

# What Do All Households Share In Common?

## The Dust Mite!!!

Look Who's Eating, Living and Sleeping In Your Bed!!!



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Dust mites live in your bedding, curtains, carpets, and upholstered furniture. The particles seen floating in a shaft of sunlight include dead mites and their waste products. Their waste products actually provoke allergic reactions.

Dust mites are microscopic bugs that belong to the same class (*Arachnida*) as spiders and ticks -- which have 8 legs -- not 6, like insects. Unlike some other kinds of mites, house dust mites are NOT parasites of living animals, humans or plants. They feed primarily on dead skin cells regularly shed by humans and animals. Dust mites thrive in places where their primary food source is most likely to be found in lounging areas, such as mattresses, pillows, bedcovers, carpets, upholstered furniture, stuffed toys, clothes, or other fabric items in the home.

Unlike insects such as cockroaches, dust mites are not capable of ingesting water; in order to obtain water, they must absorb it from the air. For this reason, they thrive in humid environments, ranging from 55% to 75% relative humidity. Ideal temperatures for dust mites are between 68 and 77 degrees Fahrenheit. The growth of dust mites can vary on a seasonal basis, or from room to room within a house, depending largely on variations in relative humidity, availability of food sources, and temperature. Dust mites take about one month to develop from an egg into an adult, and have an adult life span of about two to four months. A single adult female may lay up to 100 eggs.

Dust mite waste products contain an allergen -- *a substance that causes an allergic immune reaction* -- that, according to the Asthma and Allergy Foundation of America, adversely affects about 20 million Americans. Sensitive individuals become exposed to this allergen when they inhale household dust that contains dust mites and their waste products. Exposure to dust mites can trigger an asthma episode in an asthmatic who is sensitive to the dust mite allergen, while other asthmatics may not be affected by these mites. For persons allergic to dust mite allergen, exposure can cause *rhinitis allergica*, or *bronchial asthma*, and *hay fever*, and is characterized by nasal congestion, itching, and sneezing. In addition, exposure to dust mites can cause children who are predisposed to develop asthma to do so. This predisposition is not fully understood, but appears to depend upon a combination of hereditary and environmental factors.

A combination of measures is often most effective in reducing exposure to dust mite allergens. Because dust mites thrive in the bedroom, this is a good place to begin interventions. One important strategy for controlling dust mites includes reducing moisture and maintaining a low relative humidity in the home -- although it may not be feasible to completely eliminate dust mites from homes in moderately humid

climates. In addition to killing dust mites, steps should be taken to reduce exposure to dust mite waste products. Weekly hot water (minimum of 140 degrees Fahrenheit), laundering of bedding, including sheets, bedcovers, and blankets, will help reduce the population of dust mites and reduce allergen levels. Temperatures of 140 degrees Fahrenheit for one hour or more is generally lethal to these mites. Covering pillows and mattresses with allergen-impermeable covers will help contain dust mites and their waste products, as well as reduce exposure to dust mite allergens. Additional measures include washing stuffed toys and vacuuming and steam cleaning carpets.

### Ohio State University Extension Fact Sheet

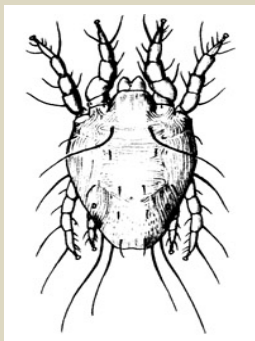
Common Name .....	Scientific Name
<b>Entomology</b>	
North American House Dust Mite	<i>Dermatophagoides farinae</i>
European House Dust Mite	<i>Dermatophagoides pteronyssinus</i>

Just under our skin are capillaries carrying blood with its circulating red cells and a variety of white blood cell types. Just outside of the capillaries, in the tissue of the dermis, lurk specialized immune cells, called **MAST CELLS**. Whenever we get itchy red bumps on our skin from contact with an “*allergen*”, it is due to how our mast cells respond to the allergen. Mast cells are covered with molecules of ImmunoGlobulin-E (IgE) antibody. There are antigens in dust mites, in their droppings and shed exoskeletons. Once these antigens get under the skin of an allergic host, the antigens cause mast cells to go berserk. Antigens stick to the mast cell IgE antibodies, causing granules in the mast cell to fire their contents into the surrounding tissue. This releases a host of inflammatory materials – leukotrienes, tumor necrosis factors, interleukin-4, and other cytokines that turn on other inflammatory cells. These materials cause fluid to leak from the capillaries and white cells, including neutrophils, T-Cells, and eosinophils to leave the circulation. The end result is a “*local inflammatory response*”, a red, itchy welt on the skin’s surface. Dust mites are carriers (vectors) of many diseases, including *typhus (scrub and murine)*, and *rickettsialpox*.

