

Dermestid Dermatitis in a 2-Year-Old Girl: Case Report and Review of the Literature

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Abstract: Dermatitis from contact with carpet, larder, and hide beetles (family *Dermestidae*) is a seemingly uncommon or underrecognized hypersensitivity reaction to the specialized hairs on the larvae of certain dermestid beetles. The erythematous papulovesicular dermatitis that may result from such contact can be mistakenly construed as evidence of bites of bedbugs or other arthropods or infestation with scabies mites or can be the basis for a diagnosis of delusory parasitosis. We present a case of dermestid dermatitis in a 2-year-old girl and provide a review of the current literature.

Beetles are generally of minor importance in dermatology. Adult blister and false blister beetles (families *Meloidae* and *Oedemeridae*) contain and exude cantharidin, and certain rove beetles (family *Staphylinidae*) contain paderin, a vesicating fluid that results in blistering and erythematobullous reactions. Larvae of some caterpillars are covered with urticating hairs or spines that are hollow and envenomating and others that are nonenvenomating but mechanically irritating. Similarly, some carpet, hide, and larder beetles (family *Dermestidae*) are covered with hastisetæ, specialized hairs that can cause urticaria, dermatitis, vasculitis, lymphadenopathy, and allergic rhinitis in sensitized persons. These effects seem to be mechanical and allergic in nature and do not involve a

specific toxin (1). The lesions that result may easily be confused with dermatitis from diverse other causes, including various kinds of arthropod bites, mite infestations, contact dermatitis, and bullous impetigo, and as evidence of delusory parasitosis.

CASE REPORT

A 2-year-old girl in Germany was referred for evaluation of worsening skin eruptions that had begun a few months earlier on her feet and progressed to her face and hands. The parents reported that new lesions were observed in the mornings, and these mainly occurred on areas not protected by clothing. The patient's mother reported occasionally having

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similar lesions on her skin, but only one or two at a time. The child's father was unaffected but had been out of the house working overseas for the previous 9 months. The child had been eating and sleeping well and was otherwise healthy and meeting all growth curves, with occasional upper respiratory infections and otitis media treated with multiple different antibiotics. On initial inspection of the home by the parents 1 month after onset, a small brown insect had been found crawling on the child's bed but was discarded as something presumably brought in from outdoors.

Physical examination revealed multiple erythematous urticarial papules with superficial excoriations on the face, hands, and feet (Figs. 1 and 2). The rest of the skin was unremarkable. The patient was diagnosed with a papular urticaria reaction and the parents were advised to search the house for insects.

The parents conducted an exhaustive search of the patient's room, during which several insects were found on and in the patient's stuffed animals, mattresses, drawers, baseboards, and behind nightstands (Fig. 3). Insects were not observed on a synthetic rug partially covering the floor of the child's room. The child's room was treated using a pyrethroid aerosol fog for a presumptive bedbug infestation and the child was moved to another room and given new



Figure 1. Multiple excoriated erythematous urticarial papules on the face of a 2-year-old girl.



Figure 2. Excoriated urticarial papules on the right hand.



Figure 3. Carpet beetle larva with multiple brown bristle-like hairs along the body and posterior surface.

bedding, but she continued to develop new, but fewer, lesions. In an effort to further remove presumed environmental irritants, the mattresses were vacuumed, the carpets steam cleaned, and all of the old bedding and linens discarded. A dramatic reduction in the appearance of new lesions was realized thereafter.

The patient's lesions were treated with triamcinolone 0.1% ointment twice a day to the body, tacrolimus 0.1% ointment twice a day to the face, and colloidal oatmeal baths. At follow-up 3 days later, there was a 70% to 80% improvement in lesions, and within 2 weeks the lesions were all healing. Presuming that further insect abatement efforts were required, the apartment was again fogged with an aerosolized insecticide. An inspection of the adjoining dwelling in the adjoining duplex apartment revealed hundreds of live larvae, larval casings, insect eggs, and adult

beetles. The occupants of that neighboring unit seemed unaffected and refused housecleaning and fumigation. After discussion with two dermatologists and an entomologist, the affected family was urged to move to another residence.

