

Airborne contact dermatitis from *Ambrosia deltoidea* (triangle-leaf bursage)

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3 cases of contact dermatitis due to exposure to airborne allergens from *Ambrosia deltoidea* (triangle-leaf bursage) are presented. Although airborne plant dermatitis was suggested in each case by a history of aggravation of the rash by outdoor exposure and typical skin lesions, patch testing with an oleoresinous extract of *A. deltoidea* leaves identified the source of the sensitizer, not previously reported. As *A. deltoidea* is a ragweed that probably contains sesquiterpene lactones nearly identical to those of ragweeds widely prevalent in most of North America, the patients presented indicate the need for commercially available, standardized, plant extracts for patch testing in this country. The finding of positive patch tests with filters from an air sampler placed in 1 patient's domestic environment suggests a new avenue of investigation in airborne contact dermatitis.

Key words: air sampling; airborne contact dermatitis; *Ambrosia*; Compositae; plant dermatitis; ragweed. © Blackwell Munksgaard, 2003.

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Contact dermatitis caused by airborne antigens is a well-recognized problem in which there is chronic persistent erythema, induration and intense pruritus that mainly involves exposed skin, particularly the face and hands. When there is no occupational exposure to an antigen known to cause airborne contact dermatitis (ACD), the condition may be misdiagnosed as atopic dermatitis, photo-induced dermatitis (1) or neurodermatitis. Exposure (often occupational) to airborne dusts containing antigens from chrysanthemum and other flowers and herbs in the Compositae family of plants are known to cause contact dermatitis (2–6). Many species belonging to the Compositae family, including plants belonging to the genus *Ambrosia*, are known to cause contact dermatitis (7–14), mainly from sensitization to sesquiterpene lactones in the plant oleoresin (9, 10). Some of the Compositae, particularly the ragweeds, have caused airborne dermatitis. However, occurrence of ACD from non-occupational exposure to plants is not often suspected in cities in the American Southwest, because of the lack of awareness of a locally prevalent species of ragweed that could cause this disease.

For the past 15 years, patch-testing materials from plant oleoresins have not been obtainable from commercial sources in the USA. This is a

possible reason for the lack of published reports on contact dermatitis due to plant materials in this country for over a decade, while studies of plant dermatitis in many other countries continue. In this report, we describe several cases of ACD from *Ambrosia deltoidea*, a weed that is common in southern Arizona and superficially bears little resemblance to other species of *Ambrosia* that are commonly recognized as ragweed. In 1 case, evidence of sensitivity to material captured on air filters is presented, suggesting a method of proof of ACD.

Patients and Methods

Case no. 1

A 63-year-old university professor who had lived in southern Arizona for 25 years presented with a 4-year history of an erythematous rash that began on his face after returning from a camping trip. The rash was extremely pruritic and involved swelling of the eyelids and diffuse erythema and scaling. The rash would flare within 8 hr of being outdoors at any time of the year, especially on windy days. The rash reduced in intensity within 24 hr of a visit to a mountainous area and would clear completely within several days of beginning a vacation on the coast of France. The rash also responded to treatment with prednisone,

60 mg/day, but was resistant to treatment with intermediate-potency topical corticosteroids. Installation of high-efficiency filtration in his home air-conditioning did not reduce the intensity of his rash. There was no history of rhinitis or asthma. On examination, he had diffuse, beefy red erythema of the face, neck and hands, with fine cracking of the skin, consistent with epidermal disruption. Deep skin creases in the forehead and face gave him a leonine facial appearance (Fig. 1). A few plaques of erythema were noted on the arms, legs and trunk. Prick tests with aqueous extracts of locally prevalent allergenic pollen including *A. deltoidea* were negative.

Case no. 2

A 72-year-old man who moved to southern Arizona from Kansas 5 years previously presented with an intensely pruritic red rash on his face, hands and arms for 18 months. He scratched to the point of bleeding and noted that his skin would often split and bleed spontaneously. The rash was usually accompanied by swelling of the skin and oozing. At times, his eyelids would be swollen shut. Moderate-potency topical corticosteroid creams were ineffective, and the rash would respond only to an injection of triamcinolone acetonide, followed by a relocation to Kansas for a 7-week period. His rash reduced in intensity if he was able to stay indoors and was usually worse when he spent any time outdoors, particularly during windy weather, which provoked intense pruritus of his skin and itchy, watery eyes. Examination showed florid erythema of his face and forehead, extending to the hairline. The erythema extended down to the neck and upper chest, with a clearly defined margin. The erythema on the hands and forearms was maximal on the dorsum of the skin. There were

