Local, lethal & lurking:
Arizona Brown Spider (*Loxosceles arizonica*)

ARIZONA POISON AND DRUG INFORMATION CENTER
THE UNIVERSITY OF ARIZONA – COLLEGE OF PHARMACY
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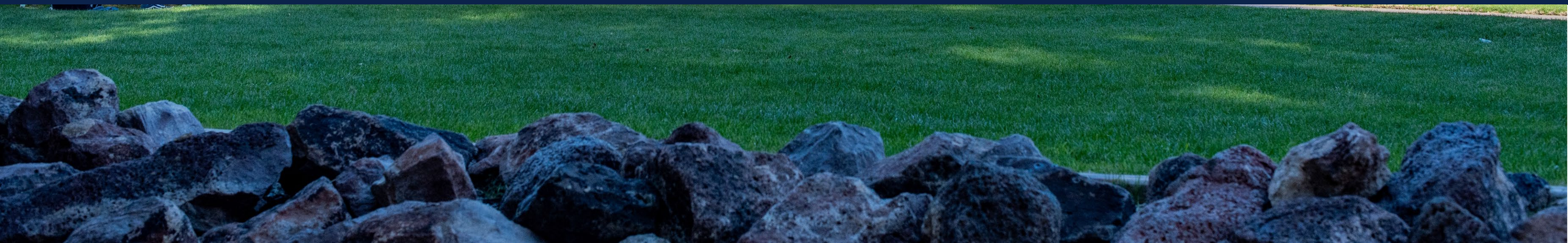

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SPEAKER DISCLOSURE

Dr Jonathan Meadows has an NO outside interest with involvement in the work reported here. This interest has been disclosed to the University of Arizona and reviewed in accordance with its conflict-of-interest policies.

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Brown Recluse General Features [1]

- *Loxosceles* = Greek for “crooked or slanted legs” in a rest position
- Cephalopod dorsum: brown violin
  - L deserta → none
- “Violin or fiddleback spider”
- Semicircle of 3 dyads of eyes (6 eyes) on head
- Legs 5x as large as body

- Synanthropic, nocturnal, building dwellers
- Genus distribution: worldwide
- Peak: Spring – Autumn

- ***Uncommon/rare*** bites
  - In clothing, stored over season (bathing suit, shirts, pants)

2022 Annual Report of the National Poison Data System® (NPDS) from America's Poison Centers®: 40th Annual Report

Brown recluse "case mentions": 682 (1.9%)
All Bites and Envenomations: 35,024

Brown Recluse Envenomation [1]

- Venom
  - Cytotoxic: ***Sphingomyelinase D***
    - Dermatonecrosis
    - RBC lysis factor
    - Platelet serotonin release
  - Spreading factor: hyaluronidase
  - Others: deoxyribonucleases, ribonucleases, collagenases, esterases, metalloproteinase (loxolysin → gelatin, sugar removal), alkaline phosphatases, lipase

RBC sphingomyelin interaction
→ Choline + N-acylsphingosine phosphate
→ Chain rxn of inflammatory mediator release (thromboxane, leukotrienes, prostaglandins, and neutrophils)

Polymorphonuclear leukocyte (PML) + Hemorrhage + Edema

Microcirculation occlusion & coagulation

Vessel thrombosis/clotting
→ Tissue ischemia
→ Skin loss

The Journal of Pediatrics
March 1988

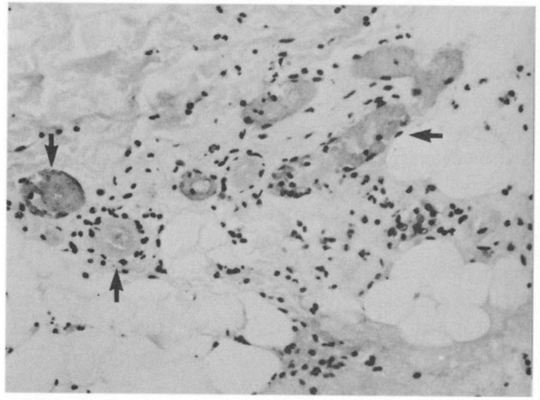
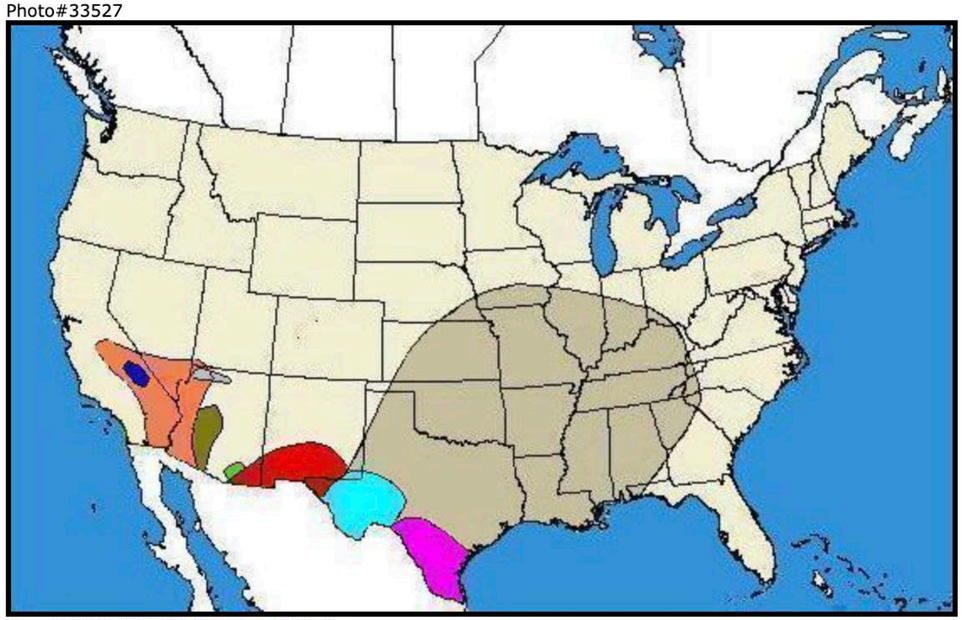


