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DUST ALLERGY: A COMMON MANIFESTATION OF INDIA THROUGH DUST MITES

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ABSTRACT

Sneezing and wheezing? Chances are, dust mites are one source of your suffering. High concentrations of dust mite allergens are a significant risk factor for the development of allergies and related diseases such as asthma and rhinitis (hay fever). 80% of children and young adults with asthma are sensitive to dust mites. Studies suggest that more than 45% of homes have bedding with dust mite concentrations that exceed a level equated with allergic sensitization. Dust mites are microscopic creatures (smaller than 1/70 of an inch) that thrive in warm, dark, moist places—temperatures of 68°-84°F and humidity levels at 75-80%. They thrive in bedding because that is where they find their biggest meals: They thrive on sloughed-off human and animal skin. Under the microscope, dust mites appear as sightless, spider-like arachnids. They breathe through their skin and while in dormancy, they are impervious to poisons, so insecticides are worthless even if you choose to use them. You can also find dust mites in dust ruffles and bed curtains and on feathers, furs, protein-based textiles and other organic fibers. Polyester bedding is also a well-known haven for dust mites because it traps moisture from perspiration.

It's the feces and body parts from the dust mites that are the allergens, so simply killing the mites won't remove the allergen, although reducing populations is always a considerable help. To minimize mite populations, you need to make changes in your daily living and cleaning routines. While you may not be able to do all of these things, just implementing a few of these techniques will reduce the number of mites in the bedroom.

1. Direct sunlight kills dust mites, so hang bedding in the sun whenever possible. (Be mindful, though, that outdoor allergens can collect on bedding hung outside.)

2. Dust mites die when the humidity falls below 40-50%; use a dehumidifier if the weather is humid.

3. Wash bed linens once a week in hot water—the water temperature should be 130°F or higher—to kill mites.

4. Steam-cleaning carpets considerably lessen dust mite populations and deter population growth.

5. Vapor steam-cleaning (using a small machine that heats surfaces with dry steam) kills fungus, dust mites, bacteria, and other undesirables. This is a good way to clean bedding that you can't launder, such as mattresses. Vapor contains only 5-6% water (conversely, most steam cleaners use lots of warm water to clean), so the vapor steam doesn't contribute to a moist environment. Vapor steam deeply penetrates whatever it is cleaning, and it is great for upholstery, couches, carpets, and mattresses.

6. The natural lanolin in wool repels dust mites—another reason to buy wool bedding.

7. Studies at found significant reduction of dust mites when allergen-proof covers were combined with properly laundered bedding, dry steam-cleaning, and vacuuming. Vacuuming alone didn't work as well as the combination of vacuuming with dry steam-cleaning of carpets and upholstery.

8. Buy a new pillow every 6 months (dust and dust mites live in pillows).

9. Eliminate wall-to-wall carpet (especially over concrete floors because concrete generates moisture/humidity). Decorate with washable throw rugs instead.

10. Freeze stuffed animal toys in the freezer (in a tightly closed plastic bag), and shake vigorously outside after removing them from the freezer. Or, wash stuffed toys often.

More Tips for Everyday Mite Control

It almost goes without saying that keeping a bedroom clean is important for mite control. Use a HEPA vacuum in the room, and run a HEPA air filter near the bed when the room isn't occupied. Make sure the bedroom curtains or window coverings are washable. Horizontal venetian blinds can be wiped clean with a damp cloth (but they do collect a lot of dust), and if you have shades that can't easily be washed, they should be of a type that's easily vacuumed. Be sure to avoid fuzzy fabrics and bed linens and fluffy pillows; they'll attract and capture dust. Cut the clutter. It is very hard to dust well when surfaces are covered with dust-collecting objects. Rough, raw pine and fabrics are also hard to keep free from dust. If you

can't bear to get rid of certain possessions, use covered storage containers for papers, magazines, and other bric-a-brac to reduce dust-catching surfaces.

KEYWORDS: Atmospheric Dust, Domestic Dust, Dust Mites, Dust allergy, HEPA, MERV, Antihistamines, Decongestants, Nasal steroids, Chromones, Leukotriene Receptor Antagonists, OTC Drugs.

