

# An approach to spider bites

## *Erroneous attribution of dermonecrotic lesions to brown recluse or hobo spider bites in Canada*

Robert G. Bennett, MSc, PhD    Richard S. Vetter, MSc

### ABSTRACT

**OBJECTIVE** To dispel prevalent myths surrounding diagnosis of dermonecrotic and associated conditions supposedly resulting from bites of brown recluse, hobo, or other spiders in Canada.

**SOURCES OF INFORMATION** Worldwide, spider bites are regularly misdiagnosed as the etiologic agents in human dermonecrosis mainly as a result of inaccurate, erroneous, or hyperbolic popular and professional literature based on inference, circumstantial evidence, inferior clinical trials, and misunderstanding of the facts regarding spider-bite envenomation.

**MAIN MESSAGE** A working diagnosis of “spider bite” or publishing a case history should be considered only when a spider is caught in the act of biting or otherwise reliably associated with a lesion. Accurate identification of the spider could be critical for correct diagnosis and subsequent treatment.

**CONCLUSION** Brown recluse spiders are not found in Canada. Hobo spiders have not been reliably implicated in dermonecrosis. Worldwide, spider-bite envenomation is an unlikely cause of dermonecrosis. Canadian physicians should give priority consideration to other, more likely, causes.

### RÉSUMÉ

**OBJECTIF** Dissiper le mythe entourant les lésions dermonécrosantes et les conditions analogues attribuées au Canada à la piqûre d'une araignée comme la recluse brune ou la tégénaire *t. campestris* (hobo spider).

**SOURCE DE L'INFORMATION** À l'échelle mondiale, des lésions dermonécrosantes chez l'humain sont régulièrement attribuées à tort à des piqûres d'araignées, à cause surtout d'articles populaires ou professionnels inexacts, erronés ou exagérés, fondés sur des conclusions, des preuves circonstancielles, des essais cliniques peu fiables et sur une méconnaissance des faits concernant les empoisonnements causés par les araignées.

**PRINCIPAL MESSAGE** On ne devrait pas envisager un diagnostic de «piqûre d'araignée» ni publier une telle histoire de cas à moins de voir l'araignée en train de piquer ou de pouvoir raisonnablement l'associer à la lésion. Une identification précise de l'araignée pourrait s'avérer critique pour un diagnostic et un traitement adéquats.

**CONCLUSION** L'araignée recluse brune n'existe pas au Canada. Aucune lésion dermonécrosante n'a été attribuée de façon certaine à la *tegenaria campestris*. À l'échelle mondiale, les dermonécroses ont peu de chance d'être dues à des piqûres d'araignée. Les médecins canadiens devraient d'abord considérer d'autres causes, plus probables.

This article has been peer reviewed.

Cet article a fait l'objet d'une évaluation externe.

*Can Fam Physician* 2004;50:1098-1101.

## Case

Consider the following reported cases of alleged bites from brown recluse spiders (*Loxosceles reclusa*) in Canada.

- After camping in northwestern British Columbia, a young girl is hospitalized for 5 weeks with a necrotic lesion on her leg that requires débridement and excision to the deep fascia and subsequent skin grafts.<sup>1</sup>
- A teenager sleeping in a tent in BC's Okanagan Valley develops a painful dermonecrotic lesion on one buttock and is hospitalized for 3 days.<sup>1</sup>
- A physician sleeping outdoors overnight in Algonquin Park in Ontario develops an idiopathic lesion.<sup>2</sup>
- A labourer in Winnipeg, Man, feels something in his work glove and the following day presents to an emergency ward with a necrotic lesion on his finger.<sup>3</sup>

In each of these cases "loxoscelism" (the cutaneous and systemic effects of a bite from a brown recluse spider<sup>4</sup>) was diagnosed although no brown recluse or other spider was caught in the act of biting, captured, or identified by a qualified expert.

