

Managing Cutaneous Reactions to Yellow Fly (*Diachlorus ferrugatus*) Bites

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PRACTICE POINTS

- *Diachlorus ferrugatus*, commonly known as the yellow fly, belongs to the Tabanidae family of insects that also includes deer flies and horse flies.
- The female yellow fly can instill a painful bite in humans and can cause local and systemic allergic reactions.
- Medical management of yellow fly bites is dictated by the severity of the reaction.

Although the yellow fly (*Diachlorus ferrugatus*) is a common flying insect in the southeastern United States, reports in the literature on allergic reactions resulting from its bite are limited. We present the case of a 48-year-old man with a rapidly progressive cutaneous allergic reaction to a bite from a yellow fly that was successfully managed with oral prednisone. We also discuss the epidemiology, cutaneous manifestations, and management of yellow fly bites.

The yellow fly (*Diachlorus ferrugatus*) is a flying biting insect belonging to the order Diptera, family Tabanidae, which also includes deer flies (genus *Chrysops*) and horse flies (genus *Tabanus*).¹ They are different from stinging insects of the order Hymenoptera (bees, wasps, yellow jackets, and hornets). As the name suggests, the yellow fly has a distinct yellow appearance, and adult yellow flies have a body length of approximately 1 cm.^{1,2} Distinguishing features of the yellow fly include prominently dark forelegs (the remaining legs are yellow), dark purple to black eyes with 2 fluorescent green

lines, and a yellow abdomen with black hairs along the lateral regions and a broad central yellow stripe.¹⁻³ Their wings have longitudinal black veins with clear spaces in between and a conspicuous brown patch at the apex (Figure 1A). In comparison, horse flies are darker and larger (Figure 1B), and deer flies are similar in shape but have stripes on the abdomen and thorax and mottled wings with dark patches near the apex (Figure 1C).¹

The Tabanidae family comprises 4455 species belonging to 137 genera and is notorious for bites that result in localized pain, swelling, itching, and discomfort.⁴ While some Tabanidae species are mechanical or biologic vectors of pathogens (eg, *Loa loa*, equine infectious anemia virus, *Trypanosoma* species, cattle and sheep anthrax and tularemia), yellow flies do not appear to play a considerable role in disease transmission.^{4,5} Nonetheless, their bites can cause discomfort and create a nuisance for individuals residing within their distribution areas as well as for agricultural livestock, contributing to lower weight gain and milk production.¹

Yellow flies are a commonly occurring species in the southeastern United States; their distribution spans several states, including New Jersey, Florida, and Texas.^{1,2} In Florida, specifically, yellow flies exhibit a seasonal pattern, with peak activity typically occurring from April through June.⁶⁻⁹ Activity levels are heightened around sunset as well as sunrise.^{1,9} Tabanids can be found in forests, parks, and gardens—particularly those that contain waterways such as freshwater lakes and streams—and typically stay near shaded woodlands that are prone to flooding.⁹

Tabanids go through the life cycle stages of egg, larva, pupa, and adult; the life cycle typically spans 1 year, with

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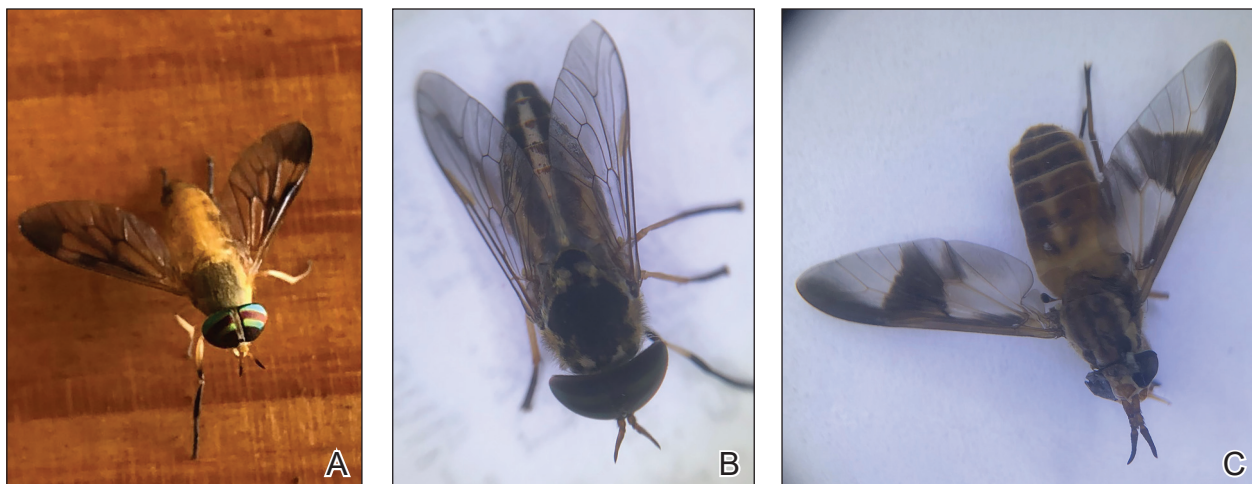


FIGURE 1. The eye color and wing color pattern distinguish the yellow fly (A) from the horse fly (B) and the deer fly (C). The specimens shown here were trapped and photographed by the authors at the patient's property in Central Florida.