Fig. 2. Vessels within subcutaneous tissue contain platelet thrombi *(arrows)*. Adjacent connective tissue infiltrated by neutrophils. (Hematoxylin and eosin; original magnification, ×100.)

Sphingomyelinase D MOA

Photo#33527



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Distribution of Brown spiders native to the United States - *Loxosceles*

This map show the range of nine of the eleven brown spiders native to the U.S.

Loxosceles apachea - Red
Loxosceles arizonica - Olive green
Loxosceles blanda - Light Blue
Loxosceles deserta - Orange
Loxosceles devia – Purple
Loxosceles kaiba - Light Grey
Loxosceles reclusa - Dark Grey
Loxosceles russelli - Blue
Loxosceles sabina - Light Green

Distribution data interpreted from:
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7468.html
http://spiders.ucr.edu/images/colorloxmap.gif
http://hobospider.org/recluse.html

tag · login or register to post comments

Contributed by Christopher C Wirth on 2 October, 2005 - 10:27pm
Last updated 19 July, 2011 - 8:49am

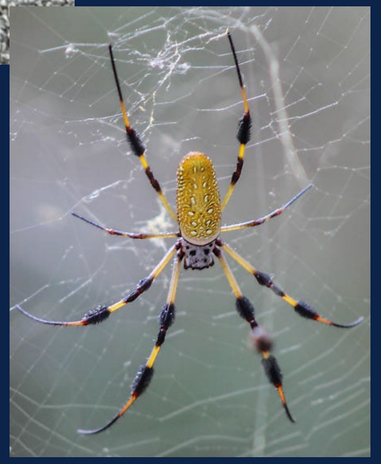
Fig 1. Geographic distribution of Loxosceles spp [5].

Reply from photograph author pending.

Species geography

Brown Recluse Envenomation: Clinical Considerations

- DDx of other necrotic wound forming species:
  - Sac spider (*Cheiracanthium*)
  - Jumping spider (*Phidippus*)
  - Orb weaver spider (*Argiope*)
- Definitive dx
  - Entomology identification
- Otherwise?
  - Dermonecrotic wound (more accurate)



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Brown Recluse Envenomation: Diagnostic testing

- No confirmatory clinical testing
- Research tests present
- Ancillary clinical laboratory testing
  - Hemolysis labs
    - CBC
    - PT, PTT/INR
    - D dimer
    - Fibrinogen
  - BMP + LFTs
  - Coombs testing
  - UA

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Brown Recluse Envenomation:
3 Basic Clinical Spectrum Categories [1]

- 1st : Local mild effects
  - Urticarial local signs + small erythematous, papule
  - → Firm
  - → Healed

Cutaneous loxoscelism [2]

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Brown Recluse Envenomation:
3 Basic Clinical Spectrum Categories [1]

2nd "Red, white, and blue" reaction

- Initially: painless or stinging sensation
- 2 to 8 hrs post bite: blistering, bleeding, and ulceration
- 1 to 3 days post bite: "Red, white, and blue" reaction =
  - Increases in diameter
  - → Central hemorrhagic vesiculation
  - → Ulceration + violaceous necrosis + surrounding ischemic skin blanching + outer erythema
  - → Induration

Cutaneous loxoscelism [2]

3 days

19 days

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Brown Recluse Envenomation:
3 Basic Clinical Spectrum Categories [1, 6]