Dust consists of particles in the atmosphere that come from various sources such as soil, dust lifted by weather, volcanic eruptions and pollution. Dust in homes, offices and other human environments contains small amounts of plant pollen, human and animal hairs, textile fibers, paper fibers, minerals from outdoor soil, human skincells, burnt meteorite particles, and many other materials which may be found in the local environment. Dust may worsen hay fever. Circulating outdoor air through a house by keeping doors and windows open — or at least slightly ajar — may reduce the risk of hay-fever-causing dust. However, in colder climates, occupants seal even the smallest air gaps, which keep fresh air from outside from circulating inside the house. Because of this, it is essential to have a plan for managing dust and airflow.

Figure-1: Atmospheric Dust & Domestic Dust

House dust mites are present indoors wherever humans live. Positive tests for dust mite allergies are extremely common among people with asthma. Dust mites are microscopic arachnids whose primary food is dead human skin cells, but they do not live on living people. They and their faeces and other allergens they produce are major constituents of house dust, but because they are so heavy they are not suspended for long in the air. They are generally found on the floor and other surfaces until disturbed (by walking, for example). It could take

somewhere between twenty minutes and two hours for dust mites to settle back down out of the air.

Figure-2: Dust Mites

Dust mites are a nesting species that prefers a dark, warm, and humid climate. They flourish in mattresses, bedding, upholstered furniture, and carpets. Their faeces include enzymes that are released upon contact with a moist surface, which can happen when a person inhales, and these enzymes can kill cells within the human body. House dust mites did not become a problem until humans began to use textiles, such as western style blankets and clothing.[1] Dust kicked up by vehicles traveling on roads may make up 33% of air pollution. Road dust consists of deposition of vehicle exhausts and industrial exhausts, tire and brake wear, dust from paved roads or potholes, and dust from construction sites. Road dust is a significant source contributing to the generation and release of particulate matter into the atmosphere.

Figure-3: Dust Allergy

Control of road dust is a significant challenge in urban areas, and also in other spheres with high levels of vehicular traffic upon unsealed roads such as mines and garbage dumps. Road dust may be suppressed by mechanical methods like sweeping vehicles, with vegetable oils, or with water sprayers. Improvements in automotive engineering have reduced the

amount of PM10s produced by road traffic; the proportion representing re-suspension of existing particulates has, as a result, increased.[2]

Control of atmospheric dust

(1) Reducing dust related health risks that include allergic reactions, pneumonia and asthmatic attacks. (2) Improving visibility and road safety. (3) Providing cleaner air, cleaner vehicles and cleaner homes and promoting better health. (4) Improving crop productivity in agriculture. (5) Reducing vehicle maintenance costs by lowering the levels of dust that clog filters, bearings and machinery. (6) Reducing driver fatigue, maintenance on suspension systems and improving fuel economy. (7) Increasing cumulative effect - each new application builds on previous residuals reducing.

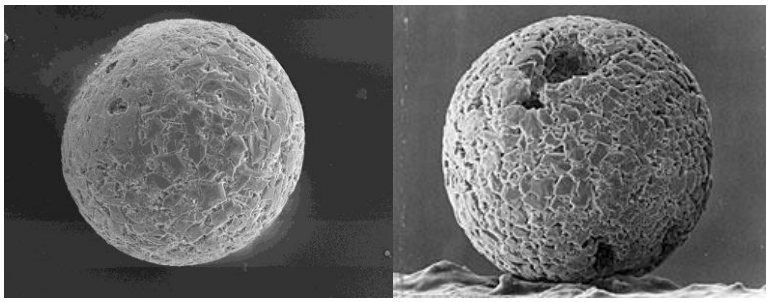


Figure-4: Scanning Electron Micrograph of Dust

Dust in such places may be suppressed by mechanical methods including paving or laying down gravel, or stabilizing the surface with water, vegetable oils or other dust suppressants, or by using water misters to suppress dust that is already airborne.

Control of domestic dust

Dust control is the suppression of solid particles with diameters less than 500 μm. Dust in the airstream poses a serious health threat to children, older people and those with respiratory illnesses. House dust can become airborne easily. Care is required when removing dust to avoid causing the dust to become airborne. A feather duster tends to agitate the dust so it lands elsewhere. Products like Pledge and Swiffer are specifically made for removing dust by trapping it with sticky chemicals.

