

## Virtual Creature Festival: Brown Recluse

*Get to know some of New Jersey's spine-tingling spiders.*

Like the black widow, the brown recluse spider seeks out the dark recesses of basements, attics, sheds, old brush piles, and dry wood stacks. Spider lore has it that these eight-legged creatures lurk in the shadows for the sole purpose of attacking and poisoning their victims with necrotic venom. Even though they can embed their fangs and inject venom into bare skin, brown recluses (*Loxosceles reclusa*) are a much maligned and severely misunderstood arachnid.



*The dark violin marking on the cephalothorax is an identifiable feature of the brown recluse spider*

The brown recluse shies away from daylight not because it is a vampire, but because it is a nocturnal hunter that surprise attacks insects like cockroaches and crickets, and even other spiders. It hides in small, camouflage sheet webs and lunges at unsuspecting prey. When it catches a soft-bodied insect, it inserts its fangs or chelicerae, injecting venom. It then retreats and waits for the poison to paralyze and liquefy its prey. When the prey is immobile and unable to defend itself, the spider returns and slurps it up. When food is scarce, the spider will scavenge dead insects, but it can survive for a long time without eating if it has a cool dry place in which to wait.

Contrary to tales of terror, brown recluse spiders don't crawl into your bed and lurk under your covers waiting to attack you on purpose. Their fangs are too short and flimsy to pass through bedding or pajamas and most bites through human skin occur completely by accident. Biting is a last-ditch response to avoid being smushed when people roll over on them in the night or slip on a shoe the spider has moved into. If possible, they will just run away.

An adult brown recluse has a dark brown to tan colored body that measures about  $\frac{1}{4}$  to  $\frac{1}{2}$  inch-long, not including its legs. With its legs extended, it's about the size of a quarter. The most distinctive characteristic of this spider is the violin, or fiddle, shaped mark on the spider's back with the neck of the violin pointing away from the head. Other common names of the brown recluse are fiddleback spider, brown fiddler, or violin spider. Unlike most other spiders, which have eight eyes, the brown recluse has only six. Recluse spiders have six eyes arranged in pairs (dyads) with one middle and two side pairs. Counting the eyes of a live venomous spider is no easy task however so best not to try this at home!



*Brown recluse has 3 pairs of eyes instead of 8 like most spiders*

Adult brown recluses are rare in New Jersey as they are a predominantly southern and midwestern species. They live for 1-2 years with adult females mating only once to produce eggs throughout her entire life. She makes several egg sacs during a season (from spring to summer) with each off-white silken egg sac contain 40 to 50 eggs. When the eggs hatch, the tiny spiderlings gradually increase in size, molting five to eight times before becoming adults. The molted skins of the brown recluse have a legs-outstretched appearance and can be useful in confirming their presence.



During daylight hours, brown recluse spiders hang out in dark, secluded areas and line their daytime hideouts with irregular sheets of silk webbing. Adult females seldom venture far from their dark retreat, whereas males and older juveniles are more mobile and tend to travel farther. This is how the spiders can wander into shoes, clothing or bedding at night and bite people when they become trapped against the skin.

Rarely deadly, a brown recluse bite can be nasty. Usually within 6 hours of being bitten, the skin may become very swollen and painful. Blisters and bruising occurs with the skin becoming purple around the bite, and eventually turning black as the skin cells die. Not every bite is as bad as this, and some bites have no venom at all. Some people think that they have been bitten by a spider when in fact they have a skin disease, infection, or a bite from another type of insect. Always wear gloves and long sleeves when working in dark corners of your home, or yard just to be safe!

### **Studying Spider Webs**

Brown recluse spiders are night hunters and catch their prey and paralyze them by injecting venom into the prey with the spider's soft fangs. Many more spiders catch their prey by using sticky woven webs to entangle prey, so they are immobilized before they eat them. Here's an activity to observe spider webs and appreciate the monumental effort involved in making these traps.

### **Materials**

- Measuring tape
- Notebook or paper
- Pencil
- At least 100-foot spool of string
- Tape



### Activity 1: Observe Spider Webs

1. Head outside to your backyard or nearby nature trail.
2. Look carefully in tall grasses or bushes to find spider webs.
3. Measure the width and height of each web you find. Count how many threads cross through the center of the web and how many threads attach the web to the shrub.
4. Recording your findings in your notebook.
5. Can you find the spider who made this web? Are there any insects trapped in the web? Remember not to touch or disturb them.
6. Make sketches of the webs -- and the spiders, if you spotted any.
7. If you saw a spider, measure or guess the length of the spider. Measure the width of the web. How much larger is the web than the spider? For example, if the spider you observed is 1 inch tall and the web is 10 inches wide and 10 inches tall, the web is 10x larger than the spider. Record your measurements of webs you observe as well as the spiders if you see them. How many times larger is the web than the spider you observe?
8. If you don't see a spider, guess the length of the spider that made the web.
9. In many cases, the web may be 10, 20 or many times larger than the spider! Could you weave a web that 10 times larger than your height? Let's try it!