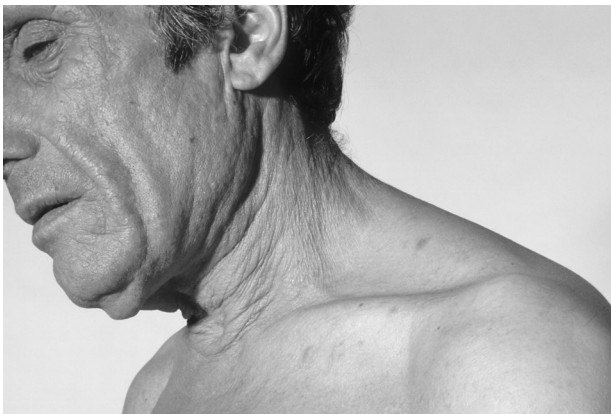


Fig. 1. Case no. 1. Note the diffuse erythema, deep skin creases and superficial fissuring of facial skin.

extensive linear excoriations and cracking of the skin, consistent with epidermal disruption. Skin creases were deepened on the face and neck (also seen in Case no. 1).

Case no. 3

A 47-year-old man presented with a 9-year history of a rash on his arms and legs that would flare whenever he hiked in the desert. At times, the rash extended to his face, forehead and eyelids. The rash typically would begin 24 hr after hiking and become progressively red over several days, followed by peeling, persisting for at least 10 days. The rash would sometimes ooze and form crusts. All of the symptoms would disappear within 48 hr of visiting Alabama. The rash was worse after hiking in certain mountainous areas near Tucson and would not occur if he hiked in the Gila River area (near Phoenix, AZ, USA) where poison oak is prevalent, even though he had a childhood history of poison ivy dermatitis.

Air sampling and patch testing

Air Sentinel air samplers (Quan-Tec Air Inc., Rochester, MN, USA), modified to collect samples on Teflon filters, were calibrated to sample at 24 L/min and were placed inside and outside the home of Case no. 1 and at an urban location in Tucson for 24 hr. The filters from the samplers were then applied under Scanpor[®] tape (Allerderm, Petaluma, CA, USA) to the patient's skin for 48 hr as patch tests. Testing with plant extracts was done with Finn Chambers[®] (Allerderm, Petaluma, CA, USA) and Scanpor[®] tape, using oleoresinous materials derived from ether extracts of leaves of *A. deltoidea* (triangle-leaf bursage), *Baccharis sarothroides* (desert broom), *Rhus lancea* (African sumac) and *Larrea tridentata* (creosote bush), prepared according to Guin and Skidmore (13). *A. deltoidea* plants (Fig. 2) were plentiful outside the home of Case no. 1, and all 4 of the plant species are known to be prevalent in Tucson, AZ. *A. deltoidea* is rare in the urban, mid-town location where 1 of the air samples was taken.

Results

In Case no. 1, reactions at 24 and 48 hr were strongly positive to patch testing with extracts of *A. deltoidea*, with a 30 × 30 mm induration and blistering. The tests were weakly positive to *L. tridentata* and negative to *B. sarothroides* and *R. lancea* (Table 1). In Case no. 1, there was a strongly positive response to the filter from the outdoor sampler at his home, a negative response



Fig. 2. *Ambrosia deltoidea* (triangle-leaf bursage, rabbit-bush).

to the indoor filter from his home and a moderately positive response to the filter from the urban sampler remote from the patient's home. These filters were also applied to a normal subject with negative responses. Patch testing with the *A. deltoidea* extract was moderately positive in Case no. 2, and in Case no. 3, there was a strongly positive response, with blistering and satellite lesions. Tests with extracts of *L. tridentata*, *R. lancea* and *B. sarothroides* were all negative in Case nos. 2 and 3.

Discussion

The rash of ACD has a characteristic appearance, maximally affecting the face and hands. This eruption frequently has a sharp demarcation at the mid biceps line and the upper sternal V line, reminiscent of photo-induced dermatitis. Unlike photo-induced dermatitis, ACD does not spare the submental area or postauricular sites. In severe cases, the skin is diffusely erythematous and thickened and often displays fine cracks (epidermal disruption) and bleeding from scratched extremely pruritic skin. In Case no. 1, evidence in support of the diagnosis of ACD precipitated by allergens from an outdoor source is based on: (1) a clear history of reproducible reduction in the intensity of the rash, with geographical relocation and deterioration on returning home; (2) a positive patch test, with filters from air samplers placed outdoors; and (3) a positive patch test with oleoresin from leaves of *A. deltoidea*, a weed commonly found in the vicinity of the patient's home. Diagnosis of ACD in the other 2 cases rested on aggravation of the rash by outdoor exposure, reduction in intensity on avoidance and a positive patch test with *A. deltoidea* extract.

