

BRIEF COMMUNICATION

Scorpion stings in Australia: five definite stings and a review

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Abstract

Despite scorpions being locally abundant in many parts of Australia, scorpion sting is a poorly defined clinical condition in Australia. Many health-care workers are unaware of the effects of their stings and scorpions are often feared based on their international reputation. Five scorpion stings that occurred in different parts of Australia where the scorpion was caught at the time of the sting and identified by a professional arachnologist are reported in the present paper. The spectrum of clinical effects of scorpion stings in Australia and the potential for significant effects are discussed. These cases and recent prospective case series demonstrate that in

Australia scorpion stings cause only minor effects. The main effect is localized pain lasting for several hours, associated less commonly with systemic effects, local numbness and paraesthesia. Most stings are from smaller scorpions from the family Buthidae and often occur indoors at night. The stings from Australian buthid scorpions cause more severe effects than from the larger species in the families Urodacidae (genus *Urodacus*) and Liochelidae (genus *Liocheles*). (Intern Med J 2004; 34: 427–430)

Key words: scorpion sting, *Lychas*, envenoming, *Urodacus*, arachnidism.

Scorpion sting is a poorly defined clinical condition in Australia,^{1–3} with many health-care workers being unaware of the existence of native Australian scorpions and the effects of their stings. This unawareness is mainly because scorpion stings are uncommon in Australia and do not cause major envenoming,¹ but it might also be because significantly more attention is focused on other venomous creatures in Australia, such as snakes, spiders and jellyfish.

Worldwide, scorpion stings are the most important cause of arachnid envenoming and are responsible for significant morbidity and paediatric mortality in many parts of central and South America, the Middle East, Asia, and northern and southern Africa.^{4–10} Although all scorpions are venomous, the most diverse and widespread family, Buthidae, includes the majority of medically significant scorpion species. Scorpion stings are characterized by severe localized pain that can require parenteral analgesia or regional anaesthesia. There is usually no associated local tissue injury. With more significant scorpion envenoming, systemic effects can occur and can be life-threatening, especially in children. Systemic effects include massive autonomic neurotransmitter release (adrenergic or cholinergic) as a

result of excitatory neurotoxins,¹¹ cardiotoxicity characterized by pulmonary oedema and arrhythmias and neurotoxicity. Experience with scorpion envenoming and its management is greatest in regions of the world where medically significant species are abundant,^{4–10} and antivenom is available in many of these regions.^{6,10,12}

We report five cases of scorpion stings that occurred in different parts of Australia where the scorpion was caught at the time of the sting and identified by an expert arachnologist and scorpion systematist. We discuss the spectrum of clinical effects of scorpion stings in Australia and the potential for significant effects.

The methodology applied here follows that previously described for accurate case definition in clinical toxicology.^{13,14} The cases were all reported to the authors or were stings to one of the authors (ESV). They include only definite stings where the scorpion was collected at the time of the sting and identified by ESV. The taxonomy follows that of Kovarik and Koch, but some of these identifications will soon change following the revision of the Australian *Lychas* species (Volschenk, unpubl. data, 2004).^{15,16}

Case 1: *Lychas buchari* (family Buthidae)

A 28-year-old man (ESV) was stung in December 1999 while collecting scorpions near Lake Hart in central South Australia (Fig. 1). The sting was on the tip of the left ring finger and occurred while he was collecting research specimens. There was immediate and very intense burning pain that was more intense than any previously experienced envenoming from bees, wasps,

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Figure 1 Male *Lychas buchari*, Tarcoola, central South Australia.

blue bottles and bulldog ants. The only indication of the sting except for severe pain was a small drop of blood at the puncture site. There was no local redness or swelling.

The severe pain lasted for approximately 15 min and immersion of the finger into hot coffee (the only immediate source of hot liquid) significantly alleviated the pain over approximately 5 min. Residual pain gradually subsided over 2 h. The local area remained hypersensitive and touching the finger resulted in paraesthesia, which gradually resolved over 2 days. The pain did not radiate and there were no systemic effects.

Case 2: *Lychas variatus* (family Buthidae)

A 22-year-old woman was stung on the left ring finger by a scorpion. She developed moderate immediate pain, which was associated with slight localized swelling. The pain remained for 1–2 h and the swelling remained for 24 h.

Case 3: *Urodacus planimanus* (family Urodacidae)

The second sting suffered by ESV occurred in March 2002 while he was transferring a study specimen from one container to another in Perth. The sting occurred on the back of the right thigh and caused immediate but moderate pain equivalent to a mechanical bite, and no burning sensation was experienced. The sting was significantly less painful than the sting by *Lychas buchari* received previously. Mild tingling irritation lasted for 30 min and there were no other local or systemic effects.

