

Casting a Sticky Trap:

SPIDERS

and Their Predatory Ways

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Eating insects and other small arthropods is what spiders do for a living. That spiders are an enormously successful group of animals is testimony to how efficient they are at catching their prey. Most insects move swiftly and, for their size, are quite powerful. "For spiders to capture such prey, they have, as a group, developed an impressive arsenal of weapons and a variety of strategies.

Except for one small family (Uloboridae), all spiders in Illinois have venom for killing or paralyzing their insect prey. The spider seizes the insect using mouthparts called chelicerae and injects the venom through hollow cheliceral fangs.

Many spiders also rely heavily upon silken snares or webs to entangle and render helpless various flying insects. Webs take many different forms, but all are constructed of a scleroprotein of remarkable strength and elasticity. Silk is produced as a liquid in special abdominal glands and is drawn out as threads from appendages called spinnerets located at or near the end of the abdomen.

Of the many web forms, there are a few that are of particular interest in Illinois. The long-legged cellar spider (*Pholcus*) spins a loose, irregular web in corners of dark basements or outhouses. The common house spider (*Achaearanea*) spins a similar web. In addition to an irregular maze of threads, the grass spider (*Agelenopsis*) makes a horizontal platform with a funnel-like retreat at one end in which it hides, waiting for an insect to fall upon the platform. The crowning achievement of engineering in web construction is the familiar two-dimensional symmetrical orb web of the garden spider (*Argiope*) and its many relatives. The typical orb web incorporates a close spiral of

sticky silk, capable of trapping and holding even relatively large and powerful insect prey. Damage to the orb caused by wind or struggling prey can be quickly repaired, or the entire can be web taken down and replaced. Many orb weavers replace their tattered web with a new one every day.

Other spiders do not utilize webs for prey capture. Crab spiders, perfectly camouflaged against their background, lie in wait on flowers or on the bark of trees to ambush unsuspecting insects. Wolf spiders, fisher spiders, and jumping spiders are keen-sighted hunters that actively search for their prey.

Still other spiders exhibit rather bizarre or unique methods of capturing prey. Among the spiders known to occur in Illinois are *Sphodros atlanticus* (purse web spider), *Mastophora bisaccata* (bolas spider), *Mimetus puritanus* (pirate spider), and *Scytodes thoracica* (spitting spider). All of these spiders have quite interesting prey procurement techniques.

Rather formidable-looking, the purse web spider is related to the large hairy tarantulas and trapdoor spiders. She excavates a long burrow in the soil at the base of a tree and lines the burrow with silk. The silken lining is extended up the side of the tree as a tube, or "purse," for a distance of about ten inches (fig. 1). The spider takes her position inside the burrow just below soil level. If an insect chances to walk across the aerial part of the tube, the spider senses the vibrations, rushes

to the spot, and impales the insect with its long chelicerae. First using her mouthparts to cut a small slit in the tube, the spider then pulls the insect inside. After her meal, the spider repairs the tear in the tube, resumes her position below ground, and awaits the next victim.

Mastophora, the bolas spider, is a member of the family Araneidae, the typical orb weavers. This small spider has abandoned the practice of orb web construction altogether. Nonetheless, silk plays a prominent role in its prey procurement. *Mastophora* is a nocturnal hunter, spending the daylight hours clinging to a tree branch. In the evening, she moves to the tip of a twig and fastens both ends of a silken line to the twig.

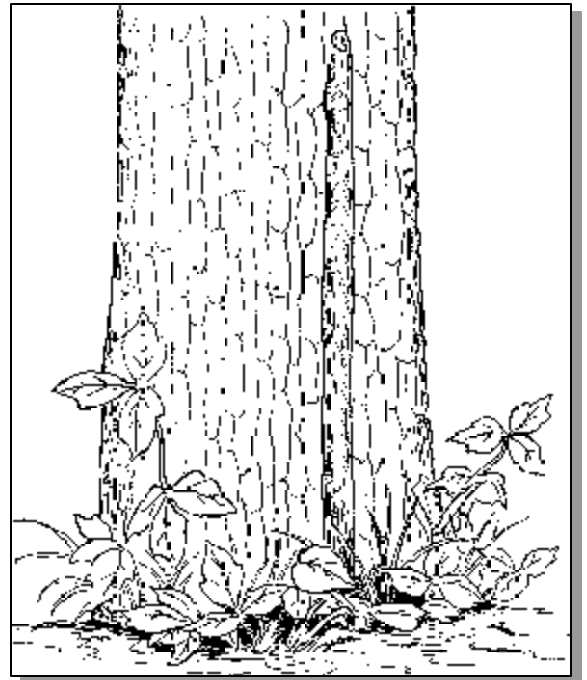


Figure 1. Purse web of *Sphodros* against a tree trunk

She then spins out a short thread that remains attached to her spinnerets, combing out viscid material with her hind legs that accumulates as large drop of glue at the tip of the thread to form a casting line or bolas. Hanging by the hind legs of one side of her body from the trapeze line attached to the twig, she grasps the casting line by a front leg in anticipation of the approach of a night-flying moth (fig. 2). When a moth comes near, the spider swings the bolas line so that the sticky tip strikes the body or wing of the victim. Arrested by the viscid, elastic thread, the moth struggles in vain to escape, and the spider quickly draws in her line and administers a venomous bite. The moth is soon paralyzed and enswathed in sheets of silk, after which the bolas spider enjoys a leisurely meal. One may wonder if the success of the bolas spider in capturing moths is attributable solely to its patience in waiting for a moth to come near enough or if other forces are at work. Evidence strongly suggests that the spider produces a volatile chemical that serves as an olfactory attractor. The chemical probably mimics the sex pheromone produced by female moths, since the prey of the bolas spider are always male moths.

