What's Eating You? Bark Scorpions (*Centruroides exilicauda* and *Centruroides sculpturatus*)

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PRACTICE **POINTS**

- *Centruroides* scorpions can inflict painful stings.
- Children are at greatest risk for systemic toxicity.

Centruroides is a common genus of bark scorpions in the United States with at least 21 species considered to be medically important, including the closely related *Centruroides exilicauda* and *Centruroides sculpturatus*. Stings from *C exilicauda* and *C sculpturatus* have been shown to cause fatality in children more often than in adults. More severe complications are caused by the neurotoxin released by *Centruroides* stings. Most stings can be managed at home, but for those patients who require treatment, antivenin has been shown to decrease time to symptom abatement.

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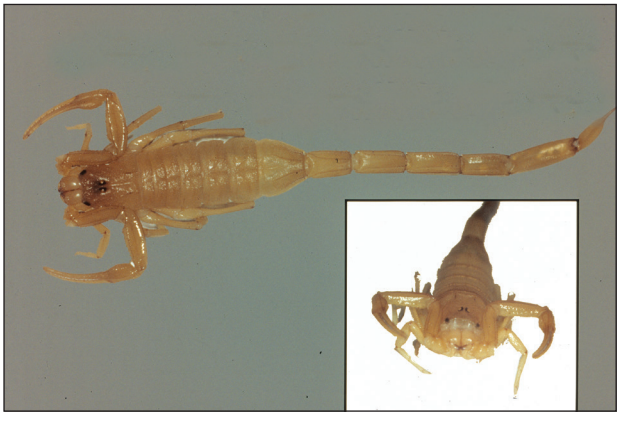
Epidemiology and Identification

Centruroides is a common genus of bark scorpions in the United States with at least 21 species considered to be medically important, including the closely related *Centruroides exilicauda* and *Centruroides sculpturatus*.[1] Scorpions can be recognized by a bulbous sac and pointed stinger at the end of a tail-like abdomen. They also have long lobsterlike pedipalps (pincers) for grasping their prey. Identifying characteristics for *C exilicauda* and *C sculpturatus* include a small, slender, yellow to light brown or tan body typically measuring 1.3 to 7.6 cm in length with a subaculear tooth or tubercle at the base of the stinger, a characteristic that is common to all *Centruroides* species (Figure).[2] Some variability in size has been shown, with smaller scorpions found in increased elevations and cooler temperatures.[1,3] Both *C exilicauda* and *C sculpturatus* are found in northern Mexico as well as the southwestern United States (eg, Arizona, New Mexico, Texas, California, Nevada).[1] They have a preference for residing in or around trees and often are found on the underside of bark, stones, or tables as well as inside shoes or small cracks and crevices. Scorpions typically sting in self-defense, and stings commonly occur when humans attempt to move tables, put on shoes, or walk barefoot in scorpion-infested areas. Most stings occur from the end of spring through the end summer, but many may go unreported.[1,4]



Bark scorpion (*Centruroides sculpturatus*).

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The venom of the *Centruroides* genus includes peptides and proteins that play a fundamental role in toxic activity by impairing potassium, sodium, and calcium ion channels.[1,3] Toxins have been shown to be species specific, functioning either in capturing prey or deterring predators. Intraspecies variability in toxins has been demonstrated, which may complicate the production of adequate antivenin.[3] Many have thought that *C exilicauda* Wood and *C sculpturatus* Ewing are the same species, and the names have been used synonymously in the past; however, genetic and biochemical studies of their venom components have shown that they are distinct species and that *C sculpturatus* is the more dangerous of the two.[5] The median lethal dose 50% of *C sculpturatus* was found to be 22.7 µg in CD1 mice.[6]

Envenomation and Clinical Manifestations

Stings from *C exilicauda* and *C sculpturatus* have been shown to cause fatality in children more often than in adults.[7] In the United States, Arizona has the highest frequency of serious symptoms of envenomation as well as the highest hospital and intensive care unit admission rates.[6] Envenomation results in an immediate sharp burning pain followed by numbness.[4] Wounds can produce some regional lymph node swelling, ecchymosis, paresthesia, and lymphangitis. More often than not, however, wounds have little to no inflammation and are characterized only by pain.[4] The puncture wound is too small to be seen, and *C exilicauda* and *C sculpturatus* venom do not cause local tissue destruction, an important factor in distinguishing it from other scorpion envenomations.

More severe complications that may follow are caused by the neurotoxin released by *Centruroides* stings. The toxin components can increase the duration and amplitude of the neuronal action potential and enhance the release of neurotransmitters such as acetylcholine and norepinephrine.[8] Stings can lead to cranial nerve dysfunction and somatic skeletal neuromuscular dysfunction as well as autonomic dysfunction, specifically salivation, fever, tongue and muscle fasciculations, opsoclonus, vomiting, bronchoconstriction, diaphoresis, nystagmus, blurred vision, slurred speech, hypertension, rhabdomyolysis, stridor, wheezing, aspiration, anaphylaxis, and tachycardia, leading to cardiac and respiratory compromise.[4,8] Some patients have experienced a decreased sense of smell or hearing and decreased fine motor movements.[7] Although pancreatitis may occur with scorpion stings, it is not common for *C exilicauda*.[9] Comorbidities such as cardiac disease and substance use disorders contribute to prolonged length of hospital stay and poor outcome.[8]

Treatment

Most *Centruroides* stings can be managed at home, but patients with more serious symptoms and children younger than 2 years should be taken to a hospital for treatment.[7] If a patient reports only pain but shows no other signs of neurotoxicity, observation and pain relief with rest, ice, and elevation is appropriate management. Patients with severe manifestations have been treated with various combinations of lorazepam, glycopyrrolate, ipratropium bromide, and ondansetron, but the only treatment definitively shown to decrease time to symptom abatement is antivenin.[7] It has been demonstrated that *C exilicauda* and *C sculpturatus* antivenin is relatively safe.[7] Most patients, especially adults, do not die from *C exilicauda* and *C sculpturatus* stings; therefore, antivenin more commonly is symptom abating than it is lifesaving.[10] In children, time to symptom resolution was decreased to fewer than 4 hours with antivenin, and there is a lower rate of inpatient admission when antivenin is administered.[4,10,11] There is a low incidence of anaphylactic reaction after antivenin, but there have been reported cases of self-limited serum sickness after antivenin use that generally can be managed with antihistamines and corticosteroids.[4,7]

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