THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Cooperative Extension

az1768 May 2018

Scorpions of the Desert Southwest United States

Dawn H. Gouge, Shujuan (Lucy) Li, Christopher Bibbs, and Shaku Nair

Infants crying inconsolably, may have been stung by a scorpion. Symptoms in young children include screaming, crying, holding a stung hand or foot, twitching muscles, flailing limbs and erratic eye movement.

Scorpion stings are painful and can be deadly for small children in the absence of medical support.

If children 9 years or under, or weighing less than 70lb (32 Kg) are stung, call 911 or the Poison Help Hotline 1 (800) 222-1222, or take them to the nearest hospital for treatment immediately.

Older, larger children may need pain management to cope with discomfort.

Symptoms can include: severe pain, loss of muscle control, roving or abnormal eye movements, slurred speech, respiratory distress, excessive salivation, frothing at the mouth, airway obstruction, and vomiting.

Most healthy adults can manage a sting without seeking the help of a doctor, but it is always advisable to call the Poison Help Hotline 1 (800) 222-1222 for advice, as each individual has a unique response.

Scorpions are predatory arachnids related to spiders, mites, and ticks. They are some of the oldest known terrestrial arthropods (animals with an external skeleton, a segmented body, and paired jointed limbs). Scorpions have an elongated body and a segmented tail that ends in a stinger that can deliver a venomous sting. They have four pairs of legs and pedipalps with plier-like pincers on the end, used for grasping (Fig. 1).

Figure 1. Arizona bark scorpion (2 inches in length) Chloe Fung (UA intern 2017)

There are close to 2,000 described species of scorpions worldwide, at least 100 in the U.S., and more than 50 species in the desert southwestern states. Scorpions have long been of concern and interest to humans primarily due to their ability to give painful, and sometimes life threatening stings, but also because they are important and beneficial components of many ecosystems.

Commonly Encountered Scorpions

The most commonly occurring scorpion species in the low desert southwest include:

Arizona bark scorpion *Centruroides sculpturatus* (Fig. 1). This species also colonizes small parts of California, Nevada, New Mexico, Utah, Colorado, Texas, and northwestern Mexico. Adults are 2-3 inches in length, have relatively slender appendages and a long, slender tail. Their coloration and markings are highly variable, some being pale in color, others darker with stripes or checkered patterning. The Arizona bark scorpion is the only scorpion of medical concern in the U.S. (Curry et al. 1983), and while all native scorpions can sting, only Arizona bark scorpion stings are hazardous to human health.

Arizona giant hairy scorpion *Hadrurus arizonensis* (Fig. 2) is the largest scorpion in the U.S.; they are heavy bodied scorpions, and adults often exceed 5 inches in length. This species can be found in the Sonoran and Mojave Desert areas of Arizona,

Figure 2. Arizona giant hairy scorpion (4.5 inches in length)

California, Nevada and Utah, as well as the Sonoran and Baja California Norte areas of Mexico. They have a mild venom, but strong pedipalps that they use to grasp prey. The scorpions often have a darker body, pale sides, and pale buff colored appendages, when viewed from above. They feed on a wide variety of insects, arachnids, small lizards and other animals. This species is also called the desert hairy scorpion as they are found in low sandy areas.

These harmless giants spend most of their time under rocks and in shallow burrows; they are a beneficial addition to your home landscape as they consume Arizona bark scorpions voraciously.

The **Arizona stripe-tailed scorpion** *Paravaejovis spinigerus*, and the yellow ground scorpion *Vaejovis confusus* (Fig. 3), are burrowing species, and full-grown at less than 3 inches in length. They are often mistaken for bark scorpions, but the stripe-tailed scorpion is heavily armored, with comparatively bulkier pedipalps and tail. Although yellow ground scorpions have more delicate pedipalps (Fig. 4), their tails are wider and much bulkier. Both scorpions feed on smaller arthropods, and seek moisture.

Figure 3. Arizona stripe-tailed scorpion top, and yellow ground scorpion below (both about 1 inch in length)

Figure 4. Scorpion pedipalps

Figure 5. Arizona stripe-tailed scorpion burrow entrance

Figure 6. Female scorpions with young

The Arizona stripe-tailed scorpion is found in Arizona, California, southwestern New Mexico and northwestern Sonora in Mexico, while the less commonly found, but broadly present yellow ground scorpion is reported throughout much of Arizona, California, Idaho, Nevada, Utah and northern Mexico.