Certified HEPA (tested to MIL STD 282) can effectively trap 99.97% of dust at 0.3 μm. Not all HEPA (type/media) filters can effectively stop dust; while vacuum cleaners with HEPA (type/media) filters, water, or cyclones may filter more effectively than without, they may still exhaust millions of particles per cubic foot of air circulated. Central vacuum cleaners can

be effective in removing dust, especially if they are exhausted directly to the outdoors.[3] Air filtering appliances differ greatly in their effectiveness. Laser particle counters are an effective way to measure filter effectiveness, medical grade instruments can test for particles as small as 0.3 µm. In order to test for dust in the air, there are several options available. Pre weighted filter and matched weight filters made from polyvinyl chloride or mixed cellulose ester are suitable for respirable dust (less than 10 µm in diameter).

Figure-5: Pledge and Swiffer

Control of dust resistance on surfaces

A dust resistant surface is a state of prevention against dust contamination or damage, by a design or treatment of materials and items in manufacturing or through a repair process. A reduced tactility of a synthetic layer or covering can protect surfaces and release small molecules that could have remained attached. A panel, container or enclosure with seams may feature types of strengthened rigidity or sealant to vulnerable edges and joins.[4]

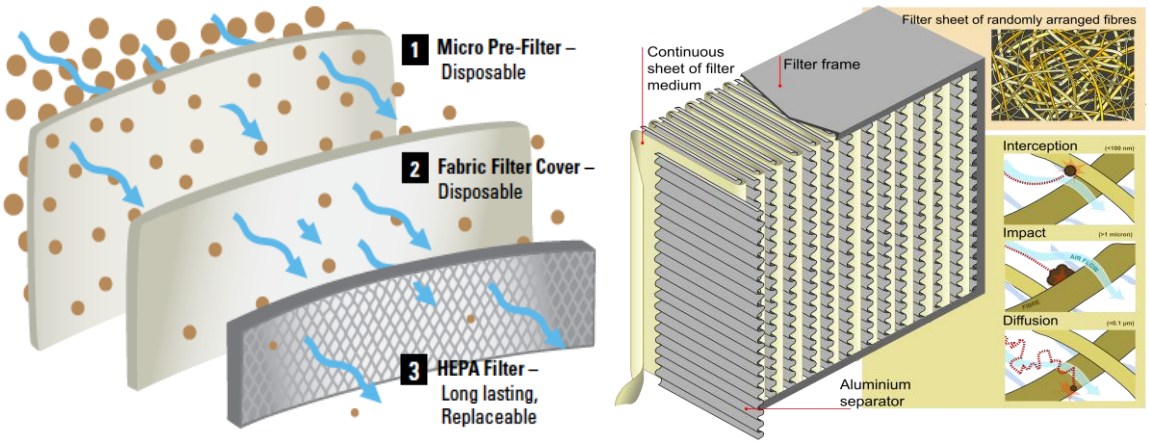


Figure-6: HEPA (High Efficiency Particulate Arrestance) Filter

Dust mite allergy symptoms caused by inflammation of nasal passages include

- Sneezing.
- Running nose.
- Itchy, red or watery eyes.
- Nasal congestion.
- Itchy nose, roof of mouth or throat.
- Cough & facial pressure with pain.

Symptoms to Watch For

Dust allergy symptoms are similar to those of pollen allergies:

- Red, itchy, watery eyes
- Runny, itchy, stuffy nose
- Sneezing

'The Dirt' on Dust Mites

To get rid of these tiny creatures in your home, keep in mind their living habits. They prefer temperatures of 70°F or higher and humidity of 75-80%. They can't survive in colder, drier places. In our country dust mite allergies peak in July and August, when dust mite populations are high because of warm weather. Dust mites like to eat dead skin from pets and humans. You probably shed enough skin a day to feed a million dust mites. Flakes of dead skin in carpeting, beds, and furniture are like tasty snacks for them.[5]

