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# House Dust Mites, *Dermatophagoides* spp. (Acari:Pyroglyphididae)[1]

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INTRODUCTION: The term "house dust mites" has been applied to a large number of mites found in dwellings associated with dust. The American house dust mite *Dermatophagoides farinae* Hughes and the European house dust mite *Dermatophagoides pteronyssinus* (Trouessart) are discussed in this circular. The first permanent structures for houses date back to 6,000 to 5,000 B.C., but it was not until the late 1600's that scientists 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.

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 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 mites 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 review of house dust mites and the related problems see Wharton (1976) and **House dust biology** by van Bronswijk (1981).

Figure 1. *Dermatophagoides farinae* Hughes, Scanning Electron Micrograph of female, approximately 2000X magnification. (courtesy of G.W. Wharton)

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DISTRIBUTION: Nearly cosmopolitan associated with house dust and bird nests.

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

LIFE STAGES AND BIOLOGY: The life cycle of these 2 mite species include egg, active larva, resting larva (pharate tritonymph), active tritonymph, resting tritonymph (pharate adult), and active adult. Between 19 to 30 days are needed to complete a life cycle depending upon the temperature and humidity (Furumizo, 1973). Mated females live about 2 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.

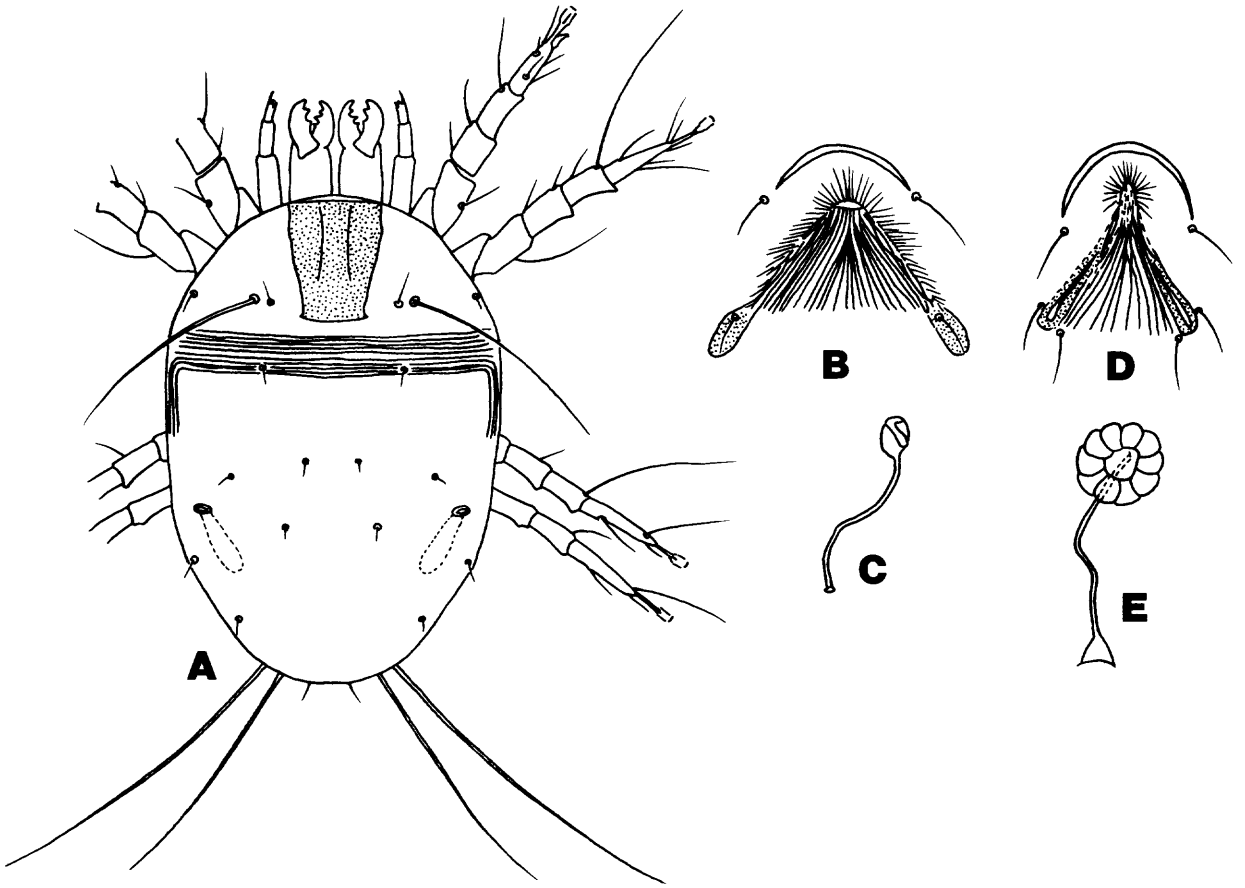


Figure 2. *Dermatophagoides* spp. A. Dorsum of *D. farinae* Hughes. B. Female genital opening. C. Bursa copulatrix and seminal receptacle. D. *D. pteronyssinus* (Trouessart) female genital opening. E. Bursa copulatrix and seminal receptacle.

