

[SHORT COMMUNICATION]

ANTIGENIC RELATIONSHIP BETWEEN THE HOUSE DUST MITE
DERMATOPHAGOIDES FARINAE AND THE PREDACIOUS MITE
PHYTOSEIULUS PERSIMILIS

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We have examined the antigenic relationship between the house dust mite *Dermatophagoides farinae* and the predacious mite *Phytoseiulus persimilis*. Immunoblotting analysis demonstrated that there was a very weak antigenic cross-reactivity between these different suborder of mites but that this cross-reactivity was not attributed to *D. farinae*'s major allergen's, *Der fI* and *Der fII*. These results suggest that *P. persimilis* might scarcely provoke allergic symptoms in patients sensitized to house dust mites.

Key words: cross-antigenicity — *Dermatophagoides farinae* — *Phytoseiulus persimilis*

INTRODUCTION

There are many kinds of mites which inhabit plants. Among these mites, *Tetranychus urticae* and *Panonychus ulmi* belonging to the spider mites are well known to damage plants such as vegetables and fruit trees. Most agricultural chemicals have little insecticidal effect on these mites and are likely to induce resistance to chemicals. Thus, biological control of *T. urticae* by use of the predacious mites, *Phytoseiulus persimilis*, was conducted on greenhouse vegetable crops in North America¹⁾²⁾. On the other hand, the house dust mites, *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae* are one of the most important allergens, which cause the allergic diseases such as bronchial asthma and allergic rhinitis in many parts of the world³⁾⁴⁾. From a taxonomic point of view, *D. pteronyssinus*, *D. farinae* and *P. persimilis* belong to different suborder each other. There are few reports concerning the cross-reactivity between the mites of different suborder. In this

study, we examined antigenic relationship between *D. farinae* and *P. persimilis*. Immunoblotting analysis showed that there was slight antigenic cross-reactivity between *D. farinae* and *P. persimilis*.

MATERIALS AND METHODS

P. persimilis were obtained using Spidex® (Koppert B.V., Netherland). Cultivation of *D. farinae* were performed as previously described⁵⁾.

Mite extracts

Mites extracts were prepared by extracting 100 mg of mite bodies of either *P. persimilis* or *D. farinae* in 10 ml of phosphate buffer (PB), pH 8.0, for 24 h at 4°C. The extracts were centrifuged (10,000 ×g for 30 min at 4°C) and the supernatants were used as the mite extracts.

Rabbit antisera

Preparation of antisera to *D. farinae* were prepared by immunizing New Zealand white rabbits with a mixture of *Df* mite extract (4 mg in 1 ml saline) and 1 ml of complete Freund's adjuvant (Difco Laboratories, USA). The rabbits were injected subcutaneously with the

Received: August 10, 1994

Accepted: November 9, 1994

Abbreviations: *Df* *Dermatophagoides farinae*; *Pp* *Phytoseiulus persimilis*; PRU Phadebas RAST Unit; RAST radioallergosorbent test; SDS-PAGE sodium dodecyl sulfate polyacrylamide gel electrophoresis

above mixture six times at 1-week intervals and bled 10 days after the last injection. Antisera to *Der f* I and *Der f* II were prepared according to the method of Yasueda et al⁶⁾.

Immunoblot

SDS-PAGE was carried out according to the procedure of Laemmli using 14% homogeneous gel⁷⁾, and immunoblotting was carried out according to the procedure of Towbin et al⁸⁾.

The separated proteins were transferred to polyvinylidene difluoride membrane (Immobilon®, Millipore, Mass.) The polyvinylidene difluoride membrane was incubated with rabbit anti-*D. farinae* or *Der f* I or *Der f* II sera and finally incubated in a 1 : 3000 dilution of HRP-labelled goat anti-rabbit IgG (Organon Teknika N.V.-Cappel Products, USA). The blot was developed by using Konica immunostaining HRP-1000® (Seikagaku Corporation, Japan).

