



# Black-spot poison ivy, a report of 3 cases with clinicopathologic correlation

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## INTRODUCTION

Black-spot poison ivy is an uncommon clinical manifestation of contact with *Toxicodendron* plants. Unlike allergic contact dermatitis, which typically manifests in sensitized individuals within 24–48 hours, the black lacquer that results from oxidation of the oleoresin after contact with the plant develops within hours of exposure and precedes allergic contact dermatitis, in some cases by weeks.<sup>1,2</sup> Black-spots are usually accompanied by an irritant dermatitis reaction of varying severity. The appearance of an irregular black macule is often alarming to patients and prompts clinical evaluation. Because the diagnosis is straightforward and based on clinical appearance and history alone, biopsy is rarely done; thus, few descriptions of the pathologic findings exist in the literature.<sup>3–5</sup> We herein report 3 characteristic cases of black-spot poison ivy with clinicopathologic correlation and review the pathophysiology of this uncommon condition.

## CLINICAL PRESENTATION

### Case 1

A 58-year-old woman presented with a black spot on the left arm that developed overnight and became noticeably larger over the course of a few hours (Fig 1).

### Case 2

A 15-year-old woman presented with an asymptomatic black macule on the left arm (Fig 2). A few

days before its development she had been hiking with friends who later developed what was presumed to be contact dermatitis from poison ivy exposure. She also reported similar dark spots on the clothing she was wearing the day of the hike. Examination revealed an irregular black macule on the left forearm and a few eroded plaques on the arm. Scraping with a Gillette blade easily removed the pigment without causing bleeding. A superficial shave biopsy was performed (Fig 3).

### Case 3

A 38-year-old woman with a history of malignant melanoma presented with a 1-week history of an asymptomatic black macule on the left elbow that occurred after being out in the yard (Fig 4). The patient was concerned about malignancy and requested a biopsy of the lesion (Fig 5).

## MICROSCOPIC FINDINGS

The most characteristic and consistent microscopic finding in all 3 cases was yellow-to-brown discoloration of the cornified layer. This ranged from golden brown granules to a yellowish brown-to-orange discoloration extending into the epidermis. No decoration of the pigment was seen with Fontana-Masson and Perl iron stains. The degree of associated inflammation varied in each case. In case 1, there was focal spongiosis accompanied by a mild, perivascular, largely lymphocytic inflammatory infiltrate with rare eosinophils. Cases 2 and 3

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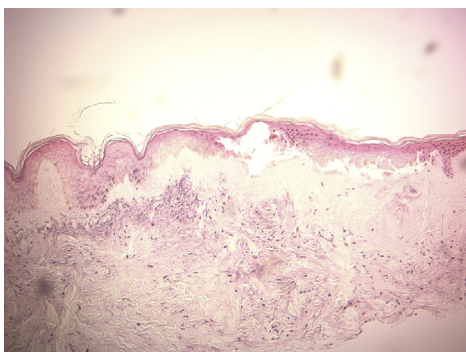
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**Fig 1.** Black-spot poison ivy in case 1. Left arm with brown macule containing central black angulated discoloration.



**Fig 2.** Black-spot poison ivy in case 2. Left arm with black, angulated macule.

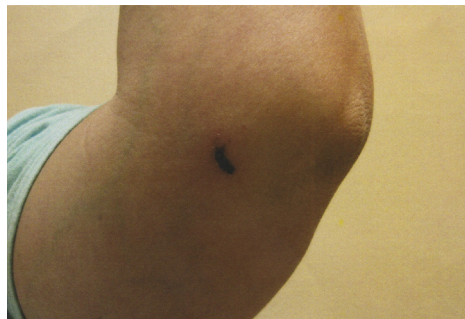


**Fig 3.** Hematoxylin-eosin staining of black-spot poison ivy lesion in case 2. Note the yellow-brown discoloration of the stratum corneum.

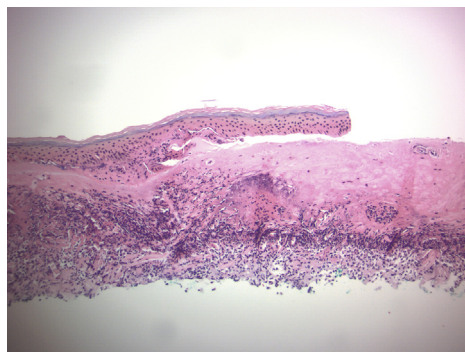
demonstrated varying degrees of epidermal necrosis, homogenization of papillary dermal collagen, and a largely lymphocytic inflammatory infiltrate with karyorrhexis (Figs 3 and 5).

## DISCUSSION

All toxicodendron plants have resin channels throughout the plant that contain urushiol oleoresins that vary in composition and concentration.



**Fig 4.** Black-spot poison ivy in case 3. Black, somewhat-angulated macule with surrounding erythema.



**Fig 5.** Hematoxylin-eosin staining of black-spot poison ivy lesion in case 3. Note the necrosis of the epidermis and superficial dermis as well as the karyorrhexis of the inflammatory infiltrate.

When the plant is injured, the sap is extruded and, within minutes of exposure to air, the sap hardens by oxidation into a black resin to seal the injury.<sup>1</sup> It is often visible on previously injured sections of the plant.<sup>2</sup> This black lacquer can also form on clothing, tools, paper, and skin. The finding of the black lacquer on multiple substrates supports the conclusion that on the skin the black lacquer is not an eschar but the oleoresin itself.<sup>3</sup> The oleoresin also accounts for the yellowish amorphous material often present in the stratum corneum seen on hematoxylin-eosin stained biopsy sections. The high concentration of the urushiol needed to produce the black resin accounts for the irritant contact dermatitis, which can mask pathologic features of allergic contact dermatitis in sensitized individuals.<sup>4</sup>

This characteristic oleoresin reaction forms the basis of the black spot test, which involves blotting an injured leaf or other plant material on a piece of white paper and waiting for black lacquer formation (a way to confirm the identity of the toxicodendron plants when the botanical identification is in question).<sup>6</sup> Black-spot poison ivy is mostly reported after

contact with *Toxicodendron radicans* and *T. rydbergii*.<sup>2-5,7-10</sup> Mallory et al demonstrated the formation of the black lacquer on skin of volunteers within an hour of application of the plant. Notably, the lacquer cannot be washed off with soap and water and typically falls off in 1-2 weeks. This lacquer is similar to the lacquer created from Japanese lacquer trees, which are also within the Anacardiaceae family. That lacquer has been demonstrated to be allergenic for hundreds of years.<sup>3</sup>

To prevent either black-spot poison ivy or toxicodendron dermatitis after contact with the plant, the patient should wash immediately with soap and water. If available, isopropyl alcohol applied liberally followed by copious rinsing with water after contact is more effective than soap for preventing allergic contact dermatitis. Bleach rapidly inactivates urushiol on clothing and tools, and organic solvents (alcohol, gasoline, acetone) can extract it from contaminated surfaces.<sup>1</sup>

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