DESCRIPTION: Both male and female adult house dust mites are globular in shape, creamy white and have a striated cuticle. The female measures approximately 420 microns in length and 320 microns in width (Figs. 1 and 2). 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) (Fig. 2).

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 mites 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 0.05g 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 min. 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.

CONTROLS: 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 chemicals have been tested and only lindane was effective at rates below 1% (Leysen *et al.* 1974). LINDANE IS NOT CLEARED FOR USE IN HOMES. Mitchell *et al.* (1985) suggested regular cleaning and a pirimiphos methyl treatment every 6 weeks would reduce allergen levels in the home. Some of the new synthetic pyrethroids have also shown promise. Fungicides can influence the population growth of house dust mites (Van de Lustgraaf, 1977, 1978), but have no direct lethal effect. Paragerm AK has a lethal effect on fungi, bacteria in house dust (Mallea and Charpin, 1977) and *Dermatophagoides* (Penaud *et al.*, 1973). Natamycin is also a proven inhibitor of house dust mites (De Saint-Georges-Gridelet, 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).

LITERATURE CITED

**Coa, A.F.** 1922. Studies in specific hypersensitiveness. V. The preparation of fluid extracts and solutions for use in the diagnosis and treatment of allergies with notes on the collection of pollens. J. Immunol. 7:163-168.

**Cook, R.A.** 1922. Studies in specific hypersensitiveness. IV. New etiologic factors in bronchial asthma. J. Immunol. 7:147-162.

**Davies, R.R.** 1958. Moulds in dust and air. Thesis, Univ. of London.

**De Saint-Georges-Gridelet, D.** 1981. Mise au point d'une stratégie de contrôle de l'acarien des poussières (*Dermatophagoides pteronyssinus*) par utilisation d'un fongicide. Acta Oecol. Oecol. Applic. 2(2):117- 126.

**Furumizo, R.T.** 1973. The biology and ecology of the house dust mite *Dermatophagoides farinae* Hughes, 1961 (Acarina: Pyroglyphidae) Ph.D. dissertation, University of California, Riverside. 143 pp.

**Hirschmann, W.** 1986. Simple method for identifying live house dust mites.The Practical Pest Controller. 38(7):1-2.

**Kern, R.A.** 1921. Dust sensatization in bronchial asthma. Med. Clin. N. America. 5:751-758.

**Korsgaard, J.** 1982. Preventative measures in house dust allergy. Am. Rev. Respir. Dis. 125:80-84.

**Leysen, M. Th., G. Reybrouck, and H. Van de Voorde.** 1974. Susceptibility of the house dust mite to pesticides and disinfectants. Acta Allergol. 29:455-461.

**Mallea, M., and J. Charpin.** 1977. Activites fongistatique et fongicide du paragerm forte ambiance sur les champigons. Allergol. Immunopathol. 5(4):536.

**Mitchell, E.B., S. Wilkins, J. McCallum Deighton, and T.A.E. Platts-Mills.** 1985. Reduction of house dust mite allergen levels in the home: uses of the acaracide, pirimiphos methyl. Clin. Allergy. 15:235-240.

**Munro-Ashman, D., and A.W. Frankland.** 1976. Treatment of Allergy to house dust with pyridine-extracted alum-precipitated extracts of the house dust mite. Ann. Allergy. 36:95-98.

**Oshima, S.** 1964. Observations of floor mites collected in Yokokama. I. On the mites found in several schools in summer. Japan J. San. Zool. 15(4):233-244 (in Japanese with English summary).

**Penaud, A., J. Mouirit, P. Autran, P. Timon-David, M. Jacquet-Francillon, and J. Charpin.** 1973. Reflexions sur les moyens de lutte contre les acariens pyroglyphides des poussières domestiques. Marseille-Medical. 110(5):377-380.

**Shamiyeh, N.B., R.P. Hornsby, S.E. Bennett, and N.L. Woodill.** 1973. Distribution of house dust mites in the environs of a Tennessee River Valley. J. Econ. Entomol. 66:998.

**Spieksma, F. Th. M., P. Zuidema, and M.J. Leupen.** 1971. High altitude and house-dust mites. British Med. J. 1:82-84.

**Suggars, A.L.** 1987. House Dust Mites: A Review. J. Entomol. Sci. Suppl. 1:3-15.

**van Bronswijk, J. E.M.A.** 1981. House dust biology. NIB Publishers, The Netherlands. 314 pp..

**Van de Lustgraaf, B.** 1977. Xerophilic fungi in mattress dust. Mykosen. 20:101-106.

**Van de Lustgraaf, B.** 1978. Ecological relationships between xerophilic fungi and house dust mites (Acarina: Pyroglyphidae). Oecologia (Berlin). 33:351-359.

**Voorhorst R., M.I.A. Spieksma-Boezeman, and F. Th. M. Spieksma.** 1964. Is a mite (*Dermatophagoides* sp.) the producer of the house-dust allergen? Allergie u. Astma. 10(6):329-334.

**Wharton, G.W.** 1976. House dust mites. J. Med. Entomol. 12(6):577-621.

**Yoshikawa, M. and P.H. Bennett.** 1979. House dust mites in Columbus, Ohio. Ohio J. Sci. 79(6):280-282.

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