In North America, many medical conditions that cause dermonecrosis have been misdiagnosed as the effects of bites from brown recluse or other spiders,<sup>5-17</sup> and fully 80% of spider-bite diagnoses are erroneous.<sup>13</sup> In general, spiders are erroneously blamed around the world for causing dermonecrotic lesions when the evidence points in many other directions.<sup>5,14,18-22</sup> Such misdiagnoses can lead to serious medical complications (or possibly litigation) if diagnosis is delayed or treatment is inappropriate or ineffective.<sup>8,23</sup>

## Sources of information

Because most studies are retrospective and few data on spider bites have been verified, the literature on spider envenomation is often based on inference from animal model toxicology; circumstantial evidence;

---

**Dr Bennett and Mr Vetter** are professional entomologists who have each been studying spiders and other arachnids for about 25 years. **Dr Bennett** works as an insect pest management specialist with the British Columbia Ministry of Forests. **Mr Vetter** is an entomologist with the University of California at Riverside and the San Bernardino County Museum.

poorly designed or otherwise inferior clinical studies; and unfortunately, considerable hyperbole. For example, in South America, experimentally induced necrosis and poor clinical reporting put blame on a harmless wolf spider (family Lycosidae) for causing skin lesions.<sup>24</sup> Wolf spider antivenin was developed and used for decades. Subsequent tracking of 515 documented wolf-spider bites in humans with no necrosis showed the attribution to be erroneous and the treatment unwarranted.<sup>24</sup> In another example, based mostly on shreds of unsubstantiated evidence, white-tailed spiders (*Lampona* species) were erroneously named the etiologic agents of human dermonecrosis in Australia. This led to bogus case histories, unnecessary calls for research funding, and hyperbole in the popular and medical press.<sup>22</sup> A recent prospective report of 130 verified white-tailed spider bites, none of which caused necrosis,<sup>21</sup> might put this myth to rest. Closer to home, several American states each report dozens to hundreds of loxoscelism diagnoses annually even though brown recluse spiders are extremely rare or have never been found in those states or regions.<sup>14,17,25</sup>

We have substantial personal knowledge and experience of the facts and myths about spider bites. We are professional entomologists and have worked extensively with medical professionals and the public in Canada and the United States on loxoscelism and other issues around spider bites.

## Main message

**Brown recluse spiders.** Loxoscelism is rare even where brown recluse spiders are an abundant native species. Homes in areas where brown recluse spiders are endemic can support large populations of these spiders without anyone who lives in them being envenomated. For example, one Kansas family collected 2055 brown recluse spiders in their home over 6 months without incident.<sup>26</sup>

No brown recluse spiders and only three specimens of *any* type of recluse spider (all belonging to a well-known vagrant South American species) have ever been found in Canada.<sup>5</sup> Despite this, loxoscelism continues to be diagnosed in this country. The unsubstantiated belief that brown recluse

spiders are being transported outside their natural range in sufficient numbers to cause necrotic lesions has led to erroneous diagnosis of many more brown recluse spider bites in non-endemic areas, such as Canada, than these spiders could possibly cause.<sup>5,14,17,25</sup>

Even if brown recluse spiders occasionally found their way into Canada, the statistical probability of people being bitten by immigrant spiders is effectively zero.<sup>17</sup> If loxoscelism truly occurred in Canada, brown recluse spiders would be sufficiently common that specimens would regularly be turned in for identification by homeowners and pest control personnel. To our knowledge, this has never happened.

**Hobo spiders.** In recent years, in southwestern Canada and adjacent regions of the United States, hobo spiders have been implicated in relatively minor necrotic lesions among humans.<sup>27,28</sup> Hobo spiders exist in Canada only in rare, localized populations in extreme southern British Columbia<sup>29</sup> and, contrary to popular belief, are timid and unlikely to bite. We know of no authentic Canadian report of hobo spider envenomation. Also, new research suggests that hobo spiders have been falsely accused,<sup>30</sup> and researchers are reevaluating whether hobo spider venom is even toxicologically active.

**Other spiders.** Physicians might lean away from diagnoses of brown recluse or hobo spider bites but continue to blame other spiders as the cause of idiopathic necrosis. A recent prospective study of 750 verified bites from a variety of spider species in Australia demonstrated, however, that not one bite from any spider resulted in a necrotic lesion.<sup>20</sup> Some of the spiders discussed are found around the world, so this study could be applicable worldwide.

**Differential diagnoses.** There are many diagnoses more reasonable than “spider bite” or loxoscelism

for idiopathic necrotic lesions. Various infections (bacterial, viral, fungal) and cancers (basal cell carcinoma, lymphoma); topical (poison ivy or oak, burns), arthropod-vector (Lyme disease, tularemia), and vascular disorders; and conditions of miscellaneous or idiopathic etiology (eg, pressure ulcers, pyoderma gangrenosum) are more realistic and credible causes of such lesions.<sup>5,17,31</sup> All have been misdiagnosed as resulting from spider bites.

