What's Eating You? *Triatoma* and *Arilus cristatus* Bugs

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PRACTICE **POINTS**

- Triatomine bugs (*Triatoma*) and the wheel bug (*Arilus cristatus*) are found throughout North America with a concentration in southern regions.
- Bites of triatomine bugs can cause anaphylaxis; prevention of bites to diminish household infestation is important because sensitization can result in increased severity of anaphylaxis upon subsequent exposure.
- Chagas disease—caused by transmission of the parasite *Trypanosoma cruzi*—can be a complication of a *Triatoma* bite in endemic areas; treatments include nifurtimox and benznidazole.
- Left undiagnosed and untreated, Chagas disease can have long-lasting implications for cardiac and gastrointestinal pathology.

Members of the *Triatoma* and *Arilus* genera (family Reduviidae) often are mistaken as the same arthropod, though their bites have vastly different health implications. Bites of the wheel bug *(Arilus cristatus)* are painful compared to *Triatoma* bites, which are painless but can cause disease and result in an anaphylactic reaction, posing a risk to human health because these pliable insects commonly infest residential dwellings. A common dermatologic presentation of bites from *Triatoma* species and *A cristatus* is an erythematous pruritic papule that can progress to an urticarial wheal, though the presentation can differ from patient to patient. Treatment depends on whether the reaction is localized or systemic, ranging from topicals to systemic agents if anaphylaxis occurs.

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Classification

Triatomine bugs (*Triatoma*) and the wheel bug (*Arilus cristatus*) are part of the family Reduviidae (order Hemiptera, a name that describes the sucking proboscis on the front of the insect's head).[1,2] Both arthropods are found in multiple countries and are especially common in warmer areas, including in the United States, where they can be seen from Texas to California.[3,4] Because blood-feeding triatomines need a blood meal to survive while laying eggs and then throughout their 5 developmental nymph stages to undergo molting, they feed on mammals, such as opossums, raccoons, pack rats, and armadillos, whereas wheel bugs mainly prey on soft-bodied insects.[1,4-6]

Triatoma bugs seek cutaneous blood vessels using thermosensors in their antennae to locate blood flow under the skin for feeding. After inserting the proboscis, they release nitric oxide and an anticoagulant that allows for continuous blood flow while feeding.[7] It has been reported that triatomine bugs are not able to bite through clothing, instead seeking exposed skin, particularly near mucous membranes, such as the hands, arms, feet, head, and trunk. The name *kissing bug* for triatomines was coined because bites near the mouth are common.[6] The bite typically is painless and occurs mainly at night when the insect is most active. After obtaining a blood meal, triatomine bugs seek shelter and hide in mud and daub structures, cracks, crevices, and furniture.[1,8]

Unlike *Triatoma* species, *A cristatus* does not require a blood meal for development and survival, leading it to prey on soft-bodied insects. Piercing prey with the proboscis, wheel bugs inject a toxin to digest the contents and suck the digested contents through this apparatus.[4] Because the wheel bug does not require a blood meal, it typically bites a human only for defense if it feels threatened. Unlike the painless bite of a triatomine bug, the bite of *A cristatus* is extremely painful; it has been described as the worst arthropod bite—worse than a hornet's sting. The pain from the bite is caused by the toxin being injected into the skin; possible retention of the proboscis makes the pain worse.[4,9] In addition, when *A cristatus* is disturbed, it exudes pungent material from a pair of bright orange subrectal glands while stridulating to repulse predators.[9]

Although *Triatoma* species and *A cristatus* have separate roles in nature and vastly different impacts on health, they often are mistaken for the same arthropod when seen in nature. Features that members of Reduviidae share

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include large bodies (relative to their overall length); long thin legs; a narrow head; wings; and a long sucking proboscis on the front of the head.[10]