Mimetus, the pirate spider, builds no web to snare prey. This strange little spider is sluggish and has poor eyesight, seemingly ill equipped to capture prey without the aid of a web. Remarkably, the pirate spider has adopted the practice of warily invading the web of another spider with the aim of killing and devouring the occupant. The spiders upon which *Mimetus* most often preys are orb weavers and comb-footed spiders (relatives of the black widow). Apparently, once the pirate spider has stealthily entered its victim's silken domain, it may lure the resident spider closer by shaking the web to simulate a captured insect. The aroused occupant rushes to dispatch its supposed prey, only to be met by the nefarious *Mimetus*. A row of long spines on each front leg (fig. 3) aids in grasping the

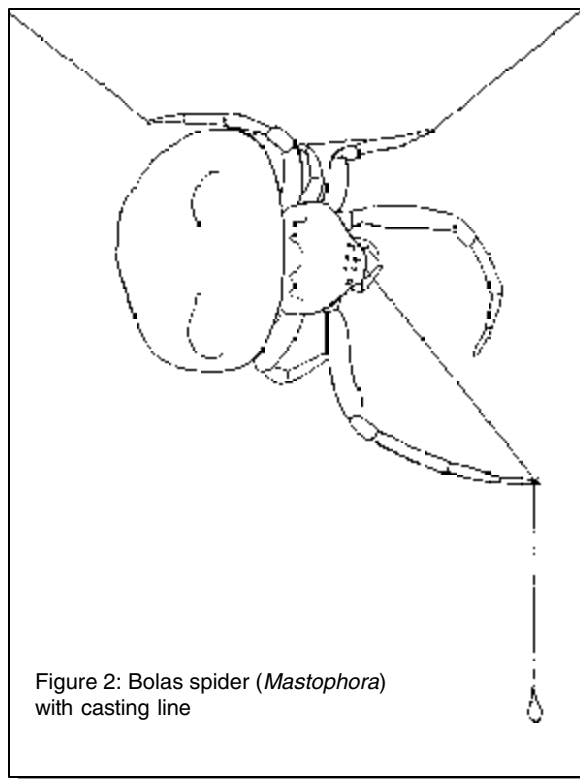


Figure 2: Bolas spider (*Mastophora*) with casting line

prey's legs. Then a bite by the intruder to the front leg of its victim introduces a quick-acting venom. Almost immediately, the bitten spider succumbs and is then fed upon by the pirate. The pirate spider's strategy is a dangerous one, however, because occasionally its intended victim turns the tables and succeeds in making a meal of the pirate spider.

Perhaps the strangest method of prey capture by spiders is that exhibited by *Scytodes*, the spitting spider. This is a small yellow spider with black spots. *Scytodes* may be found in houses, where it comes out at night to search for small insects. If a suitable prey animal comes within a short distance of the spider (usually a half inch or so), the spider's body convulses and a jet of gummy material is emitted from each chelicera (fig. 4). As the twin streams of gum are ejected, the chelicerae oscillate rapidly, causing the lines of gum to cover the victim's body in a zigzag pattern. The insect is thus glued securely to the substrate, and the spider walks forward and administers the *coup de grace*. After the victim's struggles cease, it is disentangled from the gum and eaten.

Scientific studies by many investigators reveal that spiders are present in all terrestrial communities in enormous numbers, and the effect of their predatory activities must be very significant. Their predation techniques, ranging from the mundane to the bizarre, have become highly specialized and efficient. Since spiders take all sorts of insect prey—beneficial and pest species alike—it is debatable whether spiders on the whole are beneficial, harmful, or neutral from a human vantage point. In either case, many people find that the patient study of the behaviors of these fascinating creatures can be a source of constant amazement and delight. 🕷️

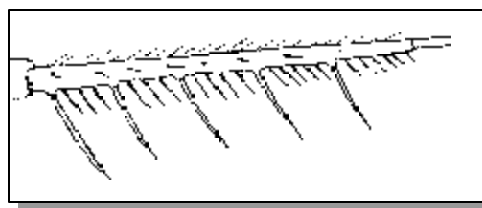


Figure 3. *Mimetus* front leg (metatarsus), showing spines

Editor's Note: For further reading see Bennett Moulder's book, *A Guide to the Common Spiders of Illinois*, Illinois State Museum Popular Science Volume X, 1992.

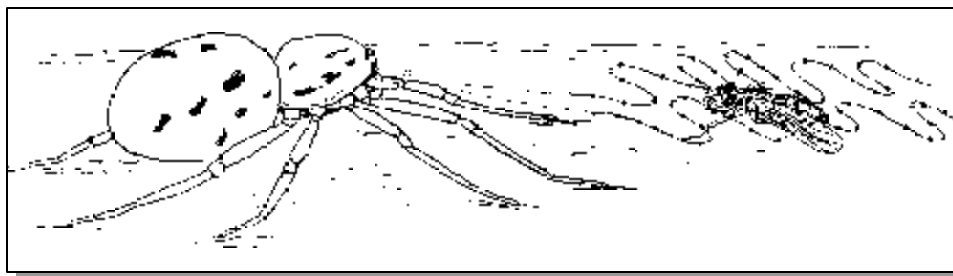


Figure 4. Spitting spider (*Scytodes*) and prey held down by twin jets of gum