A sample of larvae and adult beetles was collected for identification (provided by RJP). Included were adults of *Dermestes lardarius* (the larder beetle) and *Anthrenus* sp. (a carpet beetle), several carpet beetle larvae of *Anthrenus* sp., and fragments of one or more *Attagenus* sp.

In an effort to determine whether the beetle larvae were the source of irritation, an allergist performed skin prick and patch tests on the child. The skin prick challenge consisted of a preparation of five live larvae that had been crushed in saline. Patch testing of the patient, her parents, and an author (RJP) was performed using whole larvae, larval head, larval body, hairs, and a nontreated control, each secured for 3 hours using a gauze bandage, the maximum contact time the patient would tolerate. The patient was nonreactive to the skin prick challenge but reacted at the site of the intact larva patch test 5 days later and developed mildly erythematous papules on the face similar to her initial lesions. All other patch testing of the patient and others was negative.

DISCUSSION

Dermestid beetle larvae feed on diverse dried organic materials, including carcasses of vertebrates and invertebrates, dried foodstuffs, and natural textiles, carpets, and clothing. They neither bite nor infest living animals. The larvae of many species are covered with a dense array of barbed spearheaded hastisetæ (arrow hairs) and slender spicisetæ (bristle hairs) that break off easily, are carried aloft by air currents, are capable of lodging on human skin and mucus membranes and being inhaled and ingested, and cause allergic responses (2–4) (Figs. 4 and 5).

Hypersensitivity to dermestid beetles was reported in the medical literature as early as 1922. Longshoremen who unloaded cargo infested with dermestid larvae experienced pruritic, erythematous eruptions on exposed skin and a dry hacking cough (5). Dermestid-associated occupational disease was later reported for a museum curator with symptoms of asthma on exposure to extracts and powdered preparations made from the beetle (6). Dermestid beetle larval parts have since been reported in sputum samples and cervical smears (7–9).

Our patient's manifestations were reminiscent of those reported for a 47-year-old woman with acute



Figure 4. Carpet beetle larva with numerous slender short and long bristled spicisetæ dorsolaterally (bristle hairs) and barbed spear-headed hastisetæ posteriorly (arrow hairs) (light microscopy, 40 $\times$).

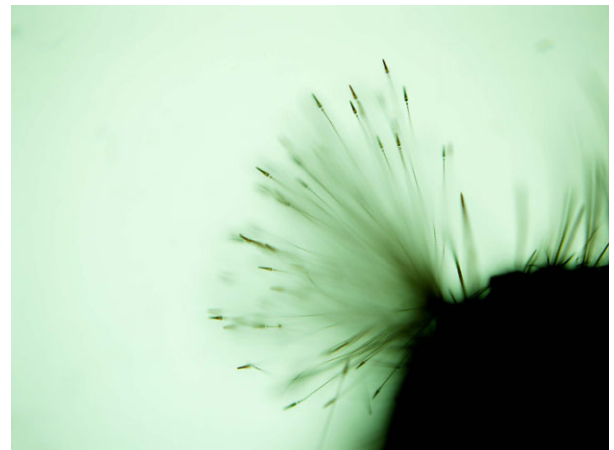


Figure 5. High-powered view of barbed arrow-headed hastisetæ (light microscopy, 100 $\times$).

dermatitis who had urticarial eruptions with papules and vesicles that began on the extensor surfaces of her forearms and spread to exposed areas of her neck, chest, and legs (10). Her apartment was infested with carpet beetles. Patch testing to larval extract in saline was negative, mildly positive to larval hairs and strongly positive to a decapitated larva within 4 minutes. Subsequent cases of patch or prick test-confirmed carpet beetle dermatitis in adults have been reported (11–15). Pediatric cases have been reported rarely in the literature (16).