the adults living 30 to 60 days.¹ Mating occurs soon after adults emerge from the pupal case in the soil.^{1,10} Females then are attracted to large dark moving objects and will feed on blood to develop eggs.^{2,10} Only female members of the Tabanidae family have modifications of the mouth parts that allow wounding of the skin (Figure 2). Their bites introduce saliva to the skin containing anticoagulants and other likely allergens. The tongue is used to lap between 20 to 600 microliters of blood.¹¹ Males feed primarily on pollen and nectar.¹⁰ Most tabanid bites result in transient wheal-and-flare reactions, but some can result in more severe allergic reactions such as in our reported case.¹⁰ Rarely, anaphylactic reactions have been documented.^{10,12}

Case Report

A 48-year-old man presented with swelling of the left hand following a yellow fly bite to the wrist 30 minutes prior while he worked outside at a ranch in central Florida (Figure 3). The patient was afebrile and reported no respiratory or gastrointestinal symptoms. The left hand and forearm were warm to the touch and appeared red and edematous (Figure 4). He was not tachycardic and did not appear to be in any distress. The patient reported that he had worked on the ranch for several years, and during that time had noted he was developing worsening localized reactions to yellow fly bites. He had visually identified the offending insect prior to the current presentation and had trapped some flies in previous incidents. Recently he had experienced rapid swelling at the bite sites but had never experienced respiratory difficulties or signs of systemic allergic reactions. He previously had used topical steroids when bites resulted in mild wheal-and-flare reactions, but he reported that these were no longer effective.

Management of the current bite reaction included oral prednisone tapered over 1 week from 40 mg to 10 mg daily as well as oral cetirizine 10 mg daily. Although bacterial



FIGURE 2. Only female members of the Tabanidae family have modifications of the mouth parts that allow wounding of the skin, as seen in this horse fly.

cellulitis was considered in the differential diagnosis, no oral antibiotics were prescribed given the patient's history of similar clinical presentations following yellow fly bites. His symptoms resolved within a few hours of his dose of prednisone. Incidentally, our patient has been able to control the progression of subsequent hypersensitivity reactions to yellow fly bites with a single 20-mg dose of prednisone administered at the onset of the bite.

Comment

In general, blood-feeding (hematophagous) insects rarely cause anaphylaxis and are more likely to cause cutaneous hypersensitivity reactions, possibly due to the



FIGURE 3. The patient sustained a yellow fly bite on the left wrist while working outside on a ranch in Central Florida. Photograph was taken within 20 minutes of original bite.

small amount of antigen injected from a bite.^{13,14} The immediate wheal-and-flare reaction is an IgE-mediated type 1 immune reaction compared to a less common type 4 T-cell mediated delayed hypersensitivity reaction.^{14,15} There are many protein allergens in the saliva of biting insects that are not well characterized. Relevant allergens include a 69 kDa salivary gland protein as well as a Tab y 1 (anticoagulant), Tab y 2 (hyaluronidase), and Tab y 5 (antigen 5-related venom protein).^{11,15-17} Some of these proteins have structural homology between insects of different orders and can cause cross-reactivity in patients who also are allergic to Hymenoptera stings (wasp-horsefly syndrome).^{12,16}

Our patient's cutaneous reaction was localized and clinically manifested with rapidly progressive erythema and edema at the bite location. He did not exhibit signs of a systemic reaction such as angioedema, respiratory or gastrointestinal symptoms, tachycardia, or hypotension. Management of affected patients depends on the extent of the reaction and may include oral or parenteral antihistamines as well as oral steroids for more severe edema.¹¹ Anaphylactic reactions generally respond to subcutaneous epinephrine.¹⁵ It would be prudent for patients with a relevant anaphylactic history to carry an autoinjectable epinephrine pen in case of difficulty breathing or general malaise following a bite. Besides avoidance of insect bites, personal protection methods include wearing long-sleeved shirts and pants and using insect repellents containing diethyl toluamide (DEET), citronella, or geraniol.¹

At present, diagnosis of cutaneous reactions to yellow fly bites is best made based on the patient's personal history.¹⁴ If the offending fly is trapped, it can be identified. As most patients cannot differentiate between insects, it may be helpful for dermatologists to know that a small amount of blood at the bite site is suggestive of a



FIGURE 4. The patient presented with rapidly progressing edema and erythema of the left hand and forearm following a yellow fly bite. The progression of swelling is demarcated from 30 minutes after the bite to 90 minutes later.

fly bite rather than a sting from a member of the order Hymenoptera. Currently, there are no consistently useful extracts for intradermal skin testing.¹¹ Although there are several commercially available serum-specific IgE tests for suspected horse fly reactions, their usefulness is doubtful without further information on sensitivity and specificity as well as the allergen utilized.^{11,18,19} The use of allergen immunotherapy to induce hyposensitization in patients who experience cutaneous reactions is not standardized and poses some risks including severe allergic reactions requiring facilities for resuscitation, variability of response patterns, and supporting evidence is weak.¹¹

Final Thoughts

Cutaneous reactions to yellow fly bites rarely are described in the dermatology literature. The salivary proteins implicated in inducing an allergic response and cross-reactivity of *D ferrugatus* with other biting and stinging insects as well as the natural course of immune reactions over time need to be further characterized.

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