Do you know what the #1 worker’s comp injury is? No, it’s not back pain; no, it’s not lacerations, broken bones, toxic exposures, falls: it’s poison ivy.¹

Plant contact dermatitis is a true allergy, though a severe one. Higher primates seem to be unique in becoming so easily allergic to poison ivy and related plants.² About ¾ of the population of the U.S. gets plant contact dermatitis at least once in their lives. Only about 15% of the population is “immune” (not allergic) to plant contact dermatitis.

The Plants

The most common North American plant to cause contact dermatitis is poison ivy (Toxicodendron radicans, previously known as Rhus toxicodendron and prior to that, according to Linnaeus, Rhus radicans). Urushiol is the oil in poison ivy bark and leaves (in small “resin canals”) – and that of similar plants, such as poison oak or poison sumac – to which so many people are allergic. All parts of the plant contain urushiol, which can remain active for a year or more in dead plants.

Poison ivy has been known by North American natives for its blistering effects for thousands of years, and similar plants were described in the seventh century in China and the tenth century in Japan.³ The first European to describe it was Captain John Smith (of “Pocahontas” fame) in 1609; it was he who gave the plant the English name poison ivy.⁴ The first reference in the modern English medical literature I’ve found dates to 1899.⁵

Poison oak, with a different leaf shape but otherwise quite similar to poison ivy, is also widely found in the western portions of North America, and a different subspecies of poison oak is found in the southeast/Atlantic coast area of North America.

Poison sumac, whose sap also contains urushiol, but with very different leaves, is found primarily in the southeastern US and in the lower Mississippi valley.

The maps on the last page outline the geographic limits of poison ivy and related plants. Poison ivy and poison oak tend to be found most abundantly in fields that have been abandoned for ~25 years,⁶ but are also found in many woodlands, roadsides, and backyards.

Identifying Poison Ivy and Kin

Poison Ivy

Poison ivy grows most commonly as ground cover, sometimes as a climbing vine on trees (which is a common source for poison ivy rash in the winter, from cutting firewood), and as a shrub. It is very, very common. The small, wooded area behind my house near Pittsburgh has hundreds of poison ivy plants.

With a little practice, poison ivy is easy to recognize. “Leaves of three, let it be” – but there’s more to it than that. Many other harmless and useful wild ground-cover plants, such as clover, clematis flowers and wild strawberries also have “leaves of three.” Technically speaking, it should be “leaflets of three” as the poison ivy leaf is actually a compound leaf with three separate leaflets; look for the bump where the leaf joins the branch to prove this to yourself. Poison ivy leaves are generally shiny, red when first growing but later turning a dense, shiny darkish green. They turn orange and red again in the fall. The tip has a characteristic point, usually with a slight asymmetry of the leaf next to the point. Leaflet edges may be smooth or may have a few broad rounded teeth. The underside of leaves are generally a bit paler than the top side, and the veins there often have little hairs. I’ve provided several slightly different pictures to show the range of leaf shapes and help you develop a mental image of the leaves. poison ivy vines on trees are harder to recognize but have characteristic red hair-tendrils that hold the vine to the bark (see picture above, center right) that are found in few other vines. Yes, the bark of the vines contains urushiol and simply touching it may get some on your skin.

There is a variant of poison ivy sometimes called Western
Poison ivy, though it’s really found in all the northern portions of North America, all the way to New England and the Maritime Provinces. Some even call it Canadian poison ivy which seems a more apt name. Some consider it just a variant of "standard" poison ivy, but it’s sometimes given its own species name, Toxicodendron rydbergii. Compared with "standard" poison ivy, the leaflet edges tend to be a bit toothier, the smaller leaflets tend to droop a bit, and the leaflets may be thinner.

Poison ivy is sometimes confused with Virginia creeper (Parthenocissus quinquefolia), as the leaves are a bit similar. But, except for the youngest leaves that may have three leaflets, Virginia creeper’s leaf is divided into five leaflets, and they generally have more teeth along the edge (see picture). Virginia creeper is nonpoisonous unless eaten.

