

HOUSE DUST MITES COLLECTED FROM HOUSES OF PERSONS WITH RESPIRATORY ALLERGIES¹

Lilian A. de las Llagas^{2*}, Myra S. Mistica³ and Arlene G. Bertuso⁴

¹ This study was supported through funds provided by the National Institutes of Health-Philippines, University of the Philippines, Manila.

² Professor, ³University Research Associate & ⁴Associate Professor, Department of Parasitology, College of Public Health, University of the Philippines, Manila, Philippines. (corresponding author: LA de las Llagas; e-mail: lilyemerine@yahoo.com)

ABSTRACT

The composition of mites present in house dust from houses of 35 people with respiratory allergy, such as bronchial asthma and allergic rhinitis, was investigated in 8 locations in the National Capital Region in the Philippines. Two methods of dust collection were used, namely: the floor sweep and the vacuum cleaner methods. The floor sweep method utilized a fine-brush broom and dustpan to sweep and collect 1g dust samples from floor surfaces. The vacuum cleaner method used the Magic brush™ to collect 1g of dust from surfaces of the following: 1) beddings (including bed sheets, blankets, pillows and mattresses), 2) upholstered furniture (including furniture that have cloth as covering) and 3) carpets (including all types of cloth or textile used as floor covering). All dust samples were brought to the laboratory for mechanical processing and mite species identification. Results revealed that the most predominant mites in house dust were *Blomia tropicalis* and *Dermatophagoides pteronyssinus*. The houses sampled were also found to have *Suidasia pontifica*, *Cheyletus malaccensis* and an unidentified species of Glycyphagidae. Results showed that the major mites in houses of the respiratory allergic persons can be grouped into house dust mites and stored product mites.

Key words : Allergy, house dust mites, species composition, stored product mites

INTRODUCTION

Many mites are free-living and can be found virtually in any environment throughout the world. The mites are primarily stored product mites, predators of stored product mites, nest dwellers, parasitic mites and phytophagous mites (Furumizo and Thomas 1977). Among the genera of mites that have been found associated with stored food products are *Acarus*, *Blomia*, *Glycyphagus*,

Lepidoglyphus, *Suidasia* and *Tyrophagus* (Furumizo and Thomas 1977; Hallas 1991; Balmes-Pacia and Corpuz-Raros 1998). These mites are particularly important as food pollutants. In the Philippines, Corpuz-Raros et al. (1988) reported the different mites associated with stored products, poultry houses and house dust. Of the stored product mites, it has been reported that *Suidasia pontifica* Oudemans (Corpuz-Raros et al. 1988) and *Tyrophagus putrescentiae* (Schrank) (Furumizo and Thomas 1977) were two of the most destructive. *T. putrescentiae* has also been reported to cause dermatitis in people handling the infested products.

Recently, the stored product mites have gained medical importance as potential producers or agents of the house dust allergens (i.e. substances produced by mites) that cause respiratory allergy such as bronchial asthma and allergic rhinitis in man. These allergens have also been reported to produce eczema (Ho 1997). Investigations of mites causing allergies in man had become widespread since the discovery of the house dust mites in 1964 (Voorhorst et al. 1967). It has been confirmed that the house dust mites were the major allergen-producing mites in houses (Hallas 1991). Ho (1997) reported that the most common species of house dust mites in Peninsular Malaysia are *Dermatophagoides pteronyssinus* Trouessart, *D. farinae* Hughes, *D. microcerus* Griffiths and Cunnington, *Euroglyphus maynei* (Cooreman), *Hirstia domicola* Fain, Oshima and Bronswijk, *Malayogyphus intermedius* Fain, Cunnington and Spieksma, *Sturnophagoides brasiliensis* Fain, *Blomia tropicalis* Bronswijk, De Cock and Oshima, *Chortoglyphus arcuatus* Tropeau, *T. putrescentiae* (Schrank), *S. pontifica* Oudemans, *S. nesbitti* Oudemans and *Cheyletus malaccensis* Oudemans. About 47 species of mites in 17 genera in the family Pyroglyphidae have been recorded worldwide (International Workshop report, 1989).

