

House Dust Mites, *Dermatophagoides* spp. (Arachnida: Acari: Pyroglyphidae) ¹

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Introduction

The term "house dust mites" has been applied to a large number of mites found in association with dust in dwellings. The American house dust mite, *Dermatophagoides farinae* Hughes, and the European house dust mite, *Dermatophagoides pteronyssinus* (Trouessart), are discussed here. The first permanent structures for houses date back to 6,000 to 5,000 B.C., but it was not until the late 1600s that scientist became interested in the dust of houses. The pyroglyphids are parasites associated with birds and/or mammals. Kern (1921) found house dust to give positive cutaneous reactions in sensitive patients. Cook (1922) and Coa (1922) also found that dust extracts gave positive skin reactions in over 30 per cent of the individuals tested. Voorhorst et al. (1964) and Oshima (1964) first published their accounts that mites were recognized to contribute to the house dust allergy problem.

Distribution

Nearly cosmopolitan in distribution; associated with house dust and bird nests.

Description

Both male and female adult house dust mites are globular in shape, creamy white and have a striated cuticle. The female measure approximately 420 microns in length and 320 microns in width. The male is approximately 420 microns long and 245 microns wide. A pair of suckers on the ventral posterior idiosoma of the male is used to grasp the female during copulation. Males are more sclerotized with enlarged legs I and III. The male aedeagus is located between the apodemes of leg IV. The female has a well-defined genital opening anterior to the bursa copulatrix located near the anus (Suggars 1987).

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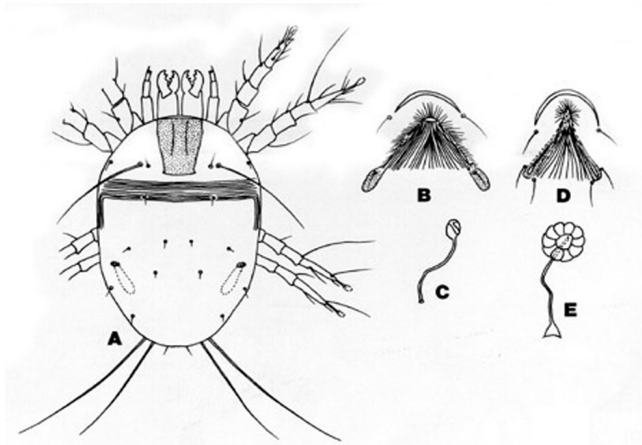


Figure 1. *Dermatophagoides* spp. A) Dorsum of *D. farinae* Hughes. B) Female genital opening. C) Bursa copulatrix and seminal receptacle D) *D. pteronyssinus* (Trouessart) female genital opening. E) Bursa copulatrix and seminal receptacle. Credits:

Life Stages and Biology

The life cycle of these two mite species include egg, active larva, resting larva (pharate tritonymph), active tritonymph, resting tritonymph (pharate adult), and active adult. Between 19 and 30 days are needed to complete a life cycle depending upon the temperature and humidity (Furumizo 1973). Mated females live about two months. A male may attach itself to a tritonymph female and mate when she reaches the adult stage. *D. farinae* lays eggs over a 30-day period, producing about an egg a day, while *D. pteronyssinus* lays about 80 eggs over a 45-day period. There is a general agreement that house dust mites in the home feed on shed skin of man. The average individual sheds 0.5 to 1.0 gram of skin daily. Spieksma et al. (1971) reported that the mites were sensitive to relative humidity and at 60% or lower the mite population stops growing and dies out.

Hosts

Mammals, particularly man, and in bird nests, and occasionally in bee hives.

Economic Importance

Because of the medical implications, house dust and the fauna of mites associated with house dust have been tested for the source of the house dust allergen. Mites and insects that inhabit buildings as well as bacteria, fungi, and algae appear to have

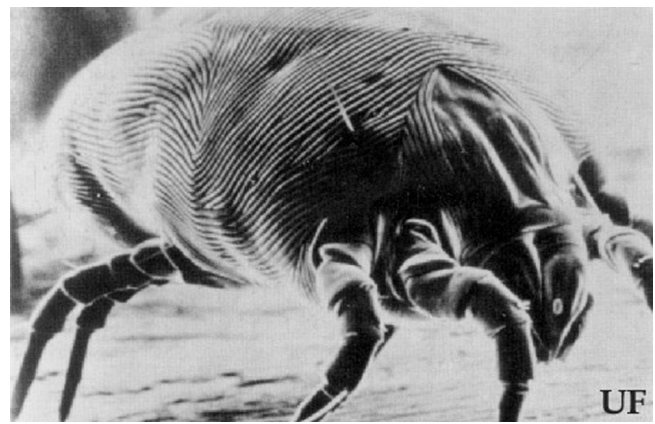


Figure 2. Scanning electron micrograph of female house dust mite, *Dermatophagoides farinae* Hughes, approximately 2000X magnification. Credits: G. W. Wharton

allergenic properties. The influence of house dust mites to the overall problem of dust allergies is not clearly known. In dust samples taken by the senior author and those taken by other workers, the American and European house dust mite are usually found in high numbers (Yoshikawa and Bennett 1979). Davies (1958) reported the highest house dust allergen activity were found in dust samples stored at 85% RH. Mite analyses were not included in Davies' report. The age of the dust also appears to be a factor in the degree of allergen activity. Mite allergens are mainly present in feces of house dust mites and may become airborne and inhaled by patients, giving rise to asthma, rhinitis, or atopic dermatitis (Van Bronswijk 1981). For a complete reviews of house dust mites and the related problems see Wharton (1976) and van Bronswijk (1981).

Survey and Detection

Vacuum mattresses, carpets, sofas, and chairs and examine the dust collected for mites. A number of complicated procedures have been published for separating mites from the dust. A simple method for detecting the presence of mite is to put a small amount of dust on the surface of water and examine it under 20X magnification. Live and dead mites will remain on the surface of the water. Furumizo (1973) reported a sieving and flotation technique. Shamiyeh et al. (1973) placed a 0.05 g sample of dust in 30 ml of a saturated NaCl solution and added 5 drops of detergent. The dust was teased apart and subjected to ultrasonic treatment for 20 minutes. The suspension

was rinsed through a 45 micron mesh sieve, stained with crystal violet and examined under a stereo microscope. Hirschmann (1986) reported that dust mites were attracted to white DIN-A4 sheets of typewriter paper placed where the dust mites are suspected. Paper is examined in the mornings and evenings by holding the paper over a lamp. The mites cast a shadow.

Management

Reduce the humidity below 70 per cent.

Thoroughly vacuum mattresses, carpets, sofas, and chairs. Very sensitive individuals should encase their mattresses in plastic. Use drapes that can be washed and change bed clothing frequently. Vacuuming does not always remove all the live mites and Korsgaard (1982) stresses reducing humidity over sanitation. A number of insecticides and fungicides are reported to provide some relief (Leysen et al. 1974; Mitchell et al. 1985; Van de Lustgraaf 1977 and 1978; Mallea and Charpin 1977; Penaud et al. 1973; DeSaint-Georges-Grèdelet 1981). No one method has been found for reducing mites and relieving allergy suffering. Immunotherapy, i.e., injections of mite extracts into the patients to increase antibody level, has had variable success (Munro-Ashman et al. 1976).

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