2nd "Red, white, and blue" reaction

- Time course:
  - Hyperemia → erythematous circumferential outline
  - Central blister necrosis @ 3 to 4 days; 40% cases
  - Eschar formation @ 5 and 7 days
  - Indurated and eschar falls off, leaving ulcer by secondary intention @ 7 to 14 days
  - Ulceration that heals by secondary intention
  - Other symptoms: malaise (14%) , nausea (7%), myalgias, rash (5%), fever (3%)

Cutaneous loxoscelism [2]

35 days

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Brown Recluse Envenomation:
3 Basic Clinical Spectrum Categories [1]

2nd "Red, white, and blue" reaction

- Increase size → more fatty areas (thighs, buttocks, and abdomen)
- Healing time proportional to lesion size
  - 30 cm require → months or more
- Severity: location, location
  - Pediatric upper airway obstruction 2/2 progressive cervical soft tissue edema 40 hours later (R)
  - Ear envenomation → stridor and respiratory distress
  - Thrombocytosis (2,000 x 10^9/L plt ct)
  - Thrombocytosis reported

FIGURE 1. Submandibular edema caused by brown recluse spider bite, causing symptoms of upper airway obstruction.

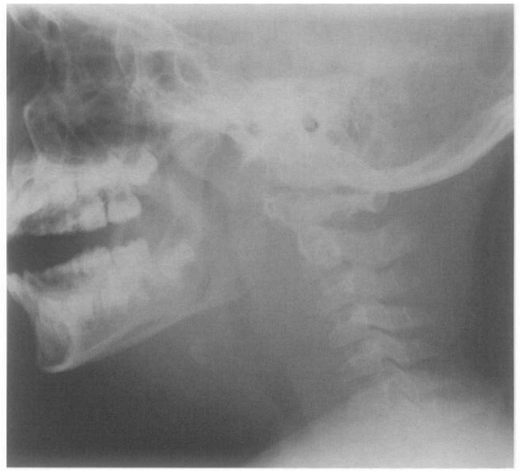

FIGURE 2. Lateral neck radiograph showing soft tissue swelling anterior and posterior to the trachea.

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Brown Recluse Envenomation:
3 Basic Clinical Spectrum Categories [1]

- 3rd : Systemic loxoscelism
  - Cutaneous reaction not predicted
  - Post bite 24 to 72 hours
  - At risk: young
  - Fever, chills, weakness, edema, nausea, vomiting, arthralgias
  - Petechial eruptions, rhabdomyolysis, disseminated intravascular coagulation (DIC), hemolysis → hemoglobinuria, acute kidney injury (AKI), and death.
  - North America: systemic illness and mortality is rare; case reports noted [3,4].

AKA Cutaneous-hemolytic/viscerocutaneous [2]

Case definitions [2]

C.M.S. Malaque et al.

Putative: spider not known to be in area, atypical skin lesion

Presumptive: spider known to be in area, compatible lesion, typical clinical course

Probable: spiders found in area, patient may have felt bite, seen a spider, typical lesion, typical clinical course

Documented: spider found after bite, identified by qualified person, typical lesion, typical clinical course

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Brown Recluse Envenomation: Treatment

- Consider severity of patient [1]

General Wound Care	*Local Wound Care*	*Systemic*
Clean	Serial observations	Antipruritic/antianxiety and/or analgesics
Tetanus prophylaxis as indicated	Natural healing by granulation	Antibiotics for secondary bacterial infection
Immobilize and elevate bitten extremity	Delayed primary closure	Antivenom (experimental)
Apply cool compresses; avoid local heat	Delayed secondary closure with skin graft	
	Gauze packing, if applicable	

- Supportive care PRN [1,2]:
  - Abx if secondary infx
  - Fluids resuscitation
  - Hemolysis (Hgb < 7 vs 8) transfusion criteria: pRBCs + consider Coombs testing
  - Coagulopathy: transfuse with products and monitor labs (ffp, platelets, *rare*)
  - Hemoglobinuria → fluids + urinary alkalinization (Bicarb)
  - AKI → IV fluids, consider dialysis/CRRT
  - Plasma exchange
- Corrective surgery in late course (2+ wks)
  - Skin grafts

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Brown Recluse Envenomation: Treatment [1,2]

- As of today, no…
  - α-anti-Loxosceles Fab (α-Loxd)
    - Requires diagnosis in less than 24 hr for effectiveness
  - Recombinant sphingomyelinase D antiloxoscelic serum
    - More research needed
  - Dapsone: risks outweigh benefits
    - Risks: hepatitis, methemoglobinemia, hemolysis
    - Benefit: In patients with central purplish bleb or vesicle w/in 6-8 hrs of bite→ reduce PML migration
    - Poor inclusion criteria (such as case definition)
  - Tetracycline - rabbit studies shows a positive signal [7]
- Never
  - Corticosteroids
  - Electric shock delivery, cyproheptadine, topical nitroglycerin (based on animal studies)
  - Colchicine (don't give patients toxicity)
  - Early surgical escharotomy