Both scorpions are typically found on sandy soils in a variety of habitats, from desert floor to rocky hillsides, and under many surface objects (including sleeping bags, shoes, etc.) where they dig short burrows or "scrapes" for protection (Fig. 5). The scorpions sting, but their venom is relatively mild, and does not usually require medical intervention.

Biology

Scorpions can be nocturnal or diurnal. They are ambush predators that feed on a variety of prey when it comes within reach. Scorpions detect their prey primarily by sensing vibrations with organs on the underside of their bodies. The scorpion pedipalps (Fig. 4) also have an array of fine sensory hairs that detect air-borne vibrations, and the tips of the legs have small organs that detect vibrations in the ground. Scorpions give birth to live young, called scorplings, which ascend their mother's back (Fig. 6). Many species assist the babies by making a "birth basket" with her folded legs to cradle and assist scorplings onto her back.

On average, a female gives birth to about 25-35 young. Scorplings remain on the mother's back until after they have completed several molts (shedding of the exoskeleton as they grow). Scorplings are very delicate and unable to defend themselves, so riding on their mother's back during this most vulnerable stage likely affords them some protection. The pale colored young have been seen to climb down, molt then return to the mother's back for several days before leaving for good, usually within one to three weeks after birth. Once they assume an independent existence, they periodically molt to reach adulthood. Typically, five or six molts over two to six years are required for the scorpion to reach maturity. Immature scorpions often climb onto the backs of unrelated adult females where they are tolerated and carried around for some time.

The average scorpion probably lives three to five years, but some species may live up to 25 years. A few scorpions exhibit social behaviors beyond the mother-young association, such as forming over-wintering aggregations (e.g., Arizona bark scorpions) (Fig 14), colonial burrowing, and even living in extended family groups that share burrows and food. However, most desert southwest species live solitary lives for most of the time, being intolerant of even genetically related individuals.

Our Most Venomous Species, the Arizona Bark Scorpion

The Arizona bark scorpion is typically associated with "crevice" harborage during daylight hours. They are found in walls, and under rocks, logs, tree bark, and other surface objects. They may also be found in small animal burrows and other protected places, including inside building wall voids. In fact, the Arizona bark scorpion is common around buildings of all kinds in low desert areas, and is often associated with homes and hollow-block perimeter walls. The scorpions live for 5-7 years feeding

Figure 7. Arizona bark scorpion eating a cricket, Melisa Sikes (UA intern 2017) top, and drinking water, Chloe Fung (UA intern 2017) below

Figure 8. Bark scorpions often cohabit; there are five in the image above

Figure 9. The scorpion likely entered through a gap in the weather-stripping around the door

Figure 10. Once inside a wall void, there are many opportunities to enter the interior space, Chloe Fung (UA intern 2017)

on crickets, cockroaches and many other insects, and can be seen drinking from small pools of standing water (Fig. 7). They are not territorial, and are usually found living with others, sometimes in dense populations if resources are plentiful (Fig. 8). Homes and buildings with irrigated landscapes can support healthy populations much higher than in desert wild-land areas. Around buildings, they usually go undetected unless they gain access to the interior of buildings. They enter under and around poorly fitted doorways (Fig. 9), through window vents, and under exterior walls with openings, and even via weep-holes in the weep screed (which allows water to exit from wall voids). Once inside walls, they can easily move throughout the envelop of a building and access interior spaces around electrical faceplates (Fig. 10), pipe collars, etc.

The Arizona bark scorpion (0.25 - 3 inches in length) is the most commonly encountered "house scorpion". Kang and Brooks (2017) compiled all scorpion species exposures reported to U.S. Poison Help Hotlines from 2005 – 2015, and documented that 98% of exposures occur in or around homes.

In research studies investigating the harborage preferences of Arizona bark scorpions, 95% of the scorpions preferred hollow block walls as refuge places compared with the many other options around buildings and landscapes. Vegetation (including tree bark and pine cones), ground cover, and underground

Figure 11. Barely noticable Arizona bark scorpion found crossing an interior tile floor

Figure 12. Arizona bark scorpions easily traverse textured walls

Figure 13. Arizona bark scorpions may fall from walls and ceilings, and get caught in sinks and bathtubs from which they cannot escape

burrows are also used as harborage by the scorpions, but hollow block walls are preferred.