Poison ivy may be also confused, particularly in the spring, with young boxelder trees (Acer negundo, AKA boxelder maple, ash-leaf maple), which have similar-looking leaflets of three (though they change to leaflets of five as it grows taller), and in
Poison Sumac

Shining/Winged Sumac (nonpoisonous)

Dwarf Sumac (nonpoisonous)

Staghorn Sumac (nonpoisonous)

Giant Hogweed

Stinging Nettle
the spring have a reddish leaf stalk. But young box elders are usually recognizable little trees, the leaflets are slightly different (see sketch, first page) with a shorter stem for the middle leaflet, and, unlike poison ivy's leaves that alternate on the stem, box elder leaves are opposite one another on the branch. Blackberry and raspberry bushes also have leaflets of three, but unlike poison ivy may have leaflets of five as well; and these berry bushes have thorns on the stems, except for a few species, such as the purple flowering raspberry AKA thimbleberry, which has very maple-looking leaves with white underneath.

**Poison Oak**

Poison oak is like poison ivy except:
- It is found along the Pacific coast and the southeastern states.
- The leaves have three shiny green leaflets and the same vein pattern, but have a different outline: rather than teeth, they have rounded lobules that look a bit oak-like, thus the name.

There are two species of poison oak. **Western or Pacific poison oak** (*Toxicodendron diversiloba*; old name: *Rhus diversiloba*) is found in Pacific Coast states. From eastern Virginia to Texas, you may find the slightly-different **Atlantic poison oak** (*Toxicodendron pubescens*). Western poison oak leaves have no pointy tip, but the Atlantic poison oak sometimes has a pointy-tipped leaf.

**Similar Plants**

Close relatives of poison ivy include the **mango, cashew and the Japanese lacquer tree**. If you are severely allergic to *Toxicodendron* plants, you may develop a rash from picking mangoes or cashews. Shelled cashew nuts themselves don't seem to cause allergy. However, you may get a reaction from just touching furniture coated with lacquer made from the Japanese lacquer tree. Important warning to travelers: many older Japanese toilet seats are painted with this lacquer.

There is also a genus of plants widely distributed throughout Mexico, South America, and the Caribbean, called *Comocladia*, many of which are called by the common name **maidenplum**. Most species have urushiol in the leaves and stems, like poison ivy. *Comocladia glabra* is very common in Puerto Rico and nearby islands; the common name there is **carrasco**. I saw cases of exposure to it when I was in Puerto Rico with a disaster medical team after the 2017 hurricanes, and the rash is indistinguishable from poison ivy. (Picture: public domain, US Forest Service)

There are three other North American plants known to cause severe skin reactions. While not related to poison ivy, and causing a skin reaction via a different mechanism, it's worth briefly reviewing them.

**Poodle-Dog Bush**

The **poodle-dog bush** (*Eriodictyon parryi*) thrives the first ten years after wildfires, but only in California and Baja California. The thick, spiky leaves of this purple-flowering bush have many hairs covered with a mix of phenolic compounds. While different than urushiol, it causes the same delayed-hypersensitivity rash. As far as we know, prevention, decontamination and treatment are the same as for *Toxicodendron species*. (Pictures courtesy Gary Valle, sierraphotography.com.)
Giant hogweed (Ageratum conyzoides), with large clusters of white flowers, is described as “Queen Anne’s lace on steroids” – although the top of the flower bundles is rounded like yarrow, more than the cuplike flower clusters of Queen Anne’s Lace. Unlike Queen Anne’s lace or yarrow which are short plants up to maybe 3 feet high (1 m), giant hogweed may grow to 14 feet tall (4 m). The related and similar looking cow parsnip is found natively across North America except the deep south. To tell if it’s giant hogweed or cow parsnip:

- Flowers: giant hogweed’s flower clusters are an umbrella cluster up to 2.5 feet (3/4 m) across; cow parsnip’s clusters are no larger than a foot (30 cm) wide.
- Rays (stems of individual flowers): giant hogweed has 50 or more per flower cluster, cow parsnip has no more than 30.
- Leaves: giant hogweed’s up to 5 feet (150 cm) across, cow parsnip’s leaves are no more than 2.5 feet (75 cm) across, and less deeply incised.
- Height: people say that cow parsnip never grows taller than 6 feet (2 m), but I have a picture of one, in Shenandoah National Park’s Lewis Mountain Campground from 2015, overtopping my 5’8” daughter by a foot (30 cm).