In the Philippines, investigation on the effects of house dust mites and stored product mites on human health is very limited. Cua-Lim (1978) reported *D. pteronyssinus* and *D. farinae* to be the most common species of house dust mites collected from mattresses and pillows of patients with perennial allergic asthma in Metro Manila. De las Llagas (1987) reported various mites found in the alimentary canal, urinary and respiratory tracts of humans. She found *Tyrophagus*, *Acarus* and *Dermatophagoides* in the sputum of patients suffering from asthma and eosinophilia.

The purpose of the present study is to determine the species composition and abundance of mites collected from various surfaces of each room sampled and to elucidate the relationship of mite presence and abundance in the homes of allergic persons.

MATERIALS AND METHODS

Areas of Collection

Records at the Allergy Section of the Philippine General Hospital in Manila show that 35 persons were diagnosed with respiratory allergies such as bronchial asthma and allergic rhinitis. The residences of the patients were located and distributed in Metro Manila (Las Piñas, Mandaluyong, Pasay, Pasig, Valenzuela), Antipolo and Cavite, Philippines.

House Dust Collections

House dust samples were collected from each house starting January 2002 up to March 2003. Two methods of dust collection were employed, namely: the floor sweep and the vacuum cleaner methods. The floor sweep method utilized an ordinary broom to sweep and dustpan to collect dust samples from floor surfaces. Approximately 1g of dust sample was collected in each room per house. The vacuum cleaner method used Magic Brush (The Handy Vacuum Cleaner)TM in collecting 1g dust sample each from various surfaces, namely: 1) beddings (including bed sheets, blankets, pillows and mattresses, 2) upholstered furniture (including furniture that have cloth or other material as covering) and, 3) carpets (including all types of cloth or textile used as floor covering).

All carpets used in the study were measured prior to dust collections. A 3-sq.m portion of the carpet was selected as the sampling area. Three sampling sites, measuring 1 sq ft each, were randomly selected within the sampling area of the carpet. Mechanical strokes of the Magic Brush from 100 to 200 over each sampling site in the carpet were made. At the end of each dust sampling, features of the houses such as the physical structure, furnishing and the types of materials used in the furnishings were recorded.

Extraction of Mites from House Dust

The dust samples collected through the sweep net or vacuum cleaner were transferred to transparent plastic bag with a 'zip-lock' fastening and labeled accordingly. These samples were brought to the laboratory and placed individually in a Petri dish. Each sample was observed under a stereoscope (40X magnification) to determine the presence or absence of mites. The mites were handpicked with a pair of forceps. Immature mites that were too small to collect mechanically were pooled together and reared to adulthood by placing them in a Petri dish provided with finely ground rabbit pellets as nourishment. All mites were then collected and mounted on a glass slide using Hoyer's medium and later examined under a compound microscope (100X magnification) for identification. The mites were identified using taxonomic keys and illustrations, and confirmed by Dr. Leonila Corpuz-Raros, the acarologist of UP Los Baños.

RESULTS AND DISCUSSION

A total of 2,902 mites were collected from the houses of the 35 persons diagnosed for respiratory allergies. All the rooms of the houses sampled were infested with any of the following mites: *Blomia tropicalis* (Fig. 1a) (Echimyopiidae), *Suidasia pontifica* (Fig. 1b) (Suidasiidae), *Cheyletus malaccensis* (Fig. 1c) (Cheyletidae), *Dermatophagoides pteronyssinus* (Fig. 1d) (Pyroglyphidae), and an undetermined species of Glycyphagidae (Fig. 1e). *B. tropicalis* (n = 1,492) and *D. pteronyssinus* (n = 1,286) were the most predominant mites recovered from house dust.