The Arizona bark scorpion is a proficient climber, it will make its way across interior flooring (Fig. 11), can scale walls (Fig. 12), and traverse across ceilings. Scorpions may fall from ceilings, landing in beds, sinks (Fig. 13), bathtubs, toilet bowls, etc

If you find a scorpion in a pool or spa, **do not assume it is dead or unable to sting**. They can remain alive entirely submerged for surprising amounts of time in chlorinated pool water, and recover well enough to defend themselves if fished out by hand. Educate children to hang pool towels and clothing up off the floor, as damp discarded pool towels are extremely attractive to scorpions seeking moisture. If you find scorpions in your washing machine or clothes dryer, they likely stowed away in discarded towels or clothing left on the floor, that were then placed in the washing machine.

Arizona bark scorpions are capable of dispersing significant distances, and a number of factors are known to motivate their movement. Researchers observed that light motivates bark scorpions to move, and a maximum travel distance of 114 yards (nearly the length of a football field), has been recorded under full light. Scorpions will move to harborage areas to escape extremely high temperatures, move when flooded out of refuge areas after irrigation or monsoon rains, and often relocate if disturbed by earth movement associated with building or landscape changes. Typical foraging distances around buildings, measured using telemetry tags, are relatively short distances (less than 35 yards in a night), often just enough to acquire water or harborage. Most movement occurs between 7pm-11pm, and 3am and sunrise. Males typically travel further than females, and gravid (pregnant) females move the least.

Arizona bark scorpions are active for most of the year in low-desert areas, and nighttime temperatures above 70° F are ideal. During the coolest months (November-March) they are less active, and during the coldest periods they cluster as groups (Fig. 14) in weather protected, enclosed, and undisturbed spaces called hibernacula. Groups may be found when residents undertake construction work during the winter months and block walls are removed, or building walls are opened up during remodeling efforts.

Figure 14. Bark scorpions aggregate in groups to over-winter in protected spaces

The Sting

If you are stung by a scorpion and are concerned about your symptoms, call the Poison Help Hotline at 1 (800) 222-1222, contact a medical professional or go to an emergency room.

All scorpions will sting to defend themselves, and the majority of sting incidents occur when a scorpion is accidentally grabbed, crushed against the body, or trodden on.

The **Arizona bark scorpion** is the only scorpion species of medical significance in the United States. However, a sting is not likely to be fatal, or cause long-term injury as long as medical treatment for infants and children is immediately acquired.

According to Kang and Brooks (2017), the highest number of scorpion stings per 100,000 people (referred to as sting incidence) occurs in Phoenix (up to 677 per 100 000 population) and Tucson (584), both cities in Arizona. However, high incidences are also reported in El Paso, Texas (213); Oklahoma City (209) and Tulsa (178), Oklahoma; and Las Vegas, Nevada (170). City medical centers are very familiar with the appropriate treatment, however, scorpion stings outside of Arizona and Nevada are most likely sting encounters that involve scorpion species of relatively little medical significance.

The venom of the Arizona bark scorpion is of medical concern, and may produce severe pain (but rarely swelling) at the site of the sting, numbness, frothing at the mouth, difficulties in breathing (including respiratory paralysis), muscle twitching, flailing limbs, and convulsions. Death is extremely rare, but medical treatment is imperative for the young, and elderly. Resolution of symptoms is usually complete within 72 hours.

In all cases if an individual is stung, or a child is suspected of being stung by a scorpion (including the venomous Arizona bark scorpion), first aid recommended by the Poison Help Hotline is as follows:

- Call the Hotline at 1 (800) 222-1222 immediately. A certified specialist will review the patient's symptoms and provide treatment advice, or recommend transport to the emergency room if necessary. Approximately 90% of scorpion sting exposures reported to the Arizona Poison and Drug Information Center via the Poison Help Hotline are treated at home, reducing the costs of unnecessary medical care. Poison Help Hotline staff may follow up to make sure that the person is not developing symptoms that might need medical intervention or antivenin over time.
- Wash the area with soap and water.
- Apply a cool compress on the area of the scorpion sting for ten minutes. Remove compress for ten minutes and repeat as necessary.
- If stung on an arm or leg, rest the affected limb in a supportive position.

Patients stung by the Arizona bark scorpion will likely experience an immediate burning and stinging sensation at the sting site. Following the pain, a pattern of neurotoxicity may develop with a spectrum of severity ranging from trivial to life threatening. Severe envenomation is more common in small children. Symptoms in children are more likely to include severe pain, loss of muscle control, roving or abnormal eye movements, slurred speech, respiratory distress, excessive salivation, frothing at the mouth, airway obstruction, and vomiting. Individual reactions vary greatly, but symptoms generally develop within 20 minutes, and continue to worsen during the first 4 hours after envenomation.