Giant hogweed was first sighted in North America in New England but spread through Pennsylvania as far west as Michigan and Indiana. Instead of urushiol, it contains psoralens (furocoumarmins), which combine with sunlight to cause a rash very similar to that of poison ivy. As far as is known right now, treatment is the same. Some particularly-allergic people may develop a similar rash simply from plants with smaller amounts of psoralens, such as carrots, parsnips, parsley and the rind of citrus fruits such as lemons, oranges, grapefruit and limes (“Margarita rash”). Celery has psoralens, particularly in the root, can cause a rash in farm and grocery workers and food-service workers (“celery-picker’s rash”).

**Stinging Nettles (Urtica dioecia)** and the similar wood nettles (Laportea canadensis) are found in virtually every state and province in North America. (You’re only safe in the far-northern Arctic, and, supposedly, for some reason, Arkansas.) The nettle is an annual plant that grows in a great variety of places, from open meadows to shady trailsides. The underside of the fuzzy, sharply-toothed alternate leaves and the stems are covered with tiny hairs. These are needles that will inject your skin with a witches’ brew of histamine, serotonin, acetylcholine, leukotrienes, formic acid, not to mention less-common chemicals, likely including some we don’t know about yet. Just brushing your leg against the plant causes injection. As you might suspect, being thusly-injected
results in a sharp, painful sting, as well as hives (urticaria). The stinging and itching may reputedly last for 12-24 hours. Standard anti-itch remedies, discussed below, are appropriate, but there are no formal medical recommendations for treatment.⁸

Crushed stems of **jewelweed** (*Impatiens capensis* and *I. pallida*) almost always relieves stinging nettle stings in a few minutes. I have used it effectively hundreds of times, and while this is not data ("the plural of anecdotes is not data") it’s a lot of anecdotes. It seems to work better than Sting-Eeze or pramoxine (discussed below). When I see jewelweed (which may have yellow or orange flowers) as I’m hiking, I always pluck a stem and attach it to my shoulder strap to keep it readily available. Jewelweed is often found near stinging nettles but tends to places that are a bit shadier and moister. The leaves look a bit like nettles, but the teeth are rounded, and the leaves and stems are smooth, with a characteristic translucency that is almost unique. You crush the Jewelweed leaves and stems and rub them against your skin to treat the nettle stings.

**Removing Poison Ivy**

Allergy shots don’t work for poison ivy allergy,¹⁰,¹¹ so prevention consists of:

- Avoid exposure by knowing what poison ivy looks like (go back and look at those pictures again!)
- If you know you’re likely to be exposed, use blocking agents to prevent it from getting deep into your skin.
- Clean off the urushiol off if you’ve been exposed.

You can apply various blocking agents to prevent urushiol from penetrating your skin. Several blocking cream brands are frequently mentioned in the medical literature: Ivy-Shield, Stokogard Outdoor Cream, Work Shield and Chimyl Skin Shield. None of them are currently available in the US. I suspect that natural selection in the marketplace has resulted in survival of the fittest and most effective, which seems to be **organoclay**, also known as **bentoquatam**. Organoclay/bentoquatam is a quaternary ammonium salt of bentonite, which is a specific type of clay. Organoclay has long been used as an inert ingredient in many deodorant and antiperspirant sprays. In fact, those in the know used to use certain deodorant sprays to protect their skin. However, after extensive testing by the Food and Drug Administration, organoclay became available as Ivy-Block.⁶,¹² However, it was bought out ~2014, and is now sold under the name **Ivy X Pre-Contact Solution**. It is available from [amazon.com](https://www.amazon.com) and in many drug and outdoor stores.

Even better than Ivy X Pre-Contact Solution is clothing with long sleeves, long pants, and gloves, although combining long sleeves and long pants with organoclay is best. Urushiol is difficult to wash off, and you can spread it with your hands or contaminated clothes or gloves, or from outdoor pets. Washing clothes or gear with detergent once or twice should remove any urushiol. Pretreating clothes with alcohol before washing may help remove the urushiol.