The criterion standard for spider-bite diagnosis should be a spider caught in the act of biting or otherwise *reliably* associated with a lesion (and properly identified by a qualified arachnologist). Unless this standard is met, a working diagnosis of spider bite should *not* be considered.



In Canada, hobo spiders (top) are found only in southern British Columbia. Contrary to popular belief, they are unlikely to bite and have never been reliably implicated in dermonecrotic lesions.

Brown recluse spiders (bottom) are not found in Canada. Dermonecrotic lesions should not be attributed to them here. Where these spiders are found, medically serious bites are remarkably rare.


Proper identification is critical; in our experience, the general public and the medical community identify many harmless spiders as brown recluse<sup>32,33</sup> or, more recently, hobo spiders.

Much of the literature on spider envenomation is deficient in definitive, prospective case histories.<sup>20,22</sup>

Reports of alleged spider bites should be supported by solid proof of spider involvement. Not providing this proof entrenches the mistaken belief that spider bites are a common cause of necrosis and leads to the proliferation of misdiagnoses. Decreased reliance on diagnoses of loxoscelism or other spider bite necrosis will result in improved health care through reduction of misdiagnoses, incorrect remedies, patient anxiety or arachnophobia, and potential litigation.

## Conclusion

From available case information, it is currently impossible to propose accurate diagnoses for the four cases reported in our introduction. Priority consideration should be given to one or more of the many alternative and more probable causes of necrosis.

In Canada, little evidence suggests that dermonecrotic lesions can be attributed to the effects of spider envenomation. Reports of alleged effects of spider bites should not be published unless spider involvement is conclusively proven. To do otherwise creates a confused clinical picture and throws up obstacles to appropriate and improved health care. 

## Competing interests

None declared

**Correspondence to:** Robert G. Bennett, British Columbia Ministry of Forests, 7380 Puckle Rd, Saanichton, BC V8M 1W4; telephone (250) 652-6593; fax (250) 652-4204; e-mail [Robb.Bennett@gems6.gov.bc.ca](mailto:Robb.Bennett@gems6.gov.bc.ca)

## References

- Baldwin GA, Smith DF, Douglas S. Loxoscelism in Canada. *Can Med Assoc J* 1988;138:521-2.
- Nelson J. Letter to the editor. *Can Med Assoc J* 1988;138:888-9.
- Rose G, Ross LL, Palatnick W, Embil JM. Photo quiz. *Clin Infect Dis* 2001;32:595, 636-7.
- Atkins JA, Wingo CW, Sodeman WA. Probable cause of necrotic spider bite in the mid-west. *Science* 1957;126:73.
- Vetter RS, Bush SP. Reports of presumptive brown recluse spider bites reinforce improbable diagnosis in regions of North America where the spider is not endemic. *Clin Infect Dis* 2002;35:442-5.
- Chow RK, Ho VC. Treatment of pyoderma gangrenosum. *J Am Acad Dermatol* 1996;34:1047-60.
- Freedman A, Afonja O, Chang MW, Mostashari F, Blaser M, Perez-Perez G, et al. Cutaneous anthrax associated with microangiopathic hemolytic anemia and coagulopathy in a 7-month-old infant. *JAMA* 2002;287:869-74.
- Kunkel DB. The myth of the brown recluse spider. *Emerg Med* 1985;17(5):124-8.
- Osterhoudt KC, Zaoutis T, Zorc JJ. Lyme disease masquerading as brown recluse spider bite. *Ann Emerg Med* 2002;39:558-61.

## EDITOR'S KEY POINTS

- Medically serious spider bites are rare in Canada. Necrotic skin lesions should not be attributed to them unless the spider is caught biting and actually identified.
- Physicians should search for other causes of necrotic lesions; the probability of a necrotic lesion caused by a brown recluse or hobo spider bite is effectively zero in Canada.

## POINTS DE REPÈRE DU RÉDACTEUR

- Au Canada, les piqûres d'araignée sont rarement responsables de lésions graves. Les lésions cutanées nécrotiques ne doivent pas leur être attribuées, sauf si on a vu l'araignée en train de piquer et si on l'a identifiée.
- Le médecin devrait chercher d'autres causes de lésions nécrotiques; de fait, au Canada, la probabilité que l'araignée recluse brune ou la tégénaire *t. campestris* soit en cause est à peu près nulle.

