Annotation

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House Dust Mites and Allergy

Dust is an irritant to the respiratory mucous membrane. It is often also an allergen and there is no easy means to distinguish between these two properties of dust. A patient or the parent confidently states that they know he is 'allergic' to dust. We now know that if this statement is scientifically accurate, the most important allergen of house dust is the universally distributed acarine mite genus *Dermatophagoides*. As dust is the most important inhalant allergen, it is important that we should have some detailed knowledge of the distribution and habits of the house dust mite. The Dutch have been in the forefront with investigations on the importance of the house dust mite as an allergen (Voorhorst, Spieksma-Boezeman, and Spieksma, 1964). Within 5 years the evidence was sufficient to write a book on the subject (Voorhorst, Spieksma, and Varekamp, 1969).

World-wide Distribution

The common European species of mite is *D. pteronyssinus* which the Dutch workers found in the house dust of all homes examined. The Japanese workers (Miyamoto, Oshima, and Ishizaki, 1970) state that the allergenicity of house dust is determined by the total number of mites contained in it. They found *D. culinae* (*farinae*) could be used for skin testing but that there were 36 species of mites in house dust. In Cairo the mite which is found in very large amounts is *D. farinae* (El-Hefny and Frankland, 1970). This mite has also been reported in the U.S.A. (Wharton, 1970). Ordman (1971) has for some years investigated climate asthma. He showed that those patients who were worse at the coast were particularly skin sensitive to house dust from coastal areas. The number of mites he found depended upon the relative humidity of the region. The common mite in South Africa he found was *D. pteronyssinus* while *D. farinae* mites were only found in small numbers in two towns. There is no doubt that whenever the mite is looked for in house dust it will be found. Thus mites are found in the dust in Barbados (Pearson and Hughes, 1970), in Jamaica (D. Munro-Ashman, 1971, personal communica-

tion), in Australia (Ford, 1969), and in New Zealand (Department of Agriculture Advisory Leaflet No. 32, 1971). In the mountains of Switzerland at such places as Davos which suits asthmatics, there is a low mite content (Spieksma, Zuidema, and Leupen, 1971). But it is not so much the altitude as the climate that determines mite populations. In Nairobi (1650 m) which is warm, humid, and high, *D. pteronyssinus* is found in the house dust (Gitoh and Rees, 1971). I, too, have found mites in large amounts in a pillow taken from a room at 3000 metres in Kenya. This was enough to cause an acute attack of asthma one night in someone who thought he had grown out of the complaint. The dust in Hong Kong contains mites and like the dust in Europe can cause a seasonal exacerbation of rhinitis and asthma. The rise in the mite content of dust from September to November has been shown by the Dutch workers to be related directly to an increase in asthma during this season. Allergically, the midsummer 'cold' occurring every year is recognized as being due to a sensitivity to grass pollen, the 'later cold going on to the chest' may, in an allergic patient, be due to the great increase in the seasonal fungal spores, particularly *alternaria* and *cladosporium*, while autumn 'colds' in the atopic patient could well be triggered not by infection but by sensitivity to the house dust mite. Ducted hot air when first turned on in the autumn may cause dust allergic problems. Many children with eczema and asthma seem to lose their complaints within a few days of admission to hospital. Investigation in three teaching hospitals in London has shown that there are no mites in the relatively dust free wards (Frankland, 1971).

Mites as Allergens in Dust

Intracutaneous skin tests with any allergen including dust, I believe, should never be performed. Commercial extracts of the house dust mite are available for skin testing using the prick or scratch method. When investigating the allergens characteristic of the domestic environment, McEwen (1968) showed they were contained in old keratin material, though when the work was done it was

not realized that the keratin, whether from feathers, hair, or human skin scales, served only as a source of food for mites. Soon after, it was shown (Frankland, McEwen, and Feinberg, 1970) that a mite extract of *D. farinae* could be used as a diagnostic skin test agent in house dust sensitivity. Workers in Japan (Miyamoto *et al.*, 1970) have shown that although there may be many species of mite in house dust, each species has its own characteristic antigen, but because of cross antigenicity, *D. culinae* (*farinae*) could be used for skin testing for house dust sensitivity. In London, McAllen, Assem, and Maunsell (1970) found also a close parallel between reactions in patients allergic to house dust and to *D. pteronyssinus* using skin, nasal, and bronchial provocation tests, and also in tests of histamine release from leucocytes and from passively sensitized human lung. It is much easier to culture *D. farinae* than *D. pteronyssinus*. It was shown (Pepys, Chan, and Hargreave, 1968) that these common mites contained related allergens, but only the former is available commercially for hyposensitization in this country. Specific IgE antibody against *D. farinae* was reported by Stenius and Wide (1969) and subsequently Stenius and co-workers (1971) showed that in European dust-sensitive patients there were larger amounts of specific IgE antibody to *D. pteronyssinus* than to *D. farinae*. There was a close correlation between prick tests and specific IgE antibodies which correlated with the clinical history and provocation tests. Furthermore the amounts of IgE to *D. pteronyssinus* were comparable to those found against grass pollen, in pollen sensitive patients. Colldahl (1970) found positive lung provocation tests when using high dilutions of mite extracts. The stage had therefore been reached for hyposensitization with mite extracts to be carried out.

Hyposensitization with Mite Extracts

In dust-sensitive adults, it was shown in a double-blind controlled trial by the British Tuberculosis Association (1968) that no specific benefit was obtained. An uncontrolled multicentre trial by Munro-Ashman and colleagues (1971) has encouraging results using a *D. farinae* extract (Allpyral, Dome). A double-blind trial using an aqueous extract of *D. farinae* (Bencard) in 34 patients (Maunsell, Wraith, and Hughes, 1971) was found to be effective and safe, though the concentrations used were low. Recently a double-blind controlled trial compared an aqueous extract of *D. pteronyssinus* with an extract of human skin scales. 11 asthmatics allergic to house dust who were given the mite extract improved and 5 remained

well for a year, while the 11 control patients showed little change (Smith, 1971).

Mite Control

The mites in the adult stage are 260 to 360 μm long and since they are semitransparent are barely visible to the naked eye. Mite debris of cast skins at the nymphal stage and faecal pellets of the adult are inhaled with the house dust, but many dead mites or parts of mites can often be seen in bedroom dust. These small particles can easily become airborne and inhaled in dust. Their irradiation is not easy but environmental control before hyposensitization should always be attempted in the home of the dust allergic individual. Removal of feather and kapok pillows and eiderdowns is essential. It must be remembered that mites feed on human skin scales and like warmth, so they will be found even on a rubber pillow and on sheets. Sun kills mites, so regular airing in the sunshine should be done when possible; blankets and all linen should be dry cleaned or washed whenever possible. The house should be vacuum cleaned at least once a week in the morning and the bedroom more often, paying special attention to cracks and crevices. So far no satisfactory pesticide has been found, though benzyl benzoate, lindane, and oiling have been used.

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