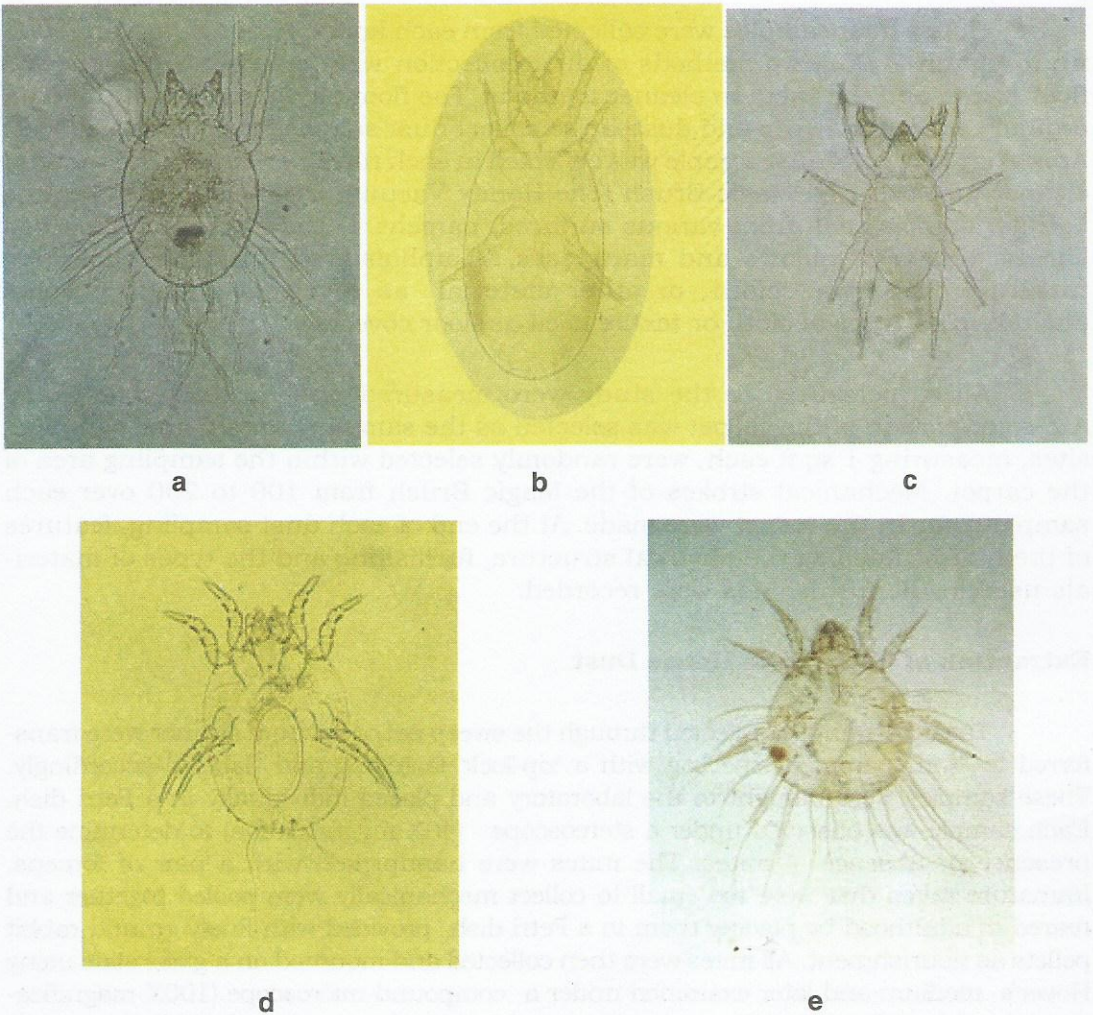


Figure. 1. a. *Blomia tropicalis*, b. *Suidasia pontifica*, c. *Cheyletus malaccensis*, d. *Dermatophagoides pteronyssinus*, e. an unidentified species in Family Glycyphagidae

Figure 2 shows the distribution of the different species of mites collected from the surfaces in the living room. Results revealed that *B. tropicalis* was the predominant species collected followed by *D. pteronyssinus*. The density of *B. tropicalis* was higher on the floor (90%) followed by the carpet (81%) and upholstered furniture (55%). *D. pteronyssinus* (40%) was collected from upholstered furnitures in the living room. A few specimens of the predatory mite, *C. malaccensis*, were also collected.