Whereas prick test results provide evidence that some eruptions derive from a type I immunoglobulin E-mediated immediate hypersensitivity reaction to larval antigen (12,15), patch tests are indicative of a

TABLE 1. Published Reports of Dermestid Dermatitis

Author	Patients, n	Time to diagnosis	Initial diagnosis	Age, years	Sex	Distribution	Location	Species	Testing
Rustin and Munro (16)	1	10 months	Scabies	2	Male	Face, trunk, penis, limbs	London	<i>Dermestidae maculatus</i>	CTNP
Lewis-Jones (21)	1	3 months	Papular urticaria	2	Female	Face, back, legs	Scotland	<i>Dermestidae</i> sp.	CTNP
Jacquemin and Ferrandez (22)	8		Not reported	Unknown	Male	Hands, legs, feet	North Africa	<i>Dermestidae undulatus</i>	CTNP
Ramachandran et al (14)	1	5 months	Infectious disease vs. connective tissue disease vs. vasculitis	40	Male	Ears, neck, shoulder, limbs	London	<i>Dermestidae peruvianus</i>	Patch: +++ larval extract
Krause et al (24)	1	2 years	Proctitis	58	Male	Perianal	Austria	<i>Anthrenus verbasci</i>	CTNP
Horster et al (15)	4	1 month	Not reported	31, unknown, 4, 1	Male and female	Legs > trunk, limbs	Munich	<i>Anthrenus museorum</i>	Prick: + larval extract with papular delayed-type hypersensitivity reaction 4 days later
Ahmed et al (12)	1	5 years	Papular urticaria	22	Male	Limbs	Los Angeles	<i>A. verbasci</i>	Prick: + larval antigen; patch: –
Cormia and Lewis (10)	1	3 weeks	Unusual contact dermatitis	47	Female	Neck, chest, limbs	New York	<i>Anthrenus scrophulariae</i>	Patch: ++ decapitated larva within 4 minutes; + hairs only; larval extract in saline
Ayres and Mihan (11)	1	unknown	Delusions of parasitosis	Middle aged	Female	Not reported	Los Angeles	<i>A. verbasci</i>	CTNP
Zanca et al (13)	1	2 weeks	“Contact with insects”	51	Female	Lower limbs	Italy	<i>A. verbasci</i>	CTNP
Hoverson (23)	1	3 months	Bedbugs	2	Female	Face, arms, legs	Germany	<i>Anthrenus</i> sp.*	Prick: – larval extract; patch: + larva after 5 days, – larval head, larval body, hairs only

CTNP, confirmatory testing not performed.

*Multiple different *Anthrenus* species were identified in the patient's home.

type 4 delayed-type hypersensitivity reaction in other cases, such as with our patient (Table 1). Dermestid beetle dermatitis has been mistaken for bedbug infestation, as well as scabies and delusory parasitosis or Ekbom's syndrome (Table 1). Many patients treated symptomatically for such delusions have provided samples of presumed arthropod or parasite villains for evaluation. Although most such samples tend to be composed of innocuous creatures and collections of debris, others contain biting, infesting, or irritating creatures, including dermestid beetles, in whole and part (17,18).

This case illustrates several common diagnostic and management challenges. Eruptions of unknown etiology are frequently assumed to result from biting or infesting arthropods, and patients and their homes often are treated presumptively. In this case, the patient's and adjoining residences were infested with abundant and diverse kinds of dermestid beetles. It may be that the beetles were thriving on natural fibers in clothing or linens or those within the stuffed doll and animals that the child cuddled frequently. When such varied kinds of dermestids are present so abundantly, and particularly in adjoining residences, they are often associated with a bird or mammal carcass nearby, perhaps above the ceiling or within the walls. No efforts were made in this case to search for such a source.

The beetle larvae and their exuviae, which were on the stuffed dolls and animals with which the child played and slept, may explain, in part, the distribution of lesions on the face and other exposed areas of the child. The child's mother experienced similar but many fewer lesions, and the child's father seemed unaffected, perhaps because of their limited exposures. Dermestid beetles, particularly carpet beetles, are to be expected in virtually every dwelling worldwide. Despite the ubiquitous distribution of these common urban pests, most persons do not develop any type of reaction (9,12).

Finally, the pesticide treatments of this dwelling were not justified since they were applied without establishing the correct identity of the pests. Such fogging treatments would not likely have been efficacious against these pests (19) and may pose an unnecessary risk (20). Cleaning, eliminating contaminated articles, or relocating would be far more effective in reducing environmental exposure. While remaining in the affected dwelling for 18 months after initial presentation, although the occasional carpet beetle larva was still found, the family continued to have fewer cutaneous manifestations by implementing strict housecleaning measures.