- Roche KJ, Chang MW, Lazarus H. Cutaneous anthrax infection. *N Engl J Med* 2001;345:1611.
- Rosenstein ED, Kramer N. Lyme disease misdiagnosed as a brown recluse spider bite. *Ann Intern Med* 1987;107:782.
- Russell FE. A confusion of spiders. *Emerg Med* 1986;18(11):8-9, 13.
- Russell FE, Gertsch WJ. For those who treat spider or suspected spider bites [letter]. *Toxicol* 1983;21:337-9.
- Vetter RS. Myth: idiopathic wounds are often due to brown recluse or other spider bites throughout the United States. *West J Med* 2000;173:357-8.
- Vetter RS, Bush SP. The diagnosis of brown recluse spider bite is overused for dermonecrotic wounds of uncertain etiology. *Ann Emerg Med* 2002;39:544-6.
- Vetter RS, Bush SP. Chemical burn misdiagnosed as brown recluse spider bite. *Am J Emerg Med* 2002;20:68-9.
- Vetter RS, Cushing PE, Crawford RL, Royce LA. Diagnoses of brown recluse spider bites (loxoscelism) greatly outnumber actual verifications of the spider in four western American states. *Toxicol* 2003;42:413-8.
- Isbister GK. Necrotic arachnidism in Australia. *Toxicol* 2001;39:1941-2.
- Isbister GK. Spider mythology across the world. *West J Med* 2001;175:86-7.
- Isbister GK, Gray MR. A prospective study of 750 definite spider bites with expert spider identification. *Q J Med* 2002;95:723-31.
- Isbister GK, Gray MR. A prospective study of 130 definite bites by *Lampona* species. *Med J Aust* 2003;179:199-202.
- White J. Debunking spider bite myths—necrotising arachnidism should be a diagnosis of last resort. *Med J Aust* 2003;179:180-1.
- Vetter RS. Brown recluse spider bite diagnoses and lawsuits. *Pediatr Emerg Care* 2003;19:291-2.
- Ribeiro LA, Jorge MT, Piesco RV, Nishioka SA. Wolf spider bites in Sao Paulo, Brazil: a clinical and epidemiological study of 515 cases. *Toxicol* 1990;28:715-7.
- Vetter RS, Edwards GB, James LF. Reports of envenomation by brown recluse spiders (Araneae: Sicariidae) outnumber verifications of *Loxosceles* spiders in Florida. *J Med Entomol*. In press.
- Vetter RS, Barger DK. An infestation of 2,055 brown recluse spiders (Araneae: Sicariidae) and no envenomations in a Kansas home: implications for bite diagnoses in nonendemic areas. *J Med Entomol* 2002;39:948-51.
- Vest DK. Necrotic arachnidism in the Northwest United States and its probable relationship to *Tegenaria agrestis* (Walckenaer) spiders. *Toxicol* 1987;25:175-84.
- Vest DK, Keene WE, Heumann M. Necrotic arachnidism—Pacific Northwest. *MMWR Morb Mortal Wkly Rep* 1996;45(21):433-6.
- Vetter RS, Roe AH, Bennett RG, Baird CR, Royce LA, Lanier WT, et al. Distribution of the medically-implicated hobo spider (Araneae: Agelenidae) and a benign congener, *Tegenaria duellia*, in the United States and Canada. *J Med Entomol* 2003;40:159-64.
- Binford G. An analysis of geographic and intersexual chemical variation in venoms of the spider *Tegenaria agrestis* (Agelenidae). *Toxicol* 2001;39:955-68.
- Isbister GK, Whyte IM. Suspected white-tail spider bite and necrotic ulcers. *Intern Med J* 2004;34(1-2):38-44.
- Vetter RS. Envenomation by an agelenid spider, *Agelenopsis aperta*, previously considered harmless. *Ann Emerg Med* 1998;32:739-41.
- Vetter RS. Identifying and misidentifying the brown recluse spider. *Dermatol Online* 1999;5(2):7. Available at: <http://matrix.ucdavis.edu/DOJvol5num2/special/recluse.html>. Accessed 2004 May 5.