Case 4: *Liocheles* sp. (juvenile; family Liochelidae)

A 4-year-old child was stung on the palmar side of the left hand while on the beach. The child experienced mild to moderate pain that lasted for approximately 1 h. There was a raised area at the sting site, but no other local or systemic effects.

Case 5: female *Liocheles waigiensis* (family Liochelidae)

The 31-year-old father of the child in case 4 attempted to catch the scorpion that had stung the child. The scorpion had gone under some rocks and while he was attempting to remove the scorpion, he was stung by a second scorpion on his right thumb. He had moderate pain for 1–2 h, which was associated with localized swelling for 24 h. He had no other local effects or systemic effects.

Although only a few cases are described here, they illustrate the important characteristics of scorpion stings in Australia and report the first definite stings from *Liocheles* scorpions (family Liochelidae) in Australia. The majority of cases are minor, and systemic effects are uncommon.¹⁷ There is a clear difference between stings by smaller buthid scorpions (species in the genus *Lychas*) and stings by the larger *Urodacus* and *Liocheles* species.

Scorpions, like spiders, are arthropods belonging to the class Arachnida, which, in Australia, also includes pseudoscorpions (Pseudoscorpionida), mites and ticks (Acarina) and whipscorpions (Amblypygi) among others. Scorpions are instantly recognizable and are characterized by their segmented body and uniquely modified metasoma (frequently, but incorrectly referred to as the ‘tail’) that terminates with the stinging apparatus (telson). Scorpions have pincers (pedipalps), which are used to hold and manipulate prey but also facilitate tactile and chemo-sensing of their environment. Scorpions do not possess fangs like spiders, but they possess homologues – jaw-like mouthparts. Scorpions occur throughout Australia and there are more than 40 named species in four families (Buthidae, Urodacidae, Bothriuridae, Liochelidae).¹⁶ Numerous additional unnamed scorpion species are known and an estimate of approximately 200 species is probably closer to the real species diversity (Volschenk, unpubl. data, 2003). Most scorpions are active at night and hide in burrows, leaf litter or under rocks during the daylight hours. In Australia, scorpions are reported from most environments that do not experience prolonged (more than 4 months) flooding or freezing.

As with other parts of the world, the most medically important group of scorpions in Australia belong to the family Buthidae, and in Australia, the majority of these are currently placed in the genus *Lychas* (Fig. 1). These are small- to moderate-sized scorpions with adult sizes ranging from 16 to 60 mm. Buthid scorpions have been found in all of Australia's terrestrial environments. Most Australian buthids are unlikely to be seen in their native habitats as their mottled appearance provides excellent camouflage – typically in leaf litter, under stones or logs, or under the bark of trees. They are usually only noticed

when they venture indoors and become conspicuous against flooring or walls of houses. Scorpions entering houses are typically male specimens that become active on warm and humid nights, searching for mates. Scorpions can also be inadvertently transported into the house with firewood.

Scorpions in the genus *Urodacus* are less commonly encountered by humans and are generally characterized by their much larger size and proportionally more massive pedipalps. Scorpions in the genus *Cercophonius* (family Bothriuridae) are also responsible for stings and are most diverse in southern Australia. *Cercophonius squama* is the only known scorpion from Tasmania. *Liocheles* species are widely distributed along the eastern coast of Australia, being found from northern New South Wales northwards to Cape York in Queensland. Representatives of the genus are also recorded in the Northern Territory and in remnant rainforest in the Kimberley region of Western Australia. *Liocheles* defy the stereotypical view of scorpions as desert animals and are restricted to rainforest, vine forest and other mesic tropical and subtropical environments.

Little information exists on scorpion stings in Australia, with the last major review by Southcott in the 1970s and a shorter version 10 years later.^{1,3} Southcott collated more than 10 cases of stings reported over the past 150 years.^{1,3} This is a surprisingly small number for a country that hosts many of the most venomous creatures in the world.