One of the most strongly allergenic materials found indoors is house dust, often heavily contaminated with the fecal pellets and cast skins of House Dust Mites. Estimates are that dust mites may be a factor in 50 to 80 percent of asthmatics, as well as in countless cases of eczema, hay fever and other allergic ailments. Common causes of allergy include house dust mites, cat dander, cockroach droppings and grass pollen. Symptoms are most often respiratory in nature – sneezing, itching, watery eyes, wheezing, etc. -- but usually NOT A RASH. However, there have been isolated reports of a red rash around the neck area. Other allergic reactions may include headaches, fatigue, and depression. The wheeze-inducing proteins are digestive juices from the mite’s gut, which are quite potent. An exposure to the mites in the first, crucial year of human life can trigger a lifelong allergy. Plain and Simple??? There is no cure – only prevention. House dust mite levels MUST be controlled!

Beds are the primary habitat – where one-third of our life is spent. A typical used mattress may have anywhere from 100,000 to 10 million mites inside. Ten percent of the weight of a two-year old pillow can be composed of dead mites and their droppings. Mites prefer warm, moist surroundings, such as the inside of a mattress when someone is on it. Their favorite food is dander – both human and animal skin flakes. Humans shed about 1/5 ounce of dander (dead skin) each week. About 80% of the materials seen floating in a sunbeam are actually skin flakes. Also, bedroom carpeting and household upholstery support high dust mite populations.

#### IDENTIFICATION



House dust mites, due to their very small size (250 to 300 microns in length), and translucent bodies, are not visible to the unaided eye. For accurate identification, one needs at least a 10X magnification. The adult dust mite’s cuticle (covering) has simple striations that can be seen from both the dorsal (top) view and from the ventral (bottom) view. The ventral view of the house dust mite reveals long setae (hairs) extending from the outer margins of the body and shorter setae on the rest of the

body. Through the microscope, one will see many oval-shaped mites scuttling around and over one another. They have eight hairy legs, no eyes, no antennae, a mouthpart group in front of the body (resembling a head), and a tough, translucent shell, giving a *"fearsome appearance"*.

## **BIOLOGY and LIFE CYCLE**

Adult female house dust mites lay up to 40 to 80 eggs singly, or in small groups of three to five. These mites pass through six developmental stages, and the adults may also molt once. Adult female mites lay cream-colored elliptical eggs coated with a sticky fluid that helps them adhere to the substrate. After eggs hatch, a six-legged larva emerges. After the first molt, an eight-legged nymph appears, and after two nymphal stages occur, an eight-legged adult emerges. The life cycle from egg to adult is about one month, with the adult living an additional one to three months.

Their diet is varied with the primary food source consisting of dander (skin scales) from humans and animals. However, needed nutrients can be provided from fish food flakes, pet food, fungi, cereals, crumbs, etc. Many mite species live in bird's nests, in barns, among stored grain, straw, etc. House dust mites are cosmopolitan in distribution - with much of the research previously done in Europe. Due to the large quantity of skin scales sloughed off daily by humans, dust mites have an abundant food supply. Dust mite antigen levels are measured in bed dust, floor dust, and room air samples. Detection in room air was best during cleaning and bed-making activities. House dust mite presence is often suspected before they are actually seen and accurately identified. Requests for control often come from individuals who have been diagnosed by medical personnel as allergic to the house dust mite or the allergens produced.

## **DUST MANAGEMENT**

Getting rid of allergy-inducing dust mites and other allergy-inducing constituents of dust is related to eliminating dust from the environment. The most important tools for managing house dust mites are the vacuum cleaner and air purification unit. Regular, thorough vacuuming of carpets, furniture, textiles and other home furnishings will help keep dust mite populations low. Avoid wet-mopping because it increases moisture in the air. Where wet-mopping is necessary, as in kitchens and bathrooms, vacuum thoroughly first. Vacuums with a water filter are preferable to those with a disposable paper bag because a water vacuum removes a greater range of particle sizes than paper bag types. It is better to vacuum thoroughly once a week, rather than lightly on a daily basis. In addition, special dust cloths and other cleaning implements that are treated chemically to hold, rather than scatter, dust may be helpful.

## **CONTROL MEASURES**

One of the best ways to control house dust mites is an Air Purification System that "kills" the mites – while purifying the air throughout the house (*air filtration products DO NOT provide this benefit – they only recirculate the same air -- and laundering only "reduces" the problem*). In addition, normal house dust in the air is removed which reduces other allergens that cause respiratory problems. The best purification system will eliminate the food source of house dust mites. These air purifiers emit a low level of ozone (activated oxygen) that attaches to fungus, mold, and bacteria on skin flakes. These machines are approximately the size of a kitchen bread box, and one machine will protect an area up to 2,500 square feet. No maintenance is required, other than a thorough cleaning once every four months or so. The air purifier can be placed near the central air return vent for air conditioning and heating systems; it can also be attached to the central air return; or, the air purifier can be centrally located within the home.

