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COMMENTARY

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Fundamental Principles of Spider Venoms

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Description

The pathophysiology of a bite is brought on by the influence of a spider's venom. A spider envenomation occurs whenever a spider injects venom into the skin. The amount of venom delivered varies depending on the type of spider and the circumstances of the encounter, and a dry bite may not necessarily include poison. The mechanical harm a spider bite can do to humans is not a major concern. There are some spider bites that do leave an infection-risking wound. Although it is known that some spider species produce venom that can damage people in concentrations comparable to that that a spider will typically inject when biting, the toxicity of spider venom often provides the greatest risk to humans. Only a small percentage of species have hazardous teeth that can bite people. Many spider species lack mouthparts with the ability to penetrate human skin. Despite the fact that venoms are by definition dangerous substances, most spiders do not produce enough harmful venom to warrant medical treatment. Effects that are lethal are rare when they occur. One of two fundamental principles governs how spider venoms work: either they are neurotoxic or necrotic. On occasion, the venom might target vital organs and systems. Spiders use some type of neurotoxic venom to render prey unconscious. Some spiders carry venom that reacts with the mammalian nervous system, yet each spider have a unique way of attacking the nervous system. Muscle cramps, spasms, and twitching are signs of overexcited motor neurons. Affected autonomic nerves can cause perspiration, drooling, and goosebumps. Extreme circumstances may lead to unstable blood pressure and heart rate.

Neurotoxic venom

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Necrotic venom

The family Sicariidae, which contains both recluse spiders and six-eyed sand spiders in the genera *Hexophthalma* and *Sicarius*, is home to the majority of spiders with necrotic venom. Sphingomyelinase D, a known dermonecrotic agent, is present in spiders in this family but is often only found in a small number of pathogenic bacteria. This family of spiders' bites can result in a wide range of symptoms, including minor localized effects, severe dermonecrotic lesions, severe systemic reactions, including renal failure, and, in some cases, death. Serious bites by sicariid spiders can cause a necrotizing ulcer that destroys soft tissue, can take months, and in rare cases, years, to heal, leaving behind significant scars, even in the absence of systemic consequences. It's possible for the damaged tissue to develop gangrene and eventually fall off. A bite may not hurt at first, but in severe cases, the wound may swell up to 10 inches over time. Bites typically start to hurt and itch within two to eight hours of the bite, get worse 12 to 36 hours later, and then start to develop necrosis over the following few days.

Although uncommon, systemic symptoms can include moderate nausea, vomiting, fever, rashes, and soreness in the muscles and joints. Rarely, more severe symptoms including hemolysis (the breakdown of red blood cells), thrombocytopenia (few platelets), and clotting factor depletion develop (disseminated intravascular coagulation). Children may be more vulnerable to the effects of systemic loxoscelism. Hemolysis-associated deaths have been documented in the brown recluse as well as closely related South American species *Loxosceles* late and

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Loxosceles intermedia. Misdiagnosis and misunderstanding are highlighted by deaths that are blamed on brown recluses even though no such creatures exist. Necrotic bites have been linked to a variety of other spiders. The first thorough investigation cleared the white tailed spider, which had been implicated with necrotic lesions for decades. Numerous times, the Sac spider's reported role in producing necrosis have been mentioned. Recent surveys cast doubt on necrosis' prevalence. Necrosis from a Hobo spider bite, a member of the Agelenidae family of grass spiders, is a subject of discussion and uncertainty.