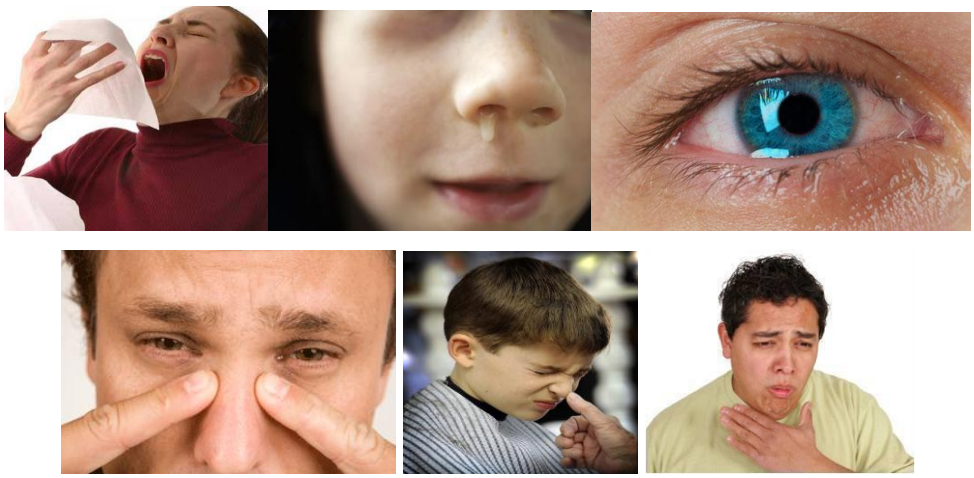


Figure-7: Symptoms of Dust Allergy

What Causes Dust Allergies?

It sounds nasty, but it's true: One piece of dust can contain pet dander, pieces of dead cockroaches and mold spores, along with dead skin and dust mites. Both cockroaches and pet

dander are common allergy triggers, too. Cockroach waste, saliva, and body parts are a problem in some homes, particularly in India.

How Can I Prevent Symptoms?

The best strategy is to limit your exposure to dust. Start in the bedroom, where you probably spend the most time. Large numbers of dust mites can gather in mattresses, bedding, and upholstered furniture. Wear a mask while cleaning, too.

Figure-8: Vacuum Cleaner

Bedroom Dust-Busting Tips

Put airtight, plastic dust-mite covers on pillows, mattresses and box springs. Use pillows filled with polyester fibers instead of kapok or feathers. Wash bedding in very hot water (55-60°C) (over 130°F) once a week. The water needs to be this hot to kill dust mites. Dry the bedding in a hot dryer.

How Can I Prevent Symptoms?

If your bedroom is in a basement with a concrete floor, move upstairs if you can. Concrete stays damp and creates the moist, humid environment dust mites love.

Around the House

Clean bare floors often with a damp mop or cloth. Vacuum carpets once or twice a week. Use a vacuum with a HEPA (high-efficiency particulate air) filter. If your dust allergy is severe, ask your doctor if replacing wall-to-wall carpeting with hardwood or vinyl floors would help. Wash throw rugs in hot water. Vacuum upholstered furniture such as sofas. Wood, leather, plaster, or metal furniture is better for dust allergies. Replace drapes with roll-up window shades. If you must have curtains, wash them in hot water each season. Get rid of stuffed animals, soft toys, and other dust collectors.

Keep Air Clean and Dry

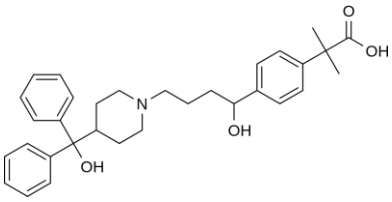
Use an air conditioner or dehumidifier to lower humidity. Put a HEPA filter with a MERV rating of 11 or 12 in your heating and air-conditioning unit. You can find the rating listed on the packaging. Change the filter every 3 months.

Keep humidity in your home below 55%. Use a hygrometer to measure it. You can get one at hardware and building supply stores.[6]

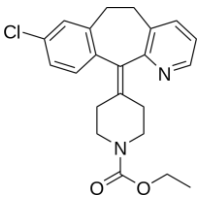
How Are Dust Allergies Treated?

Over-the-counter (OTC) or prescription allergy drugs can help control your symptoms.