Effective control of dust mites would require the maintenance of relative humidity in the home below 50%. During humid times of the year, it is important to focus on decreasing indoor humidity, especially during the winter period to reduce dust mite population. It would be helpful to run dehumidifiers in bedrooms and/or particularly damp areas of the home. Homes that have their air conditioners on constantly have lower dust mite counts than non-air-conditioned homes.

For Information on Air Purification systems that kill house dust mites and provide numerous other health benefits – especially to those who suffer from allergies, asthma, hay fever, eczema, and respiratory problems – [CLICK HERE](#).

## CHEMICAL CONTROL

No pesticides are currently labeled for house dust mites. However, two non-pesticide products – *Acarosan* and *Allergy Control Solution* – are available for treatment of house dust mites and their allergens. The active ingredients of each product is benzyl benzoate and tannic acid. Benzoic acid esters, such as benzyl benzoate, are very effective acaricides in both laboratory and field evaluations. Health risks appear to be slight as benzoates are rapidly metabolized in the body to *hippuric acid*, and then excreted in the urine. Most acaricidal studies for house dust mites have been done in Europe. Before pesticide recommendations are made in the United States, approval will be needed by the Environmental Protection Agency (EPA). For additional information, telephone 1.800.7ASTHMA.

For information on products to control dust mites, non-allergenic bedding products, asthma treatment, and personal care -- [CLICK HERE](#).

## DETECTION

The presence of house dust mites can be confirmed microscopically – which requires collecting samples from mattresses, couches and carpets. Also, it requires the use of a microscope with sufficient magnification and the technical ability to recognize house dust mites under the microscope.

Another diagnostic test— known as “**Acarex**” -- is sold and distributed in the United States. This is a “*dipstick-type*” test, similar to those sold in drugstores for glucose, etc. This test actually detects the presence of house dust mite feces. One must collect dust samples and mix a portion of the sample with reagents that comes packed with the test material. Then the dipstick is placed into the mixture, removed, and compared with the color change on a chart. It will give an indication of the level of infestation. The test kits must be kept refrigerated.



## SANITATION

Recommendations focus on “*dust control*”. One must reduce the concentration of dust borne allergens in the living environment by controlling both allergen production and the dust that serves to transport it. For the bedroom environment, consider the following measures:

- Replace feather and down pillows with those having synthetic fillings.
- Enclose the mattresses – top and sides – with non-allergenic, impermeable, plastic covers, thoroughly vacuuming mattress pillows and the base of the bed.
- Regularly damp dust the plastic cover.
- Weekly change and wash pillowcases, sheets, and under blankets, and vacuum the bed base and around the covered mattress.
- Replace woolen blankets with nylon or cotton cellulose ones. Avoid wool fabrics/rugs, because wool sheds particles, which are eaten by these mites.
- Frequently wash all bedding (blankets, mattress pads and comforters) in hot water (140 degrees Fahrenheit). Also, wash curtains regularly.
- Remove carpet and replace with wood, tile, linoleum, or vinyl floor covering. If this is not an acceptable option, make sure you thoroughly vacuum carpets weekly and deep-clean regularly.
- Mattresses covered with “fitted sheets” help prevent the accumulation of human skin scales on the surface.

- Vacuuming is best accomplished by cleaners that entrain dust into a “*liquid medium*”, such as water, rather than a dust bag. This reduces the suspension and dissemination of allergenic dust particles in the air. Frequent vacuuming by conventional vacuums results in a significant increase in air borne dust concentrations, and more likely to aggravate allergic/asthmatic conditions.

**Sources and Additional Information:**

- ❑ Asthma and Allergy Foundation of America – [www.aafa.org](http://www.aafa.org)
- ❑ Alliance for Healthy Homes – [http://www.aeclp.org/hhe/hhe\\_dust\\_mites.htm](http://www.aeclp.org/hhe/hhe_dust_mites.htm)
- ❑ “Dust Mites: A Primer”, by L. Blanco – [members.ozemail.com.au/~lblanco](mailto:members.ozemail.com.au/~lblanco)
- ❑ “The Role of Intervention in Established Allergy: Avoidance of Indoor Allergens in the Treatment of Chronic Allergic Diseases”, by T. Platts-Mills, J. Vaughan, M. Carter, and J. Woodfolk – Journal of Allergy and Clinical Immunology
- ❑ “House Dust Mites”, University of Nebraska Cooperative Extension in Lancaster County -- [www.Lancaster.unl.edu/enviro/pest/factsheets/013-97.htm](http://www.Lancaster.unl.edu/enviro/pest/factsheets/013-97.htm)
- ❑ Fact Sheet – <http://ohioline.osu.edu/hyg-fact/2000/2157.html>