In the absence of treatment, most healthy adults report complete recovery within a day or two, but pain, burning, sensitivity to touch, numbness and tingling sensations can persist for several days. In rare instances, symptoms persist for more than a week, and it is recommended that patients experiencing symptoms beyond a week seek medical care.

Parents of a young child should seek immediate medical care. Bark scorpion stings that cause difficulty swallowing and/or excessive secretions (frothing at the mouth) can result in respiratory distress (difficulty breathing) and can be severe enough to warrant endotracheal intubation (a tube is placed into the windpipe) and mechanical ventilation (a machine that supports or completely controls breathing).

Patient symptoms are graded by medical staff using a 4-point grading scale:

Mild envenomation

GRADE 1. Localized pain and/or paresthesias (burning or prickling sensation of the skin) at the site of envenomation.

GRADE 2. Pain and/or paresthesias, remote from site of envenomation.

Severe envenomation

GRADE 3. Either cranial nerve or neuromuscular dysfunction

- Cranial nerve dysfunction: Tongue twitching, excessive salivation, slurred speech or uncontrolled eye movement.
- Neuromuscular dysfunction: Involuntary shaking and jerking of arms and legs.

GRADE 4. Both cranial nerve AND neuromuscular dysfunction.

Antivenom is available for severe cases in some hospitals. Anascorp® [Centruroides (Scorpion) Immune F(ab')2 (Equine) Injection] is the only available antivenom for the treatment of patients with clinical signs of scorpion envenomation, and resolution of symptoms can usually be achieved within 4 hours of treatment.

Envenomation of children (under 9 years of age) or people with hypertension should be considered serious and caregivers should call 911 for immediate medical help. A very small number of people may be allergic to the venom, and can experience life-threatening side effects when stung (as occurs with bee stings).

Scorpion stings are most dangerous to the very young and the very old. Pets are also at risk. Cats are not immune to the effects of the venom, but may play with scorpions and withstand a number of stings before succumbing to the effects. Death by scorpion sting, if it occurs, is usually the result of heart or respiratory failure some hours after the incident. In Mexico, around 1000 deaths due to scorpion stings occur each year. In the United States, only four deaths in the past 11 years have occurred.

Seek medical support or at a minimum call the Poison Help Hotline for advice 1 (800) 222-1222.

Living With and Managing Scorpions

In the desert southwest, we share our space with the medically important Arizona bark scorpion, and our homes provide these amazing and adaptable scorpions with plentiful food, water, and shelter. To eliminate scorpions from our landscapes would require extremely unhealthy and illegal chemical use that would at best, be a temporary eradication of the pest. A far healthier and sustainable approach is to accept that scorpions are part of the natural landscape, and take precautions to exclude the creatures from the interior of homes and buildings. The following are useful tips for the safe and harmonious sharing of our incredible desert landscape.

- Educate children not to touch scorpions and report scorpion sightings to an adult caregiver.
- Be vigilant while walking outdoors at night; **wear shoes.** Be vigilant indoors at night; **wear slippers or flip-flops.**
- Do not store shoes on the floor, especially outdoors (Fig. 15).
- Pest-proof your home on the exterior and interior (see https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1677-2015.pdf).
- Do not allow towels or clothing to be discarded on the ground indoors or outdoors.
- Be careful when camping or during other outdoor activities to ensure that a scorpion has not made a home in your clothes, shoes or sleeping bags.
- If you bring firewood in from outdoor storage areas, place it directly on the fire; do not store woodpiles inside the home.
- Do not allow wood, rocks, clutter or debris to build up against the home.
- Scorpions glow brightly under Ultraviolet light (UV or black light), use a UV light to inspect inside your home for scorpions before bedtime (Fig. 16).
- Conduct UV light collections several times during summer months between 8-11pm. Make sure that you wear boots and have long tongs if you want to capture the scorpions to move them. As they are beneficial to our environment please consider collecting and releasing the scorpions into the natural desert rather than killing them.
- Keep grass closely mowed near the home. Prune bushes and overhanging tree branches away from the

