What's Eating You? Oak Leaf Itch Mite (*Pyemotes herfsi*)

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The oak leaf itch mite (*Pyemotes herfsi*), also known as the oak leaf gall itch mite or the itch mite, is a mite thought to have originated in Europe. Previously, the mite was reported to have caused a papular rash in grain workers in the Czech Republic.[1] In late August 2004, the first reported cases of a dermatitis resulting from bites of this mite in the United States occurred in Kansas. The outbreak eventually affected more than 20,000 residents, prompting an investigation that led to the identification of *P herfsi* as the most likely responsible organism; these mites were found to be infesting nearby pin oak trees *(Quercus palustris)*.[2] Since then, cases have been reported in Illinois, Nebraska, Ohio, Oklahoma, Missouri, Tennessee, and Texas.[3] We report a case involving the oak leaf itch mite in Lancaster, Pennsylvania, that caused a pruritic papular rash in a patient.

Case Report

A 34-year-old woman presented to the clinic with itchy bumps on her face, neck, arms, knees, and trunk of 1 month's duration. The pruritus was so extreme it would keep her awake at night. She had noted low-grade fevers and an episode of nausea in conjunction with the rash. Her primary care physician had treated her with prednisone, diphenhydramine, cetirizine, hydroxyzine, and intramuscular triamcinolone, but she experienced no relief from her symptoms.

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The patient reported that her 2 sons and approximately 15 neighbors all had identical pruritic papules. She had found information on *Pyemotes* mites on the Internet and was concerned that they could be the cause of her rash. Her husband, who worked for a tree service, had identified marginal leaf fold galls on the large pin oak tree in their backyard.

Clinically, the patient and her 2 sons all had multiple, distinctive, 1- to 3-cm erythematous plaques with centrally located 1- to 2-mm vesicles, some that were excoriated (Figure 1). They were located predominately on areas not covered by clothing, including the arms, neck, face, and legs. Groupings of lesions or burrows to suggest bedbug bites or scabies infestation, respectively, were not identified.

Laboratory testing performed by her primary care physician revealed normal antinuclear antibody titer, serum protein electrophoresis, complement levels, liver function tests, renal function tests, electrolytes, complete blood cell count, sedimentation rate, coagulation studies, and Lyme titer.

A punch biopsy obtained from the patient's right posterior knee demonstrated mild spongiosis and a dense perivascular neutrophilic infiltrate with focal vasculitic changes. Scattered lymphocytes and eosinophils also were noted. The histologic differential diagnosis included an arthropod bite reaction, Sweet syndrome, bowel-associated neutrophilic dermatosis, and rheumatologic-associated dermatosis.

Pin oak leaves with marginal leaf fold galls (Figure 2) were submitted to the Department of Entomology at Pennsylvania State University, University Park. Mites found within these galls were determined to be *P herfsi*. This identification was subsequently confirmed by the US Department of Agriculture's Systematic Entomology Laboratory.

Comment

Mites belong to the subclass Acarina (or Acari) of the class Arachnida, a group of invertebrates that have

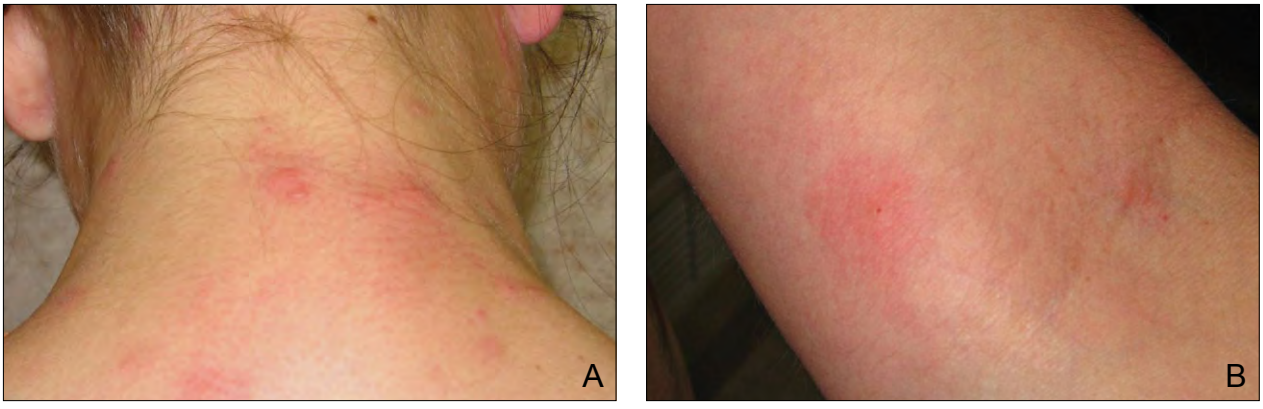

Figure 1. Bites of *Pyemotes herfsi* on the neck (A) and antecubital fossa (B).

Figure 2. Marginal leaf fold gall on pin oak leaf.