**Removing Urushiol From Your Skin**

Removing urushiol from the skin as soon as possible after of exposure will decrease the eventual rash. If you are severely allergic you only have a few minutes to remove the urushiol before it soaks into your skin. Those with moderate allergy have about 30 minutes to remove it before enough is absorbed into the skin to cause a reaction, though some cleaners (see below) may leach some of the urushiol out of the skin.⁴

A long, hot shower (copious amounts of warm water) is effective, although urushiol is oily and not very water soluble.⁴ So, if copious amounts of warm water are not available (i.e., if you’re in the backcountry, far away from hot showers), you would best use another method. Alcohol is very effective at dissolving urushiol, and thus you might use an alcoholic beverage. Some, however, think that alcohol wipes will merely spread the urushiol around. Some dermatologists suggest that soap may merely spread the urushiol, especially when only small amounts of water are available. If you have large amounts of cold water available (e.g., a lake or stream, or a fire hose), using alcohol or soap and then rinsing with large amounts of water seems appropriate.

A commercial product, **Tecnu Original** (search for “GoJo 80 Count Counter Display”). It is also available as a juicy scrub brush. Twenty of the urushiol off if you’ve been exposed.

**Outdoor Skin Cleanser**, was highly effective in one study: it prevented rash in 70% of sensitized people if used 2 hours after exposure.¹⁴ It has anecdotally been found effective even up to 48 hours after exposure. The waterless hand cleaner **Goop** has been found almost as effective as the Tecnu product and much less expensive.¹⁵ One would expect that **GoJo**, a very-similar competitor to Goop, would work just as well. For backcountry trips, it is possible to get individually-wrapped towelettes of Tecnu and GoJo, although the latter are hard to find (search for “Gojo 80 Count Counter Display”). It is also possible to repackage Goop or GoJo in a hardy 30 or 60 mL (1-2 oz) bottle such as those made by Nalgene and available from REI ([rei.com](https://www.rei.com)). In a study reported only as an abstract and never published, another widely-available product, **Zanfel**, was studied and found to be effective.¹⁶ There is not enough evidence to tell whether Zanfel or Tecnu is better, though the Tecnu study was technically better. **Jewelweed sap** is not only good for the stinging of stinging nettles, but also is very good for cleaning urushiol off your skin. Just crush the stems and leaves of a Jewelweed plant and use it as a juicy scrub brush.¹⁷
There are two main types of allergic skin rashes. One type of allergic reaction, characterized by hives (urticaria), is called immediate hypersensitivity. Severe cases of immediate hypersensitivity may progress to anaphylaxis, with swelling of the lips, tongue and airways and sometimes shock. Immediate hypersensitivity like this is also called a **Type I allergic reaction** and is related to preformed antibodies that may quickly cause mast cells to release histamine and other inflammatory chemicals.

Skin allergy to poison ivy, however, is a **Type IV allergic reaction**, also called delayed hypersensitivity or a cell-mediated allergic reaction. Such allergy takes longer to occur, and doesn't result in hives or anaphylaxis. Certain white cells migrate to the allergen-contaminated skin and release different inflammatory chemicals than with immediate hypersensitivity.

An acute Type IV allergic reaction includes itching, swelling, and redness; more severe cases may develop scaling, blisters, or open, oozing sores. Itching leads to scratching, which may result in a secondary bacterial infection. You may see a small amount of cloudy to purulent material (pus) in the blisters of a severe allergy, but a large amount of purulent drainage indicates a secondary bacterial infection.

The typical poison ivy rash starts a day or two after exposure. However, it may occur in a few hours or many days later. It usually starts in one (or a few) places and "spreads" to nearby areas. This is not truly spreading; it is simply that the areas with less exposure take longer to react. The fluid from blisters or sores does not have any urushiol to spread the rash, whether to other areas or to other people. Untreated, the rash usually lasts 3-6 weeks.

Diagnosing poison ivy rash is usually not hard. It tends to occur in areas exposed to urushiol: legs and arms. The thick skin of the palms and soles provide some protection, so rash there is rare. However, the urushiol on your palms and fingers can get to other areas when you scratch. Thus, there are characteristic patterns, including an irregular pattern of lines on the arms and legs, from brushing against broken leaves and stems. Sometime there are areas that are just in the right place to be scratched by fingers covered with urushiol. My vet says she often sees pet owners with poison ivy on the right upper arm and right neck from holding a dog or cat covered in urushiol. (Cats and dogs don't care about poison ivy, they aren't allergic to it.) An interesting variant is when two young people come in with a classic poison ivy rash, one on the back, the other on the knees and elbow. Use your imagination.