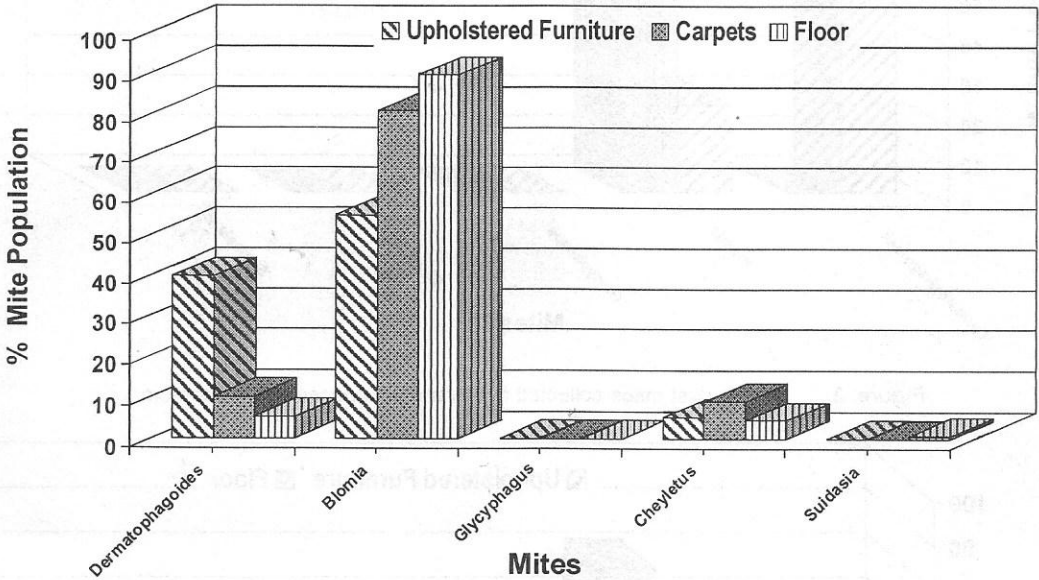


Figure. 2. House dust mites collected from various surfaces in the living room.

Similar results have been obtained for the bedroom (Figure 3). Of the mites collected from the floor, 78% were *B. tropicalis*. In contrast, 77% of the mites collected from the beddings were *D. pteronyssinus*. On the other hand, only 3 species of mites were extracted from dusts coming from the kitchen floor (Figure 4). Of the mites collected, 82% were *B. tropicalis*.

Our results showed that mites were abundant in houses where there were accumulations of dust on surfaces such as beddings, upholstered furniture and floor. It has been demonstrated that *B. tropicalis* was the most abundant species collected in dust from all the floors sampled. Dar and Gupta (1979) reported that *B. tropicalis* is a stored food product mite and chiefly a pest of grain, wheat flour and cheese. The availability of these food products in the sampled houses might have contributed to the abundance of this species.

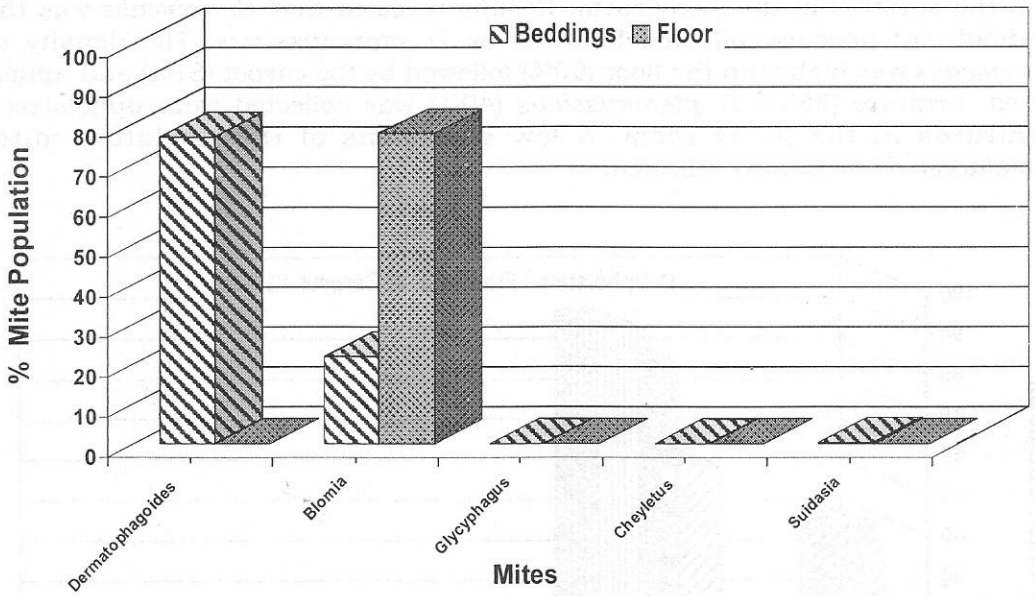


Figure 3. House dust mites collected from various surfaces in the bedroom.