Characteristics that differentiate *Triatoma* and *A cristatus* species include size, color, and distinctive markings. Most triatomine bugs are 12- to 36-mm long; are dark brown or black; and have what are called tiger-stripe orange markings on the peripheral two-thirds of the body (Figure 1).[11] In contrast, wheel bugs commonly are bigger—measuring longer than 1.25 inches—and gray, with a cogwheel-like structure on the thorax (Figure 2).[10]

Dermatologic Presentation and Clinical Symptoms

The area of involved skin on patients presenting with *Triatoma* or *A cristatus* bites may resemble other insect bites. Many bites from *Triatoma* bugs and *A cristatus* initially present as an erythematous, raised, pruritic papule with a central punctum that is visible because of the involvement of the proboscis. However, other presentations of bites from both arthropods have been reported[4,6,7]: grouped vesicles on an erythematous base; indurated, giant, urticarial-type wheels measuring 10 to 15 mm in diameter; and hemorrhagic bullous nodules (Figure 3). Associated lymphangitis or lymphadenitis is typical of the latter 2 variations.[6] These variations in presentation can be mistaken for other causes of similarly presenting lesions, such as shingles or spider bites, leading to delayed or missed diagnosis.

Patients may present with a single bite or multiple bites due to the feeding pattern of *Triatoma* bugs; if the host moves or disrupts its feeding, the arthropod takes multiple bites to finish feeding.[8] In comparison, 4 common variations of wheel bug bites have been reported: (1) a painful bite without complications; (2) a cutaneous horn and papilloma at the site of toxin injection; (3) a necrotic ulcer around the central punctum caused by injected toxin; and (4) an abscess under the central punctum due to secondary infection.[4]

Anaphylaxis—Although the bites of *Triatoma* and *A cristatus* present differently, both can cause anaphylaxis. *Triatoma* is implicated more often than *A cristatus* as the cause of anaphylaxis.[12] In fact, *Triatoma* bites are among the more common causes of anaphylaxis from bug bites, with multiple cases of these reactions reported in the literature.[12,13]

Symptoms of *Triatoma* anaphylaxis include acute-onset urticarial rash, flushing, dyspnea, wheezing, nausea, vomiting, and localized edema.[2] The cause of anaphylaxis is proteins in *Triatoma* saliva, including 20-kDa procalin, which incites the systemic reaction. Other potential causes of anaphylaxis include serine protease, which has similarities to salivary protein and desmoglein in humans.[11]

The degree of reaction to a bite depends on the patient's sensitization to antigenic proteins in each insect's saliva.[4,6] Patients who have a bite from a triatomine bug are at risk for subsequent bites, as household infestation is likely due to the pliability of the insect, allowing it to hide in small spaces unnoticed.[8] In the case of a bite from *Triatoma* or *A cristatus*, sensitization may lead to severe and worsening reactions with subsequent bites, which ultimately can result in life-threatening anaphylaxis.[1,6]

Treatment and Prevention

Treatment of *Triatoma* and *A cristatus* bites depends on the severity of the patient's reaction to the bite. A local reaction to a bite from either insect can be treated supportively with local corticosteroids and antihistamines.[3] If the patient is sensitized to proteins associated with a bite, standard anaphylaxis treatment such as epinephrine and intravenous antihistamines may be indicated.[14] Secondary infection can be treated with antibiotics; a formed abscess might need to be drained or debrided.[15]

FIGURE 1. Triatomine bug (so-called kissing bug)*(Triatoma species)*.

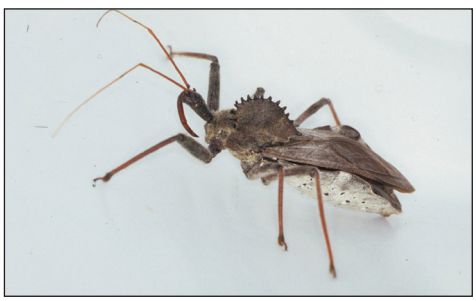

FIGURE 2. Wheel bug *(Arilus cristatus)*.