Patch testing with filters from air samplers has the potential of not only confirming the airborne nature of the sensitizing agent (as in 1 of the cases reported here) but also identifying agents eluted from the filters chemically and locating the probable source of the airborne agent by multiple sampling. Further studies are needed to validate this method.

A. deltoidea is a common weedy shrub that grows at elevations between 300 and 900 m in southern Arizona and throughout Sonora, Mexico and is related to 3 other locally prevalent ragweeds, *Ambrosia ambrosioides*, *Ambrosia dumosa* and *Ambrosia psilostachya*. *A. deltoidea* is also taxonomically related to the ragweeds *Ambrosia trifida* (giant ragweed) and *Ambrosia artemisiifolia* (short ragweed), which are widely distributed throughout North America but are rare in Arizona and Sonora. Although cross-reactivity between the contact sensitizers from *A. deltoidea* and short and giant ragweed have not been studied extensively, it is very likely that patients sensitized to *A. deltoidea* in the Southwest will have ACD on exposure to ragweeds at higher elevations in the region or elsewhere in North America. Similarly, patients with ACD due to short and giant ragweed may not be able to escape the problem by relocating to the Southwest where they are exposed to *A. deltoidea* and other ragweed species. Sesquiterpene lactones, known to be important contact sensitizers, have been extracted from *A. deltoidea* and have been found to be chemically similar to sesquiterpene lactones from a number of other ragweed species in Arizona, southern California, Nevada, Sonora and Baja California [*A. ambrosioides* (canyon ragweed), *A. dumosa* (desert ragweed), *Ambrosia cordifolia* and *Ambrosia chenopodiifolia*] (15). Even when desiccated, stems and leaves are the main source of sesquiterpene lactones, and so dermatitis from exposure to the sensitizer is a perennial problem that does not vary according to seasonal flowering of the plant.

Severe cases of ACD may be difficult to treat, while there is continued exposure. As in Case no. 1, high-potency topical corticosteroids and prednisone may provide temporary reduction in intensity, but the rash will not clear until the patient relocates to an environment free of the sensitizing agent. In severe cases, relocation to a geographical area where the flora is completely free of *Ambrosia* species may be necessary. Agents such as Ivy Block[®] Lotion (EnviroDerm Pharmaceuticals Inc., Louisville, KY, USA) may be useful in preventing exacerbations of dermatitis if applied prior to exposure, but this product may be

Table 1. Patch test and immunoglobulin E (IgE) antibody results

		Case no. 1	Case no. 2	Case no. 3	Controls
Patch tests with air sampler filters	Home indoors	Negative	ND	ND	Negative (<i>n</i> = 1)
	Home outdoors	Strongly positive	ND	ND	Negative (<i>n</i> = 1)
	Urban outdoors	Positive	ND	ND	Negative (<i>n</i> = 1)
Patch tests with ether extracts	<i>Ambrosia deltoidea</i>	Very strongly positive	Strongly positive	Very strongly positive	Negative (<i>n</i> = 10)
	<i>Larrea tridentata</i>	Borderline positive	Negative	Negative	Negative (<i>n</i> = 10)
	<i>Baccharis sarothroides</i>	Negative	Negative	Negative	Negative (<i>n</i> = 10)
	<i>Rhus lancea</i>	Negative	Negative	Negative	Negative (<i>n</i> = 10)
Patch tests with aqueous extracts	<i>A. deltoidea</i> pollen	Positive	ND	ND	
	Other pollens, house dust mite ^a	Negative	ND	ND	
Serum IgE antibody	<i>A. deltoidea</i>	Negative	ND	ND	
	Other pollens, house dust mite ^a and <i>Alternaria</i>	Negative	ND	ND	

ND = not done.

^a*Dermatophagoides farinii* and pollen from *Cynodon dactylon*, *Atriplex wrightii*, *Amaranthus palmeri*, *Salsola kali*, *Morus alba*, *Prosopis juliflora* and *Olea europaea*.

irritating in patients with established dermatitis, as was found in Case no. 1.

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