

Brown recluse spider

The **brown recluse**, *Loxosceles reclusa*, *Sicariidae* (formerly placed in a family "Loxoscelidae") is a recluse spider with a necrotic venom. Similar to other recluse spider bites, their bite sometimes requires medical attention. The brown recluse is one of three spiders (the others being *black widow* and *Loxosceles laeta*, the Chilean recluse) with medically significant venom in North America.

Brown recluse spiders are usually between 6 and 20 millimetres (0.24 and 0.79 in), but may grow larger. While typically light to medium brown, they range in color from whitish to dark brown or blackish gray. The cephalothorax and abdomen are not necessarily the same color. These spiders usually have markings on the dorsal side of their cephalothorax, with a black line coming from it that looks like a *violin* with the neck of the violin pointing to the rear of the spider, resulting in the nicknames **fiddleback spider**, **brown fiddler**, or **violin spider**.

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Description



The brown recluse.

The violin pattern is not diagnostic, as other spiders can have similar markings (e.g. *cellar spiders* and *pirate spiders*). For definitive identification it is imperative to examine the eyes. While most spiders have eight eyes, recluse spiders have six eyes arranged in pairs (dyads) with one *medial* pair and two *lateral* pairs. Only a few other spiders have three pairs of eyes arranged in this way (e.g., *scytodids*). Recluses have no obvious coloration patterns on the abdomen or legs, and the legs lack spines.^[2] The abdomen is covered with fine short hairs that, when viewed without magnification, give the appearance of soft fur. The leg joints may appear to be

Brown recluse



Scientific classification

Kingdom:	Animalia
Phylum:	Arthropoda
Subphylum:	Chelicerata
Class:	Arachnida
Order:	Araneae
Infraorder:	Araneomorphae
Family:	Sicariidae
Genus:	<i>Loxosceles</i>
Species:	<i>L. reclusa</i>

Binomial name

Loxosceles reclusa
Gertsch & Mulaik, 1940^[1]



Synonyms^[1]

- *Loxosceles reclusus*
orthographic variant



The brown recluse has three pairs of eyes, unlike most spiders.

a slightly lighter color

Life-cycle

Adult brown recluse spiders often live about one to two years. Each female produces several egg sacs over a period of two to three months, from May to July, with approximately fifty eggs in each sac. The eggs hatch in about one month. The spiderlings take about one year to grow to adulthood. The brown recluse spider is resilient and can tolerate up to six months of extreme drought and scarcity or absence of food. On one occasion, a brown recluse survived in controlled captivity for over five seasons without any food at all.^[3]

Behavior

A brown recluse's stance on a flat surface is usually with all legs radially extended. When alarmed it may lower its body, withdraw the forward two legs straight rearward into a defensive position, withdraw the rearmost pair of legs into a position for lunging forward, and stand motionless with pedipalps raised. The pedipalps in mature specimens are dark and quite prominent and are normally held horizontally forward. When threatened it usually flees, seemingly to avoid a conflict, and if detained may further avoid contact with quick horizontal rotating movements or even resort to assuming a lifeless pose (playing dead). The spider does not usually jump unless touched brusquely, and even then its avoidance movement is more of a horizontal lunge rather than a vaulting of itself entirely off the surface. When running, the brown recluse does not leave a silk line behind, which would make it more easily tracked when it is being pursued. Movement at virtually any speed is an evenly paced gait with legs extended. When missing a leg or two it appears to favor this same gait, although (presumably when a leg has been injured) it may move and stand at rest with one leg slightly withdrawn. During travel it stops naturally and periodically when renewing its internalhydraulic blood pressure that, like most spiders, it requires to renew strength in its legs.

Habitat

Brown recluse spiders build asymmetrical (irregular) webs that frequently include a shelter consisting of disorderly thread. They frequently build their webs in woodpiles and sheds, closets, garages, plenum spaces, cellars, and other places that are dry and generally undisturbed. When dwelling in human residences they seem to favor cardboard, possibly because it mimics the rotting tree bark which they inhabit naturally. They have also been encountered in shoes, inside dressers, in bed sheets of infrequently used beds, in clothes stacked or piled or left lying on the floor, inside work gloves, behind baseboards and pictures, in toilets, and near sources of warmth when ambient temperatures are lower than usual. Human-recluse contact often occurs when such isolated spaces are disturbed and the spider feels threatened. Unlike most web weavers, they leave these lairs at night to hunt. Males move around more when hunting than the females, which tend to remain nearer to their webs. The spider will hunt for firebrats, crickets, cockroaches, and other soft-bodied insects.