FIGURE 3. A well-circumscribed wheal with erythematous serpiginous borders and central punctum, secondary to a bite by a *Triatoma* bug.

There's No Place Like Home—Because *Triatoma* bugs have a pliable exoskeleton and can squeeze into small spaces, they commonly infest dwellings where they find multiple attractants: light, heat, carbon dioxide, and lactic acid.[8] The more household occupants (including pets), the higher the levels of carbon dioxide and lactic acid, thus the greater the attraction. Infestation of a home can lead to the spread of diseases harbored by *Triatoma*, including Chagas disease, which is caused by the parasite *Trypanosoma cruzi*.[5]

Preventive measures can be taken to reduce the risk and extent of home infestation by *Triatoma* bugs, including insecticides, a solid foundation, window screens, air conditioning, sealing of cracks and crevices, outdoor light management, and removal of clutter throughout the house.[8] Because *Triatoma* bugs cannot bite through clothing, protective clothing and bug repellent on exposed skin can be employed. Another degree of protection is offered by pest management, especially control of rodents by removing food, water, and nests in areas where triatomine bugs feed off of that population.[8,14]

Unlike triatomine bugs, wheel bugs tend not to invade houses; therefore, these preventive measures are unnecessary. If a wheel bug is identified, do not engage the arthropod due to the defensive nature of its attack.[4,9] Such deliberate avoidance should ensure protection from the wheel bug's painful bite.

Medical Complications

Although triatomine bugs and wheel bugs are in the same taxonomic family, subsequent infection is unique to *Triatoma* bugs because they need a blood meal to survive. Because *Triatoma* bugs feed on mammals, they present an increased opportunity for transmitting the causative agents of infection from hosts on which they have fed.[12] The principal parasite transmitted by triatomines is *T cruzi*, which causes Chagas disease and lives in the gastrointestinal (GI) tract of the insect.[5] When a triatomine bug seeks out a mucosal surface to bite, including the mouth, it defecates and urinates during or shortly after feeding, leading to contamination of the initial wound or mucosal surfaces. In addition, *Triatoma* bugs are vectors for transmission of *Serratia marcescans*, *Bartonella henselae*, and *Mycobacterium leprae*.[16]

Chagas Disease—This infection has 3 stages: acute, intermediate, and chronic.[5] The acute stage can present with symptoms of conjunctivitis, fever, lymphadenopathy, hepatosplenomegaly, and anemia. The intermediate stage typically is asymptomatic. The chronic stage usually involves the heart and GI tract and causes cardiac aneurysms, cardiomegaly, megacolon, and megaesophagus. Initial symptoms can be a localized nodule (chagoma) at the inoculation site, fever, fatigue, lymphadenopathy, and hepatosplenomegaly.[2] Unilateral palpebral edema with associated lymphadenopathy (Romaña sign) also can be seen—not to be confused with bilateral swelling in an acute reaction to an insect bite. Romaña sign is pathognomonic of *T cruzi* infection; bilateral palpebral swelling is typical of an allergic reaction.[12]

Identification of a triatomine bite is the first step in diagnosing Chagas disease, which can be life-threatening. Among chronic carriers of Chagas disease, 30% develop GI and cardiac symptoms, of which 20% to 30% develop cardiomyopathy, with serious symptoms that present 10 to 20 years after the asymptomatic intermediate phase.[2]

Chagas disease is endemic to Central and South America but is also seen in North America; 28,000 new cases are reported annually in South America and North America combined. Human migration from endemic areas and from rural to urban areas has promoted the spread of Chagas disease.[2] However, patients in the United States have a relatively low risk for Chagas disease, largely because of the quality of housing construction and use of insecticides.

Treatment options for Chagas disease include nifurtimox and benznidazole. Without treatment, the host immune response typically controls acute replication of the parasite but will lead to a chronic state, ultimately involving the heart and GI tract.[5]

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