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REFERENCES

1. Griswold GH, Greenwald M. Studies on the biology of four common carpet beetles. Cornell Agric Exp Station Memoirs 1941;240:1–75.
2. Russell RC, Otranto D, Wall RL. Beetles (Coleoptera: Meloidae, Oedemeridae, Staphylinidae and others). In: Russell RC, Otranto D, Wall RL, eds. The encyclopedia of medical and veterinary entomology. Wallingford, Oxfordshire, UK: CABI, 2013:41–45.
3. Jurecka W, Gebhart W, Mainitz M. *Anthrenus* sp. The paraffin block eater bug. Am J Dermatopathol 1987;9:204–207.
4. Brito FF, Mur P, Barber D et al. Occupational rhinoconjunctivitis and asthma in a wool worker caused by *Dermestidae* spp. Allergy 2002;57:1191–1194.
5. Loir A, Legangneux H. Accidents de travail occasionnés par des coléoptères. Bull Acad Med Paris 1922;88:68–72.
6. Sheldon JM, Johnston JH. Hypersensitivity to beetles (Coleoptera). Report of a case. J Allergy 1941;12:493–494.
7. Bryant J, Maslan AM. Carpet beetle larval parts in Pap smears: report of two cases. South Med J 1994;87:763–764.
8. Bechtold E, Staunton CE, Katz SS. Carpet beetle larval parts in cervical cytology specimens. Acta Cytol 1985;29:345–352.
9. Johnson FP, Batchelor J. Carpet beetle larval hairs in a sputum cytology specimen. Acta Cytol 1989;33:286.
10. Cormia FE, Lewis GM. Contact dermatitis from beetles, with a report of a case due to the carpet beetle, *Anthrenus scrophulariae*. N Y State J Med 1948;48:2037–2039.
11. Ayres S, Mihan R. "Delusions" of parasitosis caused by carpet beetles. JAMA 1967;199:675.
12. Ahmed R, Moy R, Barr R et al. Carpet beetle dermatitis. J Am Acad Dermatol 1981;5:428–432.
13. Zanca A, Zanca A, Cassisa A. A case of carpet beetle dermatitis. G Ital Dermatol Venereol 2012;147:216–218.
14. Ramachandran S, Hern J, Almeyda J et al. Contact dermatitis with cervical lymphadenopathy following exposure to the hide beetle *Dermestes peruvianus*. Br J Dermatol 1997;136:943–945.
15. Horster S, Prinz JC, Holm N et al. Anthrenus-dermatitis. Hautarzt 2002;53:328–331.
16. Rustin MHA, Munro DD. Papular urticaria caused by *Dermestes maculatus* Degeer. Clin Exp Dermatol 1984;9:317–321.
17. Pollack RJ, Norton SA. Ectoparasite infestations and arthropod injuries. In: Longo DL, Fauci AS, Kasper DL et al, eds. Harrison's principles of internal medicine. New York: McGraw-Hill, 2015:2744–2751.

18. Halvorson C. An approach to the evaluation of delusional infestation. *Cutis* 2012;90:E1–E4.
19. Jones SC, Bryant JL. Ineffectiveness of over-the-counter total-release foggers against the bed bug (*Heteroptera: Cimicidae*). *J Econ Entomol* 2012;105:957–963.
20. Forrester MB, Diebolt-Brown B. Total release fogger exposures reported to Texas poison centers, 2000–2009. *Toxicol Environ Chem* 2011;93:1089–1097.
21. Lewis-Jones MS. Papular urticaria caused by *Dermestes maculatus* Degeer. *Clin Exp Dermatol* 1985;10:181.
22. Jacquemin P, Ferrandez R. Les larves de *Dermestes undulatus* Brahm peuvent être nocives pour l’homme. *Bull Soc Hist Nat Afr N*. 1955;46:280–281.
23. Hoverson K, Wohltmann WE, Pollack RJ, et al. Dermestid dermatitis in a 2-year-old girl: case report and review of the literature. *Pediatr Dermatol* 2015. doi: 10.1111/pde.12641
24. Krause R, Reisinger EC, Zenahlik P, et al. The beetle *anthrenus verbasci* causing proctitis and perianal itching. *Scand J Gastroenterol* 1998;33:894–895.