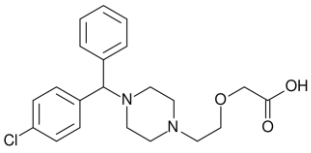
- **Antihistamines** relieve itching, sneezing and watery eyes. If something triggers an allergic reaction in your body, your immune system launches a response, releasing histamine. Histamine causes allergy symptoms like sneezing, watery eyes and skin rashes. Antihistamines block the action of histamine. When treating allergic rhinitis, antihistamines can be used in the form of tablets or nasal sprays. Tablets start working within a few hours and nasal sprays start working within 15 minutes. Research has shown that tablets and nasal sprays can both provide effective relief. They are usually well tolerated. The most common side effects of tablets are tiredness and headaches. Newer generation antihistamines work in a similar way to older ones, but they have fewer side effects. For instance, they are a lot less likely to make you feel tired, which can make a big difference if you have to drive a car or do other activities that require concentration.



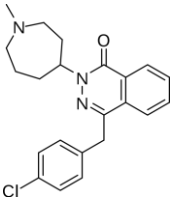
Fexofenadine



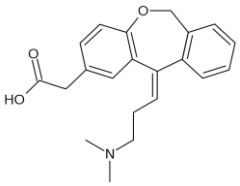
Loratadine



Cetirizine



Azelastine

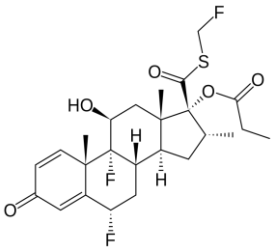


Olopatadine

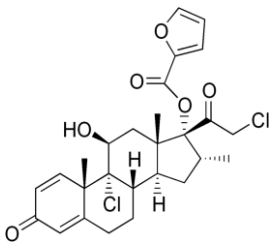
For this reason, older antihistamines ("first-generation antihistamines") are generally no longer recommended. Nasal sprays can leave a bitter taste in your mouth. Over-the-counter antihistamine tablets, such as fexofenadine (Allegra Allergy), loratadine (Alavert, Claritin), cetirizine (Zyrtec Allergy) and others, as well as antihistamine syrups for children, are available. Prescription antihistamines taken as a nasal spray include azelastine (Astelin, Astepro) and olopatadine (Patanase). **Decongestants** ease or unclog a stuffy nose. Decongestant nose drops and nasal sprays reduce swelling in the mucous membranes lining

the nose and the sinuses, making it easier to breathe through your nose. They are not suitable for the long-term treatment of allergic rhinitis, though. Although they open your nasal passages and make it easier to breathe at first, your nose might "get used to them" after a short while, and then they have the opposite effect: The membranes become swollen again and it is difficult to breathe through your nose. These medications can also cause side effects like nosebleeds. So it is recommended that these medications not be used for longer than 5-7 days.

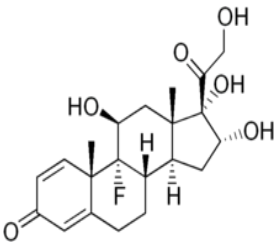
- **Nasal steroids** reduce swelling in your nose so you can breathe better. Corticosteroids are steroid drugs that contain the anti-inflammatory hormone cortisone. Corticosteroid nasal sprays reduce swelling in the mucous membranes and relieve symptoms like a runny or blocked nose. They can be used over longer periods of time, but it is then advisable to see a doctor regularly for check-ups.



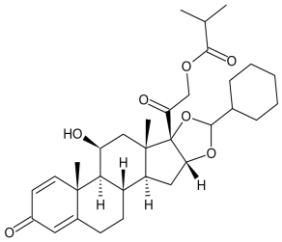
Fluticasone propionate



Mometasone furoate



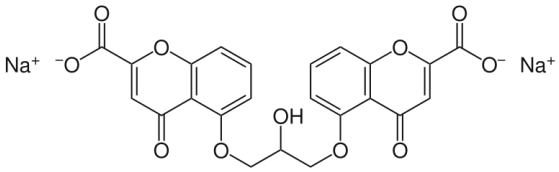
Triamcinolone



Ciclesonide

Although they do not have an immediate effect, people usually notice an effect within twelve hours. The full effect is reached after a few days. They might cause mild side effects such as nose bleeds, headaches or altered taste. These drugs include fluticasone propionate (Flonase), mometasone furoate (Nasonex), triamcinolone (Nasacort AQ), ciclesonide (Omnaris) and others. Nasal corticosteroids provide a low dose of the drug and have a much lower risk of side effects compared with oral corticosteroids.