There is a severe variant called "black spot poison ivy." When exposed to air, urushiol oxidizes to a black, tar-like substance, so thick deposits of urushiol lead to black spots on the skin; extensive skin decontamination is in order (see above).\(^\text{21,22}\)

Urushiol spreads through the smoke when *Toxicodendron*...
plants burn in a fire. The smoke can cause severe rash, and inhaling the smoke can cause severe lung symptoms. A filter mask may help prevent this. Some Toxicodendron subspecies grow in ivy form on trees, and the urushiol can last for long periods after the vine dies. If you’re building a campfire, carefully inspect the wood for red-tendrilled vines that are probably poison ivy.

One Korean chicken recipe calls for Toxicodendron leaves. Apparently the cook wasn’t allergic, but most of those who ate it, as you might expect, had really bad generalized allergic reactions.25

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**Steroids**

The mainstay of treatment of any severe Type IV (cell-mediated, delayed) allergic reaction of the skin, including reactions to urushiol, is treatment with a corticosteroid (“steroid”). This directly antagonizes the allergic reaction, which can last up to 6 weeks. It decreases the rash during this course and can even make it go away. But if you stop the steroid too soon (a common error by medical providers), the rash will reappear. Over-the-counter 1% hydrocortisone cream is, unfortunately, not strong enough to treat any but the mildest cases. A prescription for a stronger, moderate-potency steroid cream, such as triamcinolone acetonide 0.1% cream (e.g., Aristocort, Kenalog) twice a day usually suffices for mild to moderate cases.

However, topical steroid cream won’t usually work if there is significant blistering of the skin: the cream simply won’t be able to soak in. And, if the rash is extensive (>20% total body surface), it’s simply impractical to use such large amounts of cream. It’s also true that dermatologists recommend not using such potent steroid creams on the face or genitalia, for fear of causing skin atrophy.24

In such cases, systemic steroids: oral prednisone, oral dexamethasone or an injection of a sustained-release depot steroid preparation (such as Depo-Medrol or Celestone) are appropriate. Injections of shorter-acting steroids have no advantage over the oral route and are neither a useful replacement (you’d have to give it daily) nor any better than simply starting the oral steroid. I have had people say “I need a course of oral steroids. Even though I just have this teeny tiny rash right now, if I don’t get steroid pills, I will get a systemic reaction so give me a prescription for steroid pills!” We refer to these people as steroid-seekers. It is best to not knuckle under and prescribe oral steroids when they are not indicated. We now know that even short courses of steroids have bad side effects (“makes you two or three times as likely to get a broken bone, a blood clot in the leg, or to get overwhelming bacterial sepsis”).26

A common error is to provide a short course of oral steroids such as a Medrol Dosepak, or a prescription for just 10 days of prednisone. Although not studied in a controlled manner, many decades of experience by primary care doctors and dermatologists tell us that this is simply not long enough, and that you should prescribe fourteen days.26 The allergists’ professional associations say to treat with the equivalent of 0.5-1.0 mg/kg (roughly 60 mg for a 70 kg adult) of prednisone; they also say to consider reducing the dose in 5-7 days if the patient is improving significantly, but this isn’t practical for non-office-based practices such as an emergency department or urgent care center that don’t do follow-up and who generally can’t get anyone else to promptly see patients they discharge. Again: A Medrol dosepak, a short prednisone taper, or 10 days is not long enough. Prescribe a 14-day (2 week) course of oral steroids such as dexamethasone 6 mg by mouth every morning.

*If you’re concerned that this dose of dexamethasone is not as strong as 60 mg of prednisone, remember that dexamethasone is longer-lasting than prednisone, and so it will build up more than the prednisone. If you’re worried that the dexamethasone might last longer than the prescribed 2 weeks and thus cause adrenal suppression, remember that dexamethasone is so long-lasting that it tapers itself. If you think that you might want to prescribe a longer-lasting steroid like dexamethasone once every other day, consider how much simpler a daily dose is, and how much better the compliance will be with once-daily dosing. Yes, my doctoral-level pharmacy colleagues buy into this reasoning.*

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**Other Topical Agents**

A great variety of topical antipruritic (anti-itch) preparations are available without a prescription. However, many of the available anti-itch preparations contain ingredients that may themselves cause allergy or are known to be ineffective.