Brown recluse on cardboard box.

Distribution

The range lies roughly south of a line from southeastern Nebraska through southern Iowa, Illinois, and Indiana to southwestern Ohio. In the southern states, it is native from central Texas to western Georgia and north to Kentucky.^{[4][5]}

Despite rumors to the contrary, the brown recluse spider has not established itself in California or anywhere outside its native range.^[6] This directly contradicts numerous sensationalized media reports of bites occurring where these spiders are absent (and no specimens were found), such as a 2014 report from Thailand, where a man was claimed to have died from a brown recluse bite.^[7]

Over the last century, occasional spiders have been intercepted in various locations where they have no known established populations; these spiders may be transported fairly easily, though the lack of *established* populations well outside the natural range also indicates that such movement has not led to colonization of new areas, after decades of opportunities.^{[8][9]} Note that the occurrence of brown recluses in a single building (such as a warehouse) outside of the native range is not considered a successful colonization; such single-building populations can occur (e.g., in several such cases in Florida),^[10] but do not spread, and can be easily eradicated.^[11]



A large brown recluse compared to a US penny (diameter 0.75 inches, 19.05mm)

There are other species of the genus *Loxosceles* native to the southwestern part of the United States, including California, that may resemble the brown recluse, but these species have never been documented as medically significant. The number of "false positive" reports based on misidentifications is considerable; in a nationwide study where people submitted spiders that they thought were brown recluses, of 581 from California only 1 was a brown recluse—submitted by a family that moved from Missouri and brought it with them (compared to specimens submitted from Missouri, Kansas, and Oklahoma, where between 75% and 90% were recluses).^[12] From this study, the most common spider submitted from California as a brown recluse was in the genus *Titiotus*, whose bite is deemed harmless. A similar study documented that various arachnids were routinely misidentified by physicians, pest control operators, and other non-expert authorities, who told their patients or clients that the spider they had was a brown recluse when in fact it was not.^[13] Despite the absence of brown recluses from the Western U.S., physicians in the region commonly diagnose "brown recluse bites", leading to the popular misconception that the spiders inhabit those areas.^[14]

Bite

The bite frequently is not felt initially and may not be immediately painful, but it can be serious. The brown recluse bears a potentially deadly hemotoxic venom. Most bites are minor with no necrosis. However, a small number of brown recluse bites do produce severe dermonecrotic lesions (i.e. necrosis); an even smaller number produce severe cutaneous (skin) or viscerocutaneous (systemic) symptoms. In one study of clinically diagnosed brown recluse bites, skin necrosis occurred 37% of the time, while systemic illness occurred 14% of the time.^[15] In these cases, the bites produced a range of symptoms common to many members of the *Loxosceles* genus known as loxoscelism, which may be cutaneous and viscerocutaneous. In very rare cases, bites can even cause hemolysis—the bursting of red blood cells.^[16]

As suggested by its specific epithet *reclusa* (recluse), the brown recluse spider is rarely aggressive, and bites from the species are uncommon. In 2001, more than 2,000 brown recluse spiders were removed from a heavily infested home in Kansas, yet the four residents who had lived there for years were never harmed by the spiders, despite many encounters with them.^{[17][18]} The spider usually bites only when pressed against the skin, such as when tangled within clothes, towels, bedding, inside work gloves, etc. Many human victims report having been bitten after putting on clothes that had not been worn recently, or had been left for many days undisturbed on the floor. The fangs of the brown recluse are so tiny they are unable to penetrate most fabric.^[19]

Around 49% of brown recluse bites do not result in necrosis or systemic effects. When both types of loxoscelism do result, systemic effects may occur before necrosis, as the venom spreads throughout the body in minutes. Children, the elderly, and the debilitated may be more susceptible to systemic loxoscelism. The systemic symptoms most commonly experienced include nausea, vomiting, fever, rashes, and muscle and joint pain. Rarely, such bites can result in hemolysis, thrombocytopenia, disseminated intravascular coagulation, organ damage, and even death.^[20] Most fatalities are in children under the age of seven^[21] or those with a weak immune system.

