

Allergic rhinitis and asthma induced by boxelder bug sensitization

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Clinical Implications

- We describe a patient whose symptoms of allergic conjunctivitis, rhinitis, and asthma were due to sensitivity to boxelder bugs. This sensitivity can be suspected by the presence of these insects and the history of worsening symptoms during winter months.

TO THE EDITOR:

A healthy 35-year-old woman with no history of allergies or asthma moved to Salt Lake City, Utah, in 2014. During autumn of that year, the family's new house became infested with boxelder bugs (*Boisea trivittata*, aka *Leptocoris trivittatus*), Figure 1, as is common in the area. Although a nuisance, these insects were deemed harmless^{1,2} and, given her pregnancy, the use of pesticides was not pursued. With the arrival of spring, the insect infestation receded. When the bugs returned the following fall, the patient developed symptoms of severe allergic conjunctivitis with itching, redness, and tearing. Symptoms progressed to those characteristic of allergic rhinitis, with marked sneezing, nasal itching, rhinorrhea, and nasal obstruction, and then to mild intermittent asthma (treated with albuterol inhalation). Daily fexofenadine administration rendered the allergic symptoms tolerable, but asthma persisted.

These symptoms persisted throughout the fall and winter, seasons when the insects could be found in the house. With the arrival of spring, the patient's symptoms, including asthma, lessened, and fexofenadine was not required. After enduring 2 seasons of symptoms, she presented for medical appraisal. Physical examination was normal, but laboratory testing revealed an increased IgE level of 946 kU/L (normal range, <214 kU/L).

Because of the unusual seasonal symptom pattern, with worsening during winter months and improvement in the summer months and the coincidence of her symptoms with the presence of the boxelder bugs, the possibility of allergic sensitization to the insects was tested. The patient collected 8 boxelder bugs, which she immediately froze and brought to the allergy clinic on ice. The insects were placed in a mortar and pestle and ground in a volume of 5 mL of albumin buffered saline. Dilutions in the extraction buffer were prepared at 1:100, and the skin prick test was performed. As shown in Figure 2, the patient had a positive wheal and flare reaction at 15 minutes, 5 x 5 mm wheal with 20 x 20 mm flare, whereas 3 control subjects did not react to the skin test with the 1:100 dilution.

The following fall, the exterior of her house was treated with Bifen IT (Bifenthrin 7.9%) and Cymic CS (Lambda Cyhalothrin 9.7%) insecticides. Although a small number of boxelder bugs were still found inside of the house, her allergic symptoms and asthma did not return, nor did she require the use of fexofenadine.

Boxelder bugs are found throughout North America and tend to live primarily on box elder trees but can be found on maple

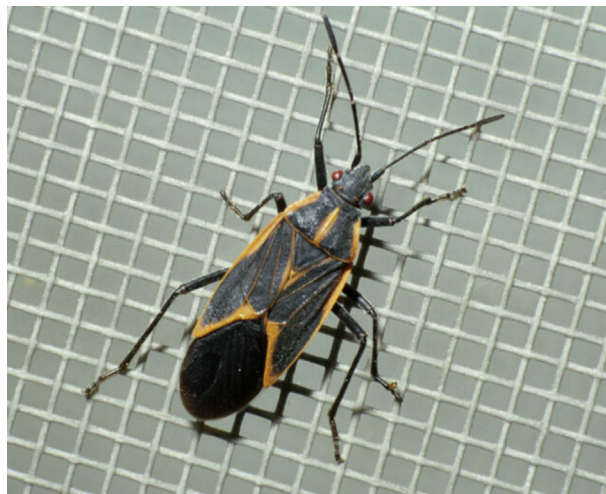


FIGURE 1. Boxelder bugs. An adult boxelder bug is about 1.3 cm in length, black with orange or red markings, including 3 stripes behind the head.



FIGURE 2. Skin prick test reaction to boxelder extract. A refers to the reaction to diluent, albumin buffer. H refers to reaction to histamine as the positive control. 100 is the reaction to a 1:100 fold dilution of the crude boxelder bug extract.

and ash trees as well. The adults are dark brown or black, with wings rimmed in red, and are approximately $\frac{1}{2}$ -inch long (Figure 1). They are not known to cause significant harm to agriculture, structures, or people, other than secreting a substance that can stain walls and upholstery. As such, they are known as “nuisance pests.” They often form large aggregates while sunning themselves, especially on southern-facing walls. During cooler months, they may invade structures seeking warmth, and hibernate in a structure’s walls.^{1,2}

Despite 2 previous reports of asthma induced by boxelder bugs,^{3,4} these insects are most often referred to as harmless, and it is not generally recognized that they induce negative health effects. In our patient, a helpful clue to etiology was the unusual seasonal timing with winter worsening. We wish to raise recognition of the negative impact on health that boxelder bugs can cause and encourage clinicians to consider these insects as a possible trigger of asthma and/or allergic conjunctivitis and rhinitis, especially in regions where they are known to be endemic. Presently, skin testing using individually formulated crude insect extract remains the only confirmatory procedure; even though antigens involved can be detected *in vitro*,⁴ commercial testing is not available.

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