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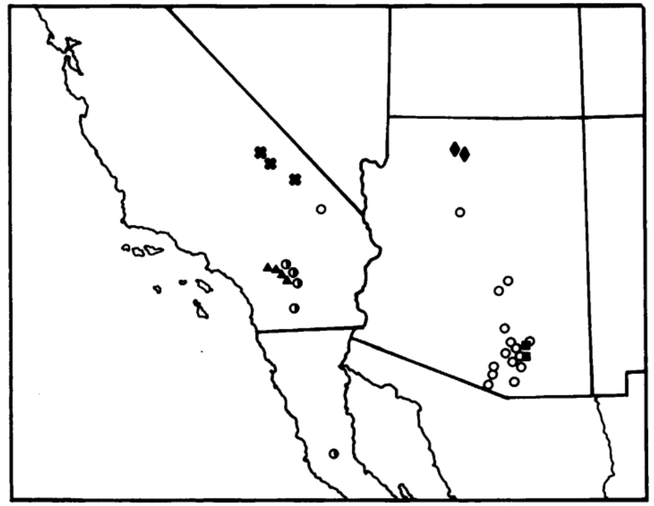
Arizona brown spider basics

- All *Loxosceles spp* has risk of clinical significant envenomation.
- *L. arizonica* first described 1958 by Drs Gertsch and Mulaik [8].
- *The Arizona Brown Spider* coined in 1968. [9]
- 1st documented bite in 1968 and 1st death in 1997. [3,10]
- First survey: Elevation 2,700-4,750 ft [11]
- Second survey: 2,600-2,800 ft [12] (2 sites, west of South Tucson)
  - Primary prey: ants [12]
  - Found under dead or fallen Saguaro cactus or human debris such as cardboard boxes. [12]
- Animal mortality risk of envenomization inverse to animal size (mice vs rabbit). [13]



MAP 4. Southwestern United States and adjacent Mexico, showing distributions of *Loxosceles russelli* (crosses), *L. kaiba* (diamonds), *L. arizonica* (open circles), *L. sabina* (squares), *L. palma* (half-filled circles), and *L. martha* (triangles).

[14]

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Diagnostic Aide

Viewpoint

May 2017

NOT RECLUSE—A Mnemonic Device to Avoid False Diagnoses of Brown Recluse Spider Bites

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» Author Affiliations | Article Information

JAMA Dermatol. 2017;153(5):377-378. doi:10.1001/jamadermatol.2016.5665

Context

- Based on *L. reclusa* bites from (a) 50 years (1000+ cases) of Missouri dermatological experience & (b) review of false reports of spider bites
- Further investigation if applicable to *L. arizonica* or other *Loxoceles spp*, globally.

Inconsistent feature		DDx
N - Numerous	More than 2 lesions	Contagious bacterial infection, herpes zoster, pyoderma gangrenosum, poison ivy or poison oak, and arthropod bites (e.g., fleas, bedbugs, and various mites).
O - Occurrence	No synanthropic disturbance	Other specific context/occurrence, such as gardening → sporotrichosis.
T - Timing	During Nov - Mar	Other spider implicated ***
R – Red Center	Inflamed red central area	Arthropod bite or sting, streptococcal cellulitis, or uncommon bacterial infection such as anthrax.
E- Elevated	Central lesion area height > 1 cm normal skin	Other arthropod bite or sting or a bacterial infection such as *S. aureus*
C - Chronic	Incomplete wound time at threshold	For large wounds, incomplete at 3 month; or for small wounds, 3 weeks → pyoderma gangrenosum, nonmelanoma skin cancer, or other (i.e. tularemia ulceration)
L - Large	Necrosis > 10 cm	Pyoderma gangrenosum.
U – Ulcerates too early	Less than 7-14 days	Within 7 days, consider infection, Pyoderma gangrenosum if ulceration, anthrax if crusting
S - Swollen	Swelling below neck and above feet	Streptococcal cellulitis, hymenopteran sting, or bacterial infection.
E -Exudative	Exudative, moist, or purulent	Bacterial infection (i.e. S. aureus that has a crusted, purulent, elevated lesion)

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2 or more? ***Likely Not*** a brown recluse bite [15]

Summary

- Rare cases, esp. viscerocutaneous form
- Usually bitten while putting on clothing and pressure applied
- Obtain good history and clinical exam.
- Most present with “small, superficial necrotic lesions that will heal completely with basic care…“ [2]
  - Hyperemia, subacute fever, malaise, myalgia
- Consider ddx using the NOT RECLUSE
- No ID lab or toxin available in US
- Order labs to eval for hemolysis, etc.
- Wound care & supportive care
- Admit if systemic/hemolytic/viscerocutaneous form
- ID by specialist (such as photo)
- Consider plastic surgery referral for outpatient follow-up

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