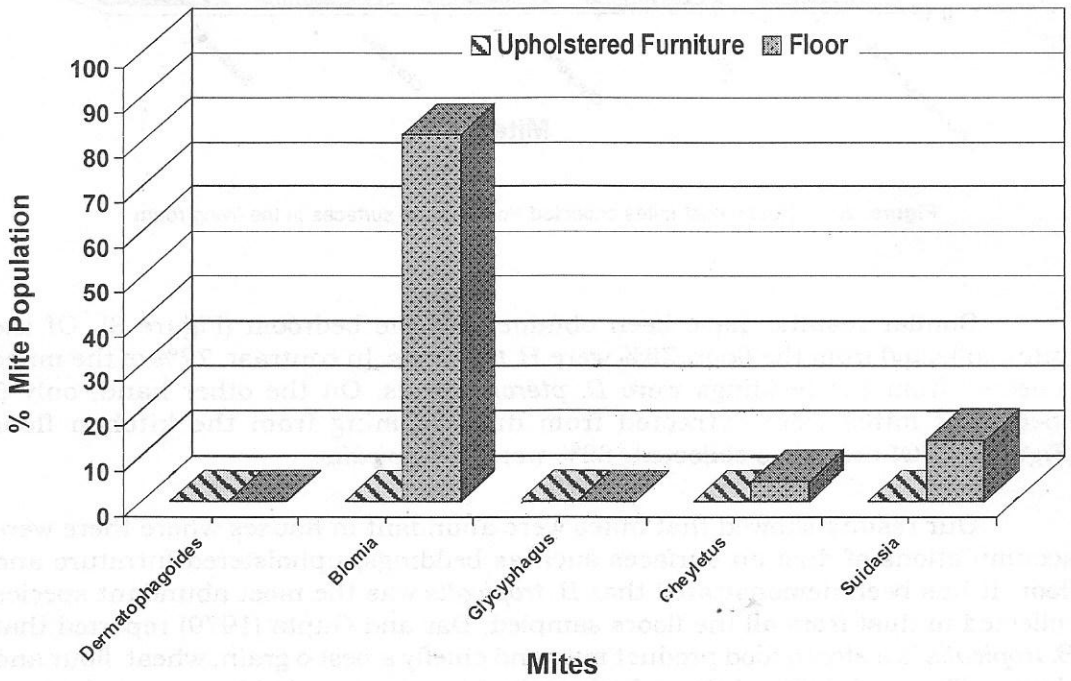


Figure 4. House dust mites collected from various surfaces in the kitchen.

The abundance of *D. pteronyssinus* in beddings, upholstered furniture and carpets, but not on kitchen floor, suggests that these surfaces provide a protective niche as well as food materials for the mites. Similar findings have been mentioned in the International Workshop Report (1989) on the occurrence of the highest number of dust mites in beddings, upholstered furniture, or carpeting. Charlet et al. (1977) reported that carpets accumulate large amount of materials suitable as food source for the mites. Furumizo and Thomas (1977) reported that *D. pteronyssinus* is a cosmopolitan house dust mite of human habitations. This species has also been found to infest mammals, birds and their nests.

B. tropicalis, *S. pontifica* and *Cheyletus malaccensis* are only the species of mites collected from the dust in the kitchen floor. *B. tropicalis* and *S. pontifica* are considered as stored product mites while *Cheyletus malaccensis* is a predator of stored product, bird nest acaroids and feather mites of chicken (Corpuz-Raros 2002). Dar and Gupta (1979) reported that these species might not be characteristic house dust dwellers like Pyroglyphids but common species in other habitats (e.g. soil) or intruders from stored food products.

CONCLUSION

In general, our results showed that the major mites in the homes of respiratory allergic persons can be grouped into house dust and stored product mites. The presence of large numbers of house dust mites and stored product mites in houses suggests a continuous source of dust allergens that can contribute to the development of asthma and rhinitis in man. The purification and assay of the allergens from those collected mites were conducted and will be published elsewhere.

ACKNOWLEDGMENTS

The authors thank the National Institutes of Health-Philippines, University of the Philippines Manila, for funding this research and the Department of Allergology and Immunology, University of the Philippines-Philippine General Hospital for the support extended to the project.

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