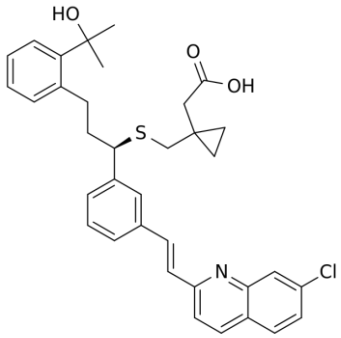
- **Chromones** as mast cell stabilizers prevent histamine from being released by certain cells in the body known as mast cells. This reduces allergic and inflammatory responses in the body. They are used in the form of nasal sprays, and are usually used to prevent symptoms, but they can also relieve symptoms. Possible side effects include irritation of the membranes lining the nose, and an unpleasant taste in your mouth.



Sodium cromoglycate

You might be able to get allergy shots (immunotherapy). They treat allergies over a longer time. Ask your doctor if they make sense for you. Cromolyn sodium prevents the release of an immune system chemical and may reduce symptoms. You need to use this over-the-counter nasal spray several times a day, and it's most effective when used before signs and symptoms develop. Cromolyn sodium doesn't have serious side effects.

- **Leukotriene receptor antagonists** as these medications block the action of leukotrienes – chemical messengers that play an important role in the inflammatory response that happens in the airways. In Germany they are licensed in the form of tablets for the treatment of asthma. As well as relieving asthma symptoms, they can also relieve the symptoms of hay fever. So doctors can also prescribe leukotriene receptor antagonists for people above the age of 15 who have both asthma and seasonal allergic rhinitis.



Montelukast

Possible side effects include respiratory tract infections (infections of the airways) and headaches. Your doctor may prescribe this prescription tablet, montelukast (Singulair). Possible side effects of montelukast include upper respiratory infection, headache and fever. Less common side effects include behavior or mood changes, such as anxiousness or depression.[7]

CONCLUSION

Use allergen-proof bed covers. Cover your mattress and pillows in dustproof or allergen-blocking covers. These covers, made of tightly woven fabric, prevent dust mites from colonizing or escaping from the mattress or pillows. Encase box springs in allergen-proof covers. Wash bedding weekly. Wash all sheets, blankets, pillowcases and bedcovers in hot water that is at least 130°F (54.4°C) to kill dust mites and remove allergens. If bedding can't be washed hot, put the items in the dryer for at least 15 minutes at a temperature above 130°F (54.4°C) to kill the mites. Then wash and dry the bedding to remove allergens. Freezing nonwashable items for 24 hours also can kill dust mites, but this won't remove the allergens. Keep humidity low. Maintain a relative humidity below 50% in your home. A dehumidifier or air conditioner can help keep humidity low and a hygrometer (available at hardware stores) can measure humidity levels. Choose bedding wisely. Avoid bedcovers that trap dust easily and are difficult to clean frequently. Buy washable stuffed toys. Wash them often in hot water and dry thoroughly. Also, keep stuffed toys off beds. Remove dust. Use a damp or oiled mop or rag rather than dry materials to clean up dust. This prevents dust from becoming airborne and resettling. Vacuum regularly. Vacuuming carpeting and upholstered furniture removes surface dust — but vacuuming isn't effective at removing most dust mites and dust mite allergens. Use a vacuum cleaner with a double-layered microfilter bag or a high-efficiency particulate air (HEPA) filter to help decrease house-dust emissions from the cleaner. If your allergies are severe, leave the area being vacuumed while someone else does the work. Stay out of the vacuumed room for about two hours after vacuuming. Cut clutter. If it collects dust, it also collects dust mites. Remove knickknacks, tabletop ornaments, books, magazines and newspapers from your bedroom.

Remove carpeting and other dust mite habitats. Carpeting provides a comfortable habitat for dust mites. This is especially true if carpeting is over concrete, which holds moisture easily and provides a humid environment for mites. If possible, replace wall-to-wall bedroom carpeting with tile, wood, linoleum or vinyl flooring. Consider replacing other dust-collecting furnishings in bedrooms, such upholstered furniture, non-washable curtains and horizontal blinds.

Install a high efficiency media filter in your furnace and air conditioning unit. Look for a filter with a Minimum Efficiency Reporting Value (MERV) of 11 or 12 and leave the fan on to create a whole house air filter.

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