In his review, Southcott described cases from the late nineteenth century through to the first half of the twentieth century.¹ It includes three fatal cases that had been

attributed to scorpion stings: two in Victoria^{18,19} and one of a baby in Western Australia where the scorpion was not caught.¹ The two in Victoria were rightly discounted by Southcott in 1973.^{1,18,19} Both were cases where no scorpion was seen or identified and were misattributed to scorpion stings. The case from Western Australia was never published and was documented only by Southcott; again the scorpion was not caught.¹

The remainder of the cases reviewed by Southcott were definite stings where the creature was caught and identified,¹ providing a better picture of the effects of scorpion stings.¹³ Flecker was the first to report scorpion stings by formally identified scorpions in 1937, with four stings from the smaller buthid scorpions and one from a species of *Urodacus*.²⁰ Southcott included further cases in his review of stings by buthids and *Urodacus* spp. (Table 1).¹ There have been reports of stings by scorpions in Tasmania that are most certainly *C. squama*.²¹ There had been no further reports over the past 25 years until a recent prospective study of scorpion stings.¹⁷

The effects of different groups of scorpions are described in Table 1. The most important difference is between buthids and remaining urodacids and liochelids. Although the large *Urodacus* scorpions have been alleged to be the most important, the species in the present report caused insignificant effects compared with the buthid scorpions, as demonstrated by comparing cases 1 and 3 in the same person.² A recent prospective study of 95 definite scorpion stings also reported buthids to cause more significant effects.¹⁷

In Australia, no antivenom exists for native scorpions, and supportive treatment appears to be adequate.

Table 1 Major groups of scorpions in Australia and summary of the clinical effects and circumstances of stings^{1,17}

Scorpion group	Location	Circumstances	Clinical effects/severity
<i>Lychas</i> spp. (family Buthidae)	Australian mainland	Indoors, at night; often trodden on or picked up inadvertently	Severe pain in most cases (90%) with a median duration of 2 h (IQR 1–8 h); systemic effects in 13% of cases; other local effects include numbness (13%), paraesthesia (11%) and tenderness (37%)
<i>Isometrus</i> spp.; <i>Isometroides</i> spp. (family Buthidae) [†]	Australian mainland	Indoors, at night	Similar to <i>Lychas</i> spp.; severe pain in 67% of cases; no systemic effects in six cases; other local effects include numbness, paraesthesia and tenderness
<i>Cercophonius squama</i> (family Bothriuridae)	Tasmania and southern Australian mainland	89% indoors and the majority during daylight hours	Severe pain in 73% of cases with a median duration of 1 h (IQR 45 min–2 h); systemic effects in 9% of cases; other local effects include tenderness (36%)
<i>Urodacus</i> spp. (family Urodacidae) [‡]	Australian mainland	More common outdoors, mainly during daylight; often trodden on	No cases of severe or persistent pain; no other local effects except swelling and redness; no systemic effects reported
<i>Liocheles</i> spp. (family Liochelidae) [§]	Northern Australia	Outdoors, during daytime	Pain and swelling

[†]Based on six stings;¹⁷ [‡]based on nine stings;^{1,17} [§]two cases reported in the present article. IQR, interquartile range.

Symptomatic treatment of localized pain is the most important therapy. Only a small number of patients present to an emergency department or hospital for treatment, despite many suffering significant persistent pain. In a study of 95 patients calling a poison information centre following a scorpion sting, only five patients attended an emergency department and five patients saw their general practitioner.¹⁷ This suggests that it is reasonable to reassure patients over the phone and that oral analgesia and locally applied ice can be sufficient. In the event that patients present to an emergency department with severe and persistent pain, then it would be appropriate to use intravenous analgesia, and in intractable cases, local or regional anaesthesia might be useful. In case 1, immersion of the stung finger into a hot liquid (coffee) appeared to alleviate the pain and is similar to anecdotal cases of hot water immersion providing pain relief for centipede bites.^{22,23}

A relatively recent phenomenon in Australia is the keeping of native scorpions (and spiders) as pets. Species in the genera *Liocheles* and *Urodacus* are the most sought after by enthusiasts, owing to their larger body size. Anecdotal reports to ESV by scorpion enthusiasts indicate low numbers of sting incidents. Many scorpion enthusiasts are quite knowledgeable about these animals and are aware of the benign nature of envenoming by their 'pets'; thus, these incidents are never reported to medical practitioners. The exploitation of these scorpions also raises potential conservation problems in that the collection localities are frequently kept secret, and the species being kept are often unidentifiable because of inadequate taxonomy. Many Australian scorpions are locally endemic and could be threatened by over collecting, but taxonomic and biogeographical knowledge of species in the genera *Liocheles* and *Urodacus* is insufficient to address these issues properly.

Despite scorpions being locally abundant in many parts of Australia, they are a rare cause of envenoming. These cases and recent prospective case series demonstrate that in Australia, scorpion stings cause only minor effects. The main effect is localized pain lasting for several hours, associated less commonly with systemic effects, local numbness and paraesthesia. Most stings are from smaller buthid scorpions and often occur indoors at night. These smaller scorpions cause more severe effects than the larger *Urodacus* scorpions.

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