While the majority of brown recluse spider bites do not result in any symptoms, cutaneous symptoms occur more frequently than systemic symptoms. In such instances, the bite forms a necrotizing ulcer as the result of soft tissue destruction and may take months to heal, leaving deep scars. These bites usually become painful and itchy within 2 to 8 hours. Pain and other local effects worsen 12 to 36 hours after the bite, and the necrosis develops over the next few days.^[22] Over time, the wound may grow to as large as 25 cm (10 inches). The damaged tissue becomes gangrenous and eventually sloughs away

Misdiagnosis

There is now an ELISA-based test for brown recluse venom that can determine whether a wound is a brown recluse bite, although it is not commercially available and not in routine clinical use. Clinical diagnoses often use Occam's razor principle in diagnosing bites based on what spiders the patient likely encountered and previous similar diagnoses.^{[5][15][23]}

A new mnemonic device, "NOT RECLUSE", has been suggested as a tool to help laymen and medical professionals more objectively screen and diagnose potential cases of loxoscelism.^[24]

There are numerous documented infectious and noninfectious conditions that produce wounds that have been initially misdiagnosed as recluse bites by medical professionals, including:

- *Pyoderma gangrenosum*
- Infection by *Staphylococcus*
- Infection by *Streptococcus*
- Herpes
- Diabetic ulcers
- Fungal infection
- Chemical burns
- *Toxicodendron dermatitis*
- Squamous cell carcinoma
- Localized vasculitis
- Syphilis
- Toxic epidermal necrolysis
- Sporotrichosis
- Lyme disease^[25]

Many of these conditions are far more common and more likely to be the source of necrotic wounds, even in areas where brown recluse spiders actually occur.^[5] The most important of these is methicillin-resistant *Staphylococcus aureus* (MRSA), a bacterium whose necrotic lesions are very similar to those induced by recluse bites, and which can be lethal if left untreated.^[26] Misdiagnosis of MRSA as spider bites is extremely common (nearly 30% of patients with MRSA reported that they initially suspected a spider bite), and can have fatal consequences.^[27]

Reported cases of brown recluse bites occur primarily in Arkansas, Colorado, Kansas, Missouri, Nebraska, Oklahoma, and Texas. There have been many reports of brown recluse bites in California—though a few related species may be found there, none of these are known to bite humans.^[6] To date, the reports of bites from areas outside of the spider's native range have been either unverified, or, if verified, the spiders have been moved to those locations by travelers or commerce. Many arachnologists believe that a large number of bites attributed to the brown recluse in the West Coast are either from other spider species or not spider bites at all. For example, the venom of the hobo spider, a common European species established in the northwestern United States and southern British Columbia, has been reported to produce similar symptoms as the brown recluse bite when injected into laboratory rabbits. However, the toxicity of hobo spider venom has been called into question as actual bites have not been shown to cause necrosis, and no such occurrences have ever been reported where the spider is native.^[28]

Numerous other spiders have been associated with necrotic bites in medical literature. Other recluse species, such as the desert recluse (found in the deserts of southwestern United States), are reported to have caused necrotic bite wounds, though only rarely.^[29] The hobo spider and the yellow sac spider have also been reported to cause necrotic bites. However, the bites from these spiders are not known to produce the severe symptoms that can follow from a recluse spider bite, and the level of danger posed by these has been called into question.^{[30][31]} So far, no known necrotoxins have been isolated from the venom of any of these spiders, and some arachnologists have disputed the accuracy of spider identifications carried out by bite victims, family members, medical responders, and other non-experts in arachnology. There have been several studies questioning the danger posed by some of these spiders. In these studies, scientists examined case studies of bites in which the spider in question was identified by an expert, and found that the incidence of necrotic injury diminished significantly when "questionable" identifications were excluded from the sample set.^{[32][33]} (For a comparison of the toxicity of several kinds of spider bites, see the list of spiders having medically significant venom)

Bite treatment

First aid involves the application of an ice pack to control inflammation and prompt medical care. If it can be easily captured, the spider should be brought with the patient in a clearly tightly closed container so it may be identified.

