Mass Rearing of Mites Collected from House-Dust Samples

*by Vijayamma Thomas** *Tan Bock Hay***
*and Yap Pak Leng**

Introduction

HOUSE-DUST MITES have been recognised as an important source of allergen from the beginning of this century (Storm Van Leeuwen, *et al* 1925). Among the several mites present in house-dust samples, the "European" house-dust mite *Dermatophagoides pteronyssinus* which has world-wide distribution (Spieksma and Spieksma-Boezeman, 1967), was found to be the most important allergen (Voorhorst *et al*, 1967). A significant correlation between "North American" house-dust mite *D. farinae* and human hypersensitivity to house-dust was found by Larson *et al* (1969). Miyamoto *et al* (1970) found that house-dust was one of the most important causative antigens in bronchial asthma and allergic rhinitis in Japan. They found very close co-relation between house-dust extracts and house-dust mite extracts in skin tests (1968). Nayar *et al* (1974) found that these two species play a significant role in the etiopathogenesis of bronchial asthma in India. Pepys *et al* (1968) found a good co-relation between a history of house-dust allergy, prick tests and inhalation test reactions to an extract of a culture of *D. culinae* in asthmatic subjects. They found that most of the patients reacting to *D. culinae* reacted at a weaker level to extracts of cultures of *G. domesticus* as well as *A. siro*.

Although bronchial asthma and allergy to house-dusts are quite common among Malaysians, no work has been done so far to study the mites present in house-dust. This work was therefore undertaken to determine the common species of mites present in the dusts collected from houses of patients who suffer from bronchial asthma and nasal allergy.

In a study of this nature, the most important prerequisite is to have a technique to rear the mites in large numbers and harvest them with ease so as to be able to prepare sufficient quantities of extracts for skin tests. The paper lists various species of dust-mites isolated and a technique for mass-rearing and harvesting mites isolated from the dust samples collected from patients' houses.

Collection of House-dust Samples

A total of 98 samples of house-dust were collected from houses of patients who live in Petaling Jaya and who have complained of nasal allergy or bronchial asthma. These dust samples were collected from mattresses and furniture and were sent within 24 hours of collection to the Department of Parasitology, Faculty of Medicine.

Two amounts of about 0.2 gms. each of fine dust were examined upon receipt of the samples. The remainder of the samples were placed in plastic tubes with screw caps and were coded. These were provided with a pinch of sterile food consisting of a mixture of well ground farex and dried ox liver in the ratio of 1: 1. These were then incubated from 2 weeks to 4 weeks at room temperature (27° – 28°C) with relative humidity of 75 percent. After incubation, two other samples of about 0.2 gm. each were again examined. Those samples in which no mites were noticed were considered as negative.

* Department of Parasitology, Faculty of Medicine, University of Malaya, Kuala Lumpur.
** E.N.T. Surgeon, Assunta Hospital, Petaling Jaya.

Live mites were easily detected in dust samples examined under a low-power binocular microscope. Individual mites were removed with fine moistured camel hair brush and identified.

Mite Fauna

Of the 98 samples examined, 92 samples had one or more species of mites. The number of mites in 1 gm. of dust varied from 1 to 65. The following mites were identified:

1. *Glycyphagus geniculatus* (Vitzthum)
2. *Glycyphagus spp.*
3. *Tyrophagus putrescentiae* (Schrank)
4. *Blomia* sp.
5. *Suidasia medanensis* (Oudemans)
6. *Dermatophagoides pteronyssinus* (Trouessart)

In addition to these, there were a few other mites which were not identified. Of these, in addition to *Dermatophagoides* spp. *Glycephagus* spp. and *Tyrophagus* spp. have been found to provoke allergic reactions in patients by Maunsel, *et al* (1968) and Pepys *et al* (1968).

Culture Procedures

Cultures of *Dermatophagoides pteronyssinus, Glycyphagus* spp. and of *Tyrophagus* sp. were maintained in the laboratory.

It took about 3 to 5 months to establish stock cultures from positive dust samples and to produce large numbers. For this, about 150 to 250 mites were picked up with fine camel hair brush from the original samples. These were then introduced into clean tall plastic cups provided with 10 gms of sterile mite food consisting of a mixture of ground farex and dried ox liver in the proportion of 1: 1. The plastic cups were then closed and were kept in large jars at room temperature at a relative humidity of 80 per cent.

These cultures were then left undisturbed. After 3 to 4 weeks, these were examined. By this time, healthy cultures showed increase in the number of mites. These cultures were then left without any further addition of food. After 3 – 5 months, when mites increased gradually in numbers and the food became scarce, many active mites crawled up the sides of the plastic container. As the movement started, the lid of the plastic container was unscrewed and left loose on the cup and the container was left on water in enamel dishes. From the rim of the rearing jars the mites moved down along the outer surface (Plate I) and fell into the water. Within 2 or 3 days, very large numbers of mites fell into the water and these were collected using a fine muslin strainer. These harvested mites were used for subcultures.

Plate I.
Large numbers of mites that crawled out of the rearing cups and fell on to the water in which the rearing cups were placed.

It was noticed that under identical rearing conditions and food supply *Tyrophagus* sp. produced the most prolific and healthy cultures followed by *Glyceyphagus* spp. *D. pteronyssinus* took a longer period of time to establish in cultures and the multiplication was not very prolific.

Due to certain technical difficulties extracts of these mites were not taken for skin tests.

Discussion

Mites of the genus *Dermatophagoides* have been shown to be the main source of house-dust allergen by various investigators (Voorhorst *et al* 1967, Maunsel *et al* 1968, Larson *et al* 1969).

However, Maunsel *et al* (1968) found that extracts of other species like *Glycephagus* spp., *Tyrophagus* spp. and *Acarus siro* also provoked a lesser response. Pepys *et al* (1968) found that extracts of cultures of *A. siro* and *G. domesticus* gave reactions in patients. Miyamoto *et al* (1970) showed that from among a total of 36 species of mites which he isolated from house-dusts, no single mite was particularly related to the results of the skin tests. They came to the conclusion that the allergenicity of house-dust was largely determined by the total number of mites contained in the dust rather than by the presence of any single species. They ascribed this phenomenon to the complexity of house-dust mites and the several common antigens which these mites have.

In any future work in Malaysia on house-dust allergy, the allergenic potency of various mites present in the house-dust samples must be studied. An easy technique of mass production of various mites therefore would be of great advantages to any one who intends to work on it.

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