### Activity 2: Build a Human-sized Spider Web

1. Study your notebook web sketches and review the measurements or guesses you made.
2. If you had to build a web like a spider, how big would it be? How wide and tall would it be compared to your height? An example is to multiply your height in feet times ten. For instance, if you are 5 feet tall, then the height and width of the web would be 50 feet wide and 50 feet tall!
3. Now find a big open space outside, like a playground or ball field where you want to build your web. Remember, you're going to need a lot of room!
4. Take your string and tape the end to a tree, shrub, fence, or something on the ground.
5. Unravel your string until you have measured out 50 feet of yarn or string. This is your anchor line.
6. Now try to mimic the patterns of the spider webs you studied. Continue to lay the string in a pattern that looks like a spider web. Do this until you have made a model of a web or you run out of string. How similar does your human sized web look to the real thing?
7. If you don't have enough string, then make smaller replicas or just one the size of the webs you observed in the field.
8. Appreciate the effort that goes into making a web!

Activities adapted from <https://www.education.com/science-fair/article/spider-science/>

### How do Spiders Create Their Webs?

A spider creates its web by attaching a sticky end of silk to a surface and releasing a single thread, just like you did. This is the anchor line for the web. Once the sticky end attaches to something, the spider will attach the other end to another surface. Then the spider does something you can't do. It walks across the thread. From there it begins releasing more threads in different patterns depending on



what kind of web it will be. Different species of spiders spin different shaped webs. Many are oval or circular in shape, but all webs have a mixture of non-sticky threads and sticky threads that make up the larger pattern. Learn how an orb weaver spider spins its web [here!](#)

Spiders are born with the ability to spin silky spider web threads that can either be sticky or non-sticky. While their tiny legs walk along the non-sticky threads, the sticky threads are used to trap prey like insects or even other spiders. If only we could spin webs and catch our own breakfast!

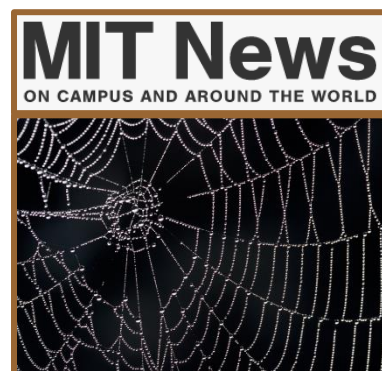
### Additional Resources

- [Brown Recluse Spider](#)
- [Brown recluse Spider](#)
- [Spider Facts](#)
- [Poisonous Spiders of New Jersey](#)
- [How Do Spiders Make their Webs](#)

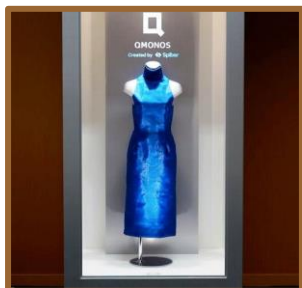
### Extensions

#### Spider Webs, Networked Systems and Earthquakes

A study from the Massachusetts Institute of Technology determined that spider webs achieve their strength because of the silk itself, but also because of their ability to accommodate stretching; the web as a whole structure also helps to resist damage. Read more in this MIT News Office article about how this research is supported by the Office of Naval Research, the National Science Foundation, [Army Research Office and MIT - Italy Program](#) and may have far reaching application including earthquake resistant buildings, networked systems or the electric grid.



## Dressed to Kill?



CNET, a new group focused on technological advances, covered QMONOS, a lightweight artificial spider silk that could potentially be mass produced and used in car parts, artificial blood vessels and even the fashion industry. A Japan-based company called Qmonos (from *kumonosu*, or “spider web”, in Japanese) created an electric-blue stretchy and super strong cocktail dress, entirely out of synthetic spider silk that they call “Spiber”! Read more [here](#).

## Questions to Consider

- ✦ Would you wear a Qmonos type garment? Why or why not?
- ✦ What would it be and why? What function would a (shirt, hat, gloves, pants etc.) made from this material allow you to do?
- ✦ Design, create and illustrate your idea.

## Looking for a Language Arts Connection to Recluse Spiders?

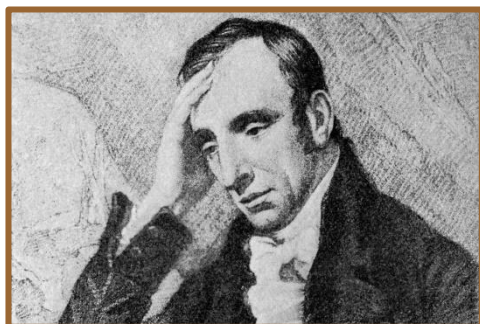


Image courtesy of the Lebrecht Music and Arts  
Photo Library/Alamy Stock Photo

Investigate the word, “recluse” and you will find references to [Poet Laureate, William Wordsworth](#), (1770-1850). According to the Poetry Foundation and Kenneth R Johnson (ed. Stephen Gill) of Lincoln College, Oxford University, Wordsworth had planned an epic poem to be called [The Recluse](#). Although incomplete, the initial stage of the writing was published under the name of *The Excursion* (1814).

## [NJ Student Learning Standards](#)

For more information about the many interdisciplinary connections that can be made when teaching about the brown recluse spider, including how this spider can be impacted by climate change, contact Kate Reilly Manager of Education, Duke Farms at [kreilly@dukefarms.org](mailto:kreilly@dukefarms.org).

With the tremendous research about spider silk, it’s a perfect opportunity to bridge the natural sciences with engineering projects, visual arts, career readiness, fashion design, and more.