and rest with their legs flattened on the substrate and carry their egg sacs by means of their jaw and pedipalps. They can walk on still bodies of water and may dive beneath the surface to escape enemies.



### Salticidae (jumping spiders)

These include about 350 species within the United States. They range 2-15 mm in size and have anterior median eyes that are quite large, giving them excellent color vision and high degrees of resolution. They hunt by jumping and bouncing on their prey.



### Tetragnathidae (long-jawed orb weaver spiders)

These include about 15 species within the United States. Their size is 3.5-25 mm and are typically identified by their long jaws, reboarded labium, cheliceral margins with stout teeth, colulus, and epigastric furrow strongly procurved. They're well camouflaged and spin orb webs that are loosely woven and built over water.



### Theridiidae (tangle-web spiders)

These include about 13 species within the United States. They range 1-11 mm in size and have a globular shaped abdomen with spinnerets placed ventrally rather than posteriorly. They utilize their small jaws in making small holes in the prey and vomit their digestive fluid into the prey's body.



### Thomisidae (crab spiders)

These include over 200 species within the United States. They're flat bodied, have two claws, and their front two pairs of legs are longer and thicker than back two. Species ambush their prey, mainly insects, sometimes holding still and relying on their camouflage, and sometimes running quickly.



## DISCUSSION

We found that spiders are numerous and diverse in Eastern Kentucky. This study also indicates the correlation of spiders with biodiversity and how essential they are in maintaining a good environment. We are continuing to sort and identify spiders from Eastern Kentucky right now. We are attempting to find more mature males, which will be much easier to identify as opposed to immature males or females.

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