The antihistamine diphenhydramine (e.g., Benadryl cream) tends to make people allergic to it. Benadryl is also in combination preparations such as Ivarest Poison Ivy Itch Cream (although Ivarest Poison Ivy Itch Spray doesn’t contain it, it has pramoxine instead, see below), and Tecnu Calagel, so it’s best to avoid them. Caladryl used to be a combination of calamine lotion (which is a bit soothing, but
nothing compared with local anaesthetics) and Benadryl, but, recognizing the problems with topical Benadryl, the company reformed it (in 1997) to contain pramoxine instead (see below). Some generic versions of Caladryl may still contain Benadryl. Some other anti-itch creams contain benzocaine or lidocaine, both local anaesthetics that tend to induce allergy when used on the skin.

Dermatologists hate topical Benadryl, lidocaine and benzocaine, just like they hate topical neomycin (e.g., Neosporin) because they get stuck dealing with severe allergic reactions from them. I tell people not to use over-the-counter creams with any of these, because if they get allergic they can’t take Benadryl by mouth at bedtime, which is good for itching when you want to be sleepy, and they can’t use benzocaine or lidocaine when they go to the dentist. And they get an allergic reaction on top of their allergic reaction.29,30

There are good alternatives. Menthol (originally from the mint plant) is non-sensitizing, and has been used for medicinally, including skin anaesthesia, for millennia.26 It has been cultivated for such uses since biblical times (Matthew xxiii, 23).

Pramoxine (also known as promocaine or tronethane), has been available as an over-the-counter anaesthetic for many years. It is rapid-acting and less allergenic than benzocaine, lidocaine or Benadryl. It is rapid-acting and there is only one (1) case report of someone being allergic to it.32 It is currently available in the U.S. in a variety of over-the-counter creams, lotions and sprays, including Caladryl and Caladryl Clear. ITCH-X Fast-Acting Anti-Itch Spray contain pramoxine but no menthol. Gold Bond Medicated Anti-Itch Lotion and Gold Bond Medicated Rapid Relief Anti-Itch Cream have both pramoxine and menthol, a great combination. However, Gold Bond Pain and Itch Relief Cream with Lidocaine is bad because of the allergy-inducing lidocaine. My favorite over-the-counter cream is the CVS Maximum Strength Anti-Itch Cream Topical Analgesic, as it contains both pramoxine and menthol, is widely available and is cheaper than Gold Bond.

Several widely-available over-the-counter remedies, including Tecnu Rash Relief and Tecnu Extreme, contain nothing but highly-diluted homeopathic herbal ingredients. No controlled studies are available; therefore these may reasonably be considered nothing more than placebo. Hyland’s Poison Ivy / Oak Tablets are made with an extract of poison ivy in a 6x dilution, which means there are 10^-6 (that’s 0.000001) grams of poison ivy per gram of water or pill. This is near the acceptable level of arsenic in drinking water (10^-5) and should present no safety concerns. But don’t expect it to help your poison ivy rash.

Back about 2002, there was some excitement that novel nonsteroidal anti-inflammatory medications such as topical tacrolimus and pimecrolimus might be even better than steroids for poison ivy. However, they were found to be no better than steroids, might cause skin cancer, and cost fifty times as much as triamcinolone cream. There are no current recommendations for their use for poison ivy.26,34

The sap of the jewelweed plant, also known as the Touch-Me Knot (Impatiens capensis; discussed above for treating stinging nettle stings) is widely reported to be effective in the treatment of poison ivy rash. Wrong. Extracts of the plant are essentially useless for treating poison ivy, but the soapy sap of the freshly-crushed stems cleans off urushiol almost as well as Dawn dish detergent.20,28

Other Oral Medications

Antihistamines help the itching of rashes such as poison ivy. My dermatology colleagues recommend fexofenadine (generic Allegra) 180 mg twice a day, which will not make anyone sleep and will decrease the itching during the day. I tell people the bottle says to take it once a day, but that’s for allergies, and it’s OK to take it twice a day for itching, because your doctor told you to. I tell people to take 50 mg of diphenhydramine (generic Benadryl) at bedtime: this works very well for itching and at bedtime, the fact that it makes you sleepy is a benefit and not a side effect.

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