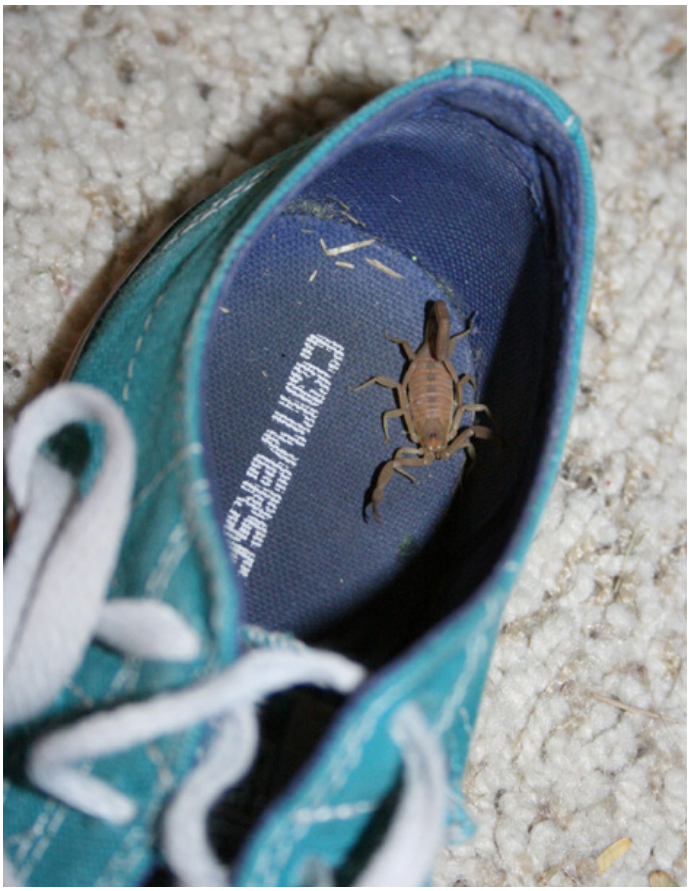

Figure 15. An Arizona bark scorpion finds a cozy harborage site in a child's shoe

Figure 16. Arizona bark scorpion fluorescing under UV light

structure. Tree branches can provide a path to the roof for scorpions. Minimize low growing ground cover vegetation.

- Store garbage containers in a frame that allows them to rest above ground level.
- Install weather-stripping around doors and windows and ensure a snug fit.
- Ensure door sweeps are tight fitting with no gaps.
- Screen weep holes in brick veneer or weep screed with coarse steel mesh (the holes should not be plugged or sealed as they are important for the ventilation of wall spaces).
- Caulk around roof eaves, pipes and any other points and wall penetrations into the building.
- Keep window screens in good repair. Make sure they fit tightly in the window frame.
- Stucco and cap hollow-block walls to make them less inviting harborage zones.
- Keep your tetanus shots and vaccinations up-to-date.

Scorpions are extremely difficult to eradicate. If you regularly find scorpions inside your home, call a pest management professional experienced in the management of scorpions. Eliminating their food sources (crickets and other insects) can help, but will not eliminate scorpions from around the home. If a reduced scorpion population is desirable, additional steps can be taken. However, scorpions are difficult to manage with pesticides alone. **Pest-proofing your home or structure is by far the most effective way to reduce scorpion contact and potential scorpion stings.**

Pest management companies often offer pest-proofing services.

References

Curry, S. C., Vance, M. V., Ryan, P. J., Kunkel, D. B. and Northey, W. T. 1983. Envenomation by the Scorpion *Centruroides sculpturatus.* Journal of Toxicology: Clinical Toxicology Vol. 21, Issue 4-5: 417-449.

Kang, A. M. & Brooks, D. E. 2017. Geographic distribution of scorpion exposures in the United States, 2010-2015.

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Cooperative Extension

The University of Arizona
College of Agriculture and Life Sciences
Tucson, Arizona 85721

Dawn H. Gouge
Department of Entomology - College of Agriculture & Life Sciences, University of Arizona

Shujuan (Lucy) Li
Cooperative Extension - Arizona Pest Management Center, Maricopa Agricultural Center, University of Arizona

Christopher Bibbs
Anastasia Mosquito Control District, FL

Shakunthala (Shaku) Nair
Cooperative Extension - Arizona Pest Management Center, Maricopa Agricultural Center, University of Arizona

Contact:
Dawn H. Gouge
dhgouge@email.arizona.edu

This information has been reviewed by University faculty.
extension.arizona.edu/pubs/az1768-2018.pdf

Originally published: 2011

Other titles from Arizona Cooperative Extension can be found at:
extension.arizona.edu/pubs