

Topographical distribution of allergens within insects and house dust mites

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I. INSECTS

Allergy to insects is divided as two principal groups: Inhalation allergy and insect sting allergy, which cause quite different clinical manifestations and where different allergens are involved.

Inhalation allergy to insects may develop at excessive exposure to flying insects, e.g. at the season of hatching, as has been shown by *chironomids*, mayflies and caddis flies (2, 11). Allergy following occupational exposure has been described by laboratory workers (fruit flies) and by beekeepers. Inhalation allergy to cockroaches has been studied extensively in USA (5). Little is known about the origin of the insect inhalation allergens.

The allergens involved in insect sting allergy are the venom components themselves. Hymenoptera venoms (especially bee venom) are well-characterized, regarding both toxic action and allergenicity of the individual molecules. In honey bee venom, phospholipase is the major allergen. Hyaluronidase, acid phosphatase, mellitin and others are minor/intermediate allergens (4).

The major allergen of wasp (yellow jacket, hornet) venom is labelled antigen 5. Its biological activity is at present unknown. Phospholipase and hyaluronidase are minor/intermediate allergens (6).

II. MITES

Several lines of evidence have demonstrated the allergenic importance of the material deposited by house dust mites dur-

ing their cultivation. Short-time cultivation of *D. pteronyssinus* in allergen-free containers and subsequent removal of the animals yielded potent extracts of the remains (14). Excrement particles obtained from mite intestines by microsurgery were found highly allergenic in house dust allergic patients (3).

Less sophisticated separation techniques (like sieving) with larger yields of material have allowed more detailed studies on allergens in culture fractions. The precise origin of these components is, however, more difficult to define, as mite-free culture fractions may contain secretions and fragments of disintegrated mite bodies besides the bulk of fecal particles.

Independent observations in three laboratories have demonstrated the presence of major allergen P1 (= Dp-42 = Dpt 12) of *D. pteronyssinus* in the excrement/used medium fraction (8, 12, 13). Small amounts of this allergen is found also in intact mite bodies, probably as part of undelivered faecal material (8, 13).

The powerful allergenicity of *D. farinae* excrement fraction has also been demonstrated (9, 10).

Of the four hitherto identified major/intermediate allergens, Dp-42 has the most clear association with the faecal particles. The three other important allergens, Dp-X, Dp-Y and Dp-23, exhibit different distribution patterns. An index of relative enrichment in excrement vs. mite body fraction would produce the following ranking: Dp-42 > Dp-X > Dp-Y > Dp-23. This diversity may reflect different degrees of storage,

release, and turnover of intestinal or glandular material. None of these components may, however, be labelled as true somatic components, for which the index is well below that of Dp-23 (8).

Recently, evidence was presented to show, that the main allergenic activity of the storage mite species (*Acaridae*, *Glycyphagidae*, etc.) is also associated with the excrement fraction (1).

REFERENCES

1. Eaton, K.K., Downing, F.S., Griffiths, D.A., Hockaday, S., & Lynch, S.: The distribution and allergenicity of storage mites in rural houses in the UK. XII congress of the European Academy of Allergology and Clinical Immunology, Rome, 1983. (Abstract).
2. Gad el Rab, M.O. & Kay, A.B.: Widespread immunoglobulin E-mediated hypersensitivity in the Sudan to the «green nimitti» midge, *Cladotanytarsus lewisi* (diptera: Chironomidae). I. Diagnosis by radioallergosorbent test. *J. Allergy clin. Immunol.*, **66**, 190–197, 1980.
3. Halmai, Zs. & Alexander, F.A.R.: Studies on the house dust allergen. *Allerg. Immunol.*, **17**, 69–71, 1971.
4. Hoffmann, D.R.: Allergens in Hymenoptera venoms. *J. Allergy clin. Immunol.*, **59**, 367–370, 1977.
5. Kang, B. & Sulit, N.: A comparative study of prevalence of skin hypersensitivity to cockroach and house dust antigens. *Ann. Allergy*, **41**, 333–336, 1978.
6. King, T.P., Sobotka, A.K., Alagon, A., Koc-houmian, L. & Lichtenstein, L.M.: Protein allergens of whitefaced hornet, yellow hornet and yellowjacket venoms. *Biochemistry*, **17**, 5165–5174, 1978.
7. Lind, P. & Löwenstein, H.: Identification of allergens in *Dermatophagoides pteronyssinus* mite body extract by crossed radioimmuno-electrophoresis with two different antibody pools. *Scand. J. Immunol.*, **17**, 263–273, 1983.
8. Lind, P., Weeke, B. & Löwenstein, H.: A reference allergen preparation of the house dust mite *D. pteronyssinus*, produced from whole mite culture – A part of the DAS 76 study. Comparison with allergen preparations from other raw materials. *Allergy*, **39**, 259–274, 1984.
9. Mitchell, W.F., Wharton, G.W. & Larson, D.G.: House dust, mites and insects. *Ann. Allergy*, **27**, 93–99, 1969.
10. Miyamoto, T., Oshima, S., Ishizaki, T. & Sato, S.: Allergenic identity between the common floor mite (*Dermatophagoides farinae* Hughes, 1961) and house dust as a causative antigen in bronchial asthma. *J. Allergy*, **42**, 14–28, 1968.
11. Shulman, S.: Insect allergy: Biochemical and immunological analyses of the allergens. *Progr. Allergy*, **12**, 246–317, 1968.
12. Stewart, G.A.: Isolation and characterization of the allergen Dpt 12 from *Dermatophagoides pteronyssinus* by Chromatofocusing. *Int. Archs Allergy appl. Immun.*, **69**, 224–230, 1982.
13. Tovey, E.R., Chapman, M.D. & Platts-Mills, T.A.E.: Mite faeces are a major source of house dust allergens. *Nature*, **289**, 592–593, 1981.
14. Voorhoorst, R., Spijksma, F.Th.M & Varekamp, H.: House dust atopy and the house dust mite *Dermatophagoides pteronyssinus* (Trouessart 1897). Stafleu's Sci. Publ. Co., Leiden, 1969.

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