Routine treatment should include immobilization of the affected limb, application of ice, local wound care, and tetanus prophylaxis. Many other therapies have been used with varying degrees of success, including hyperbaric oxygen, dapsone, antihistamines (e.g., cyproheptadine), antibiotics, dextran, glucocorticoids, vasodilators, heparin, nitroglycerin, electric shock, curettage, surgical excision, and antivenom.^{[34][35]} None of these treatments have been subjected to randomized controlled trials to conclusively show benefit. In almost all cases, bites are self-limited and typically heal without any medical intervention.^[5]

Outpatient palliative care following discharge often consists of a weak or moderate strength opioid (e.g. codeine or tramadol, respectively) depending on pain scores, an anti-inflammatory agent (e.g. naproxen, cortisone), and an antispasmodic (e.g. cyclobenzaprine, diazepam), for a few days to a week. If the pain and/or spasms have not resolved by this time, a second medical evaluation is generally advised, and differential diagnoses may be considered. Occasionally an antibiotic is prescribed as well.

Cases of brown recluse venom travelling along a limb through a vein or artery are rare, but the resulting tissue mortification can affect an area as large as several inches and in extreme cases require excising of the wound.

Specific treatments

In presumed cases of recluse bites, dapsone is often used for the treatment of necrosis, but controlled clinical trials have yet to demonstrate efficacy.^[36] However, dapsone may be effective in treating many "spider bites" because many such cases are actually misdiagnosed microbial infections.^[37] There have been conflicting reports about its efficacy in treating brown recluse bites, and some have suggested it should no longer be used routinely, if at all.^[38]

Wound infection is rare. Antibiotics are not recommended unless there is a credible diagnosis of infection.^[39]

Studies have shown that surgical intervention is ineffective and may worsen outcome. Excision may delay wound healing, cause abscesses, and lead to scarring.^[40]

Purportedly application of nitroglycerin stopped necrosis.^[41] However, one scientific animal study found no benefit in preventing necrosis, with the study's results showing it increased inflammation and caused symptoms of systemic envenoming. The authors concluded the results of the study did not support the use of topical nitroglycerin in brown recluse envenoming.^[42]

Antivenom is available in South America for the venom of related species of recluse spiders. However, the bites, often being painless, usually do not present symptoms until 24 or more hours after the event, possibly limiting the effect of this intervention.^[43]

Spider Population Control

Due to increased fear of these spiders prompted by greater public awareness of their presence in recent years, extermination of domestic brown recluses is performed frequently in the lower midwestern United States. Brown recluse spiders possess a variety of adaptive abilities, including the ability to maintain homeostasis for several seasons with no food or water.^[44] Additionally, these spiders survive significantly longer in a relatively cool, thermally stable environment.^[45]

The most important precaution is to remove and reduce trash and rubbish from your property, such as woodpiles, boxes, plywood, tires, and trash cans—especially if they are stored right next to the house. With attached garages, block off house access by sealing cracks around doors and access holes for electrical conduits or plumbing. In the Midwest, some brown recluse bites occur when a sleeping person rolls over during the night, and the trapped spider bites. In the bedroom, move the bed away from the wall, remove any skirts or ruffles and remove all items stored under it. This minimizes chances that any spider can crawl onto the bed. Do not leave clothes and shoes on the floor, or shake them before dressing if they are left out. Apparel and equipment that is only occasionally worn should be stored in tightly closed plastic bags, especially if stored in the garage or other dark storage areas. Typically, pesticide control of spiders is difficult. There are various insecticides available in retail outlets labeled for spider control. However, spiders' perched legs allow them to walk over most pesticides, making the use of chemicals to eradicate the spiders impractical and unnecessarily toxic.^[44] A 2014 study indicates that fumigation may be more effective than previously believed.^[46] Sticky traps placed along floor boards offer a non-insecticidal way to trap spiders as well as provide an idea of population levels in the structure.

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