8-jointed legs in their adult forms, including spiders, scorpions, and ticks. Mites go through 4 stages of development, which include egg, larva, nymph, and adult. At all stages the mite has 8 legs, except for the 6-legged larva stage. Mites are incredibly diverse and can survive freely in soil or water, or they can parasitize plants, animals, or insects. Among the tens of thousands of species of mites in the world, the *Pyemotes* species prey upon insects, but when they encounter humans, they can cause intensely pruritic reactions at their bite sites[4] and potentially have systemic effects.

The oak leaf itch mite typically produces a pruritic rash that consists of multiple erythematous papules, primarily occurring on exposed areas such as the extremities, face, and neck. The mite is only approximately 0.2 mm in length and is therefore very difficult to detect with the naked eye.[4] Usually, patients do not remember being bitten and only seek treatment when the pruritic rash becomes apparent. Fortunately, this particular mite cannot live on humans and is not known to transmit any infectious diseases.

In late August 2004, the first recorded domestic outbreak caused by the *P herfsi* mite was reported.[2] Approximately 300 residents of Pittsburg, Kansas, reported a pruritic rash, which ultimately affected more than 20,000 individuals in the midwestern states. The outbreak spurred a community-based survey to identify the causative agent and assess the extent of the outbreak. Of the 100 case respondents, 48% and 37% reported a rash on their neck and arms, respectively. Healthcare providers evaluated 40 of these respondents and 77% of the rashes were composed of erythematous, well-demarcated papules; less than 22% were pustular, macular, or confluent. Forty-eight percent of 187 households surveyed had at least 1 pin oak tree with leaf galls, and of the leaf galls analyzed, 59% were infested with *P herfsi*. The odds of having bites were 3.9 times greater for patients who had at least 1 pin oak tree (Figure 3) on their property than those without.[2] A further attempt to determine a causal link between the mite and the widespread dermatitis was made following the initial survey.[4] A high prevalence of gravid female mites feeding on larvae within pin oak tree leaf galls was found near the outbreak.

The tiny *P herfsi* mite is reddish tan in color and has 4 pairs of legs (2 anterior and 2 posterior).[3] Gravid females, which are generally easier to visualize due to their distended abdomen, can produce up to 250 offspring (Figure 4). The gravid female mite preys on gall-making midge larvae (Cecidomyiidae) on oak leaves. As the female feeds within the leaf gall, her offspring develop from egg to adult mite within her abdomen. The adult males emerge from the abdomen of the mother first and the females follow. Mating

Figure 3. Pin oak tree.

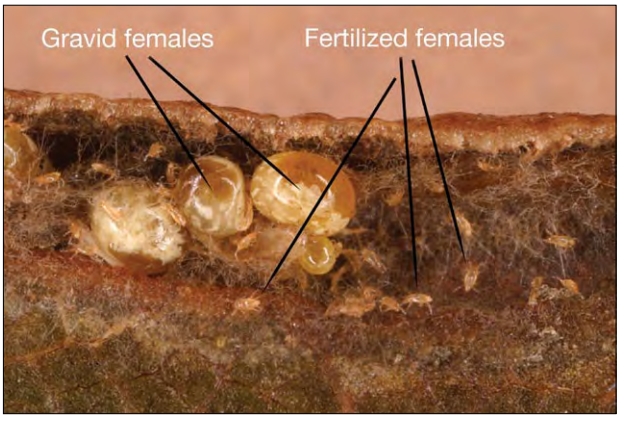

Figure 4. *Pyemotes herfsi* females, both gravid (large) and newly fertilized.

between them occurs immediately, and after mating, the males die. The ratio of males to females is estimated to be 1 to 10 to 1 to 20. The mated females then find a new leaf gall to begin the life cycle again. When the newly fertilized females become numerous, they often seek out alternative hosts. It is during this dispersal phase that mites will inadvertently bite humans. Most bites occur in the late summer and early fall when their population peaks. The mites are so small that they are carried in the wind, traveling long distances, and will easily pass through window screening and bite humans indoors.[3]

Preventive measures are recommended to reduce the risk for exposure to the oak leaf itch mite,[2] including using DEET (N,N-diethyl-meta-toluamide)–containing products before spending time outdoors, wearing protective clothing, and washing clothing as well as showering immediately after exposure to wooded or grassy areas. However, anecdotal information suggests that DEET may not provide complete protection. If the bites do occur, treatment remains symptomatic, including treating the rash with soothing lotions and reducing the itch with oral antihistamines or topical steroids.

The pin oak tree is one of the most popular decorative trees in the United States due to its aesthetic appeal. It is one of the few deciduous trees that do not shed its leaves during the winter. Although the leaves die in the fall, they remain attached to the branches until new leaves appear in the spring. It is native to the United States and is generally found in the eastern and midwestern regions. Because of the oak leaf itch mite's reproductive potential and easy dispersal with wind, the mite will most likely find hosts among commonly found pin oak trees, and dermatitides resulting from the bites of these mites will almost certainly become more prevalent throughout the country.

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