RESULTS AND DISCUSSIONS

There are many studies concerning cross-reactivity between the storage mites (e.g., *Lepidoglyphus destructor* and *Glycyphagus domesticus*) and the house dust mites (*D. pteronyssinus* and *D. farinae*) because the storage mites have been detected in not only farming environments but also house dust⁹⁾¹⁰⁾. Furthermore, these mites belong to the same suborder (*Astigmata*). However, there is no report on the extent of cross-reactivity between the predacious mites, *P. persimilis* and the house dust mites, *D. farinae* which are encountered in occupational environment and in the house respectively. These mites belong to different suborder. House dust mites and storage mites are known to be the causative allergen of allergic patients. Thus, it is important to study the possibility if *P. persimilis* provoke the allergic responses such as atopic asthma, allergic rhinitis etc., in the house dust mite sensitive patients, even though the difference of taxonomic positions between *P. persimilis* and house dust mite is larger than that

between storage mites and house dust mites. Firstly, we examined antigenic relationship between *P. persimilis* and *D. farinae*. Immunoblotting analysis demonstrated that there was a weak antigenic cross-reactivity between *P. persimilis* and the house dust mites, *D. farinae* (Fig. 1). Four kinds of cross-reactive antigen derived from *P. persimilis* were recognized. Three out

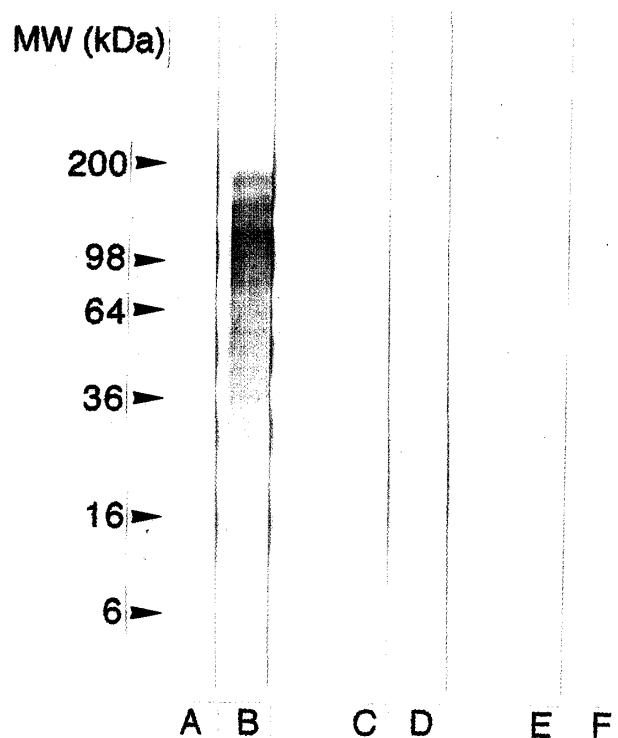


Fig. 1. Immunoblot analyses of *Df* and *Pp* extract with either rabbit anti-*Der f* I and *Der f* II sera or rabbit anti-*Df* sera.

Lane A: a staining of *Pp* extract with rabbit anti-*Df* sera and peroxidase-conjugated anti-rabbit IgG.

Lane B: a staining of *Df* extract with rabbit anti-*Df* sera and peroxidase-conjugated anti-rabbit IgG.

Lane C: a staining of *Pp* extract with rabbit anti-*Der f* II sera and peroxidase-conjugated anti-rabbit IgG.

Lane D: a staining of *Df* extract with rabbit anti-*Der f* II sera and peroxidase-conjugated anti-rabbit IgG.

Lane E: a staining of *Pp* extract with rabbit anti-*Der f* I sera and peroxidase-conjugated anti-rabbit IgG.

Lane F: a staining of *Df* extract with rabbit anti-*Der f* I sera and peroxidase-conjugated anti-rabbit IgG.

of four were located in the molecular weight of 70, 72, 75 kDa and one of four was 110 kDa. It is known that two groups of allergens, the *Der* I group (*Der p* I, *Der f* I) and the *Der* II group (*Der p* II, *Der f* II) were existing in the *Df* and *Dp*, respectively. These allergens are designated as major allergens of house dust mites, since over 70% of patients sera reacted to these allergens¹¹⁾. Furthermore, it is reported that *Der f* I and *Der p* I, *Der f* II and *Der p* II show the almost same antigenicity, respectively. Thus, we studied the cross-reactivity between *P. persimilis* and *Der f* I and *Der f* II, respectively. No band was detected between extract of *P. persimilis* and anti-*Der f* I or anti-*Der f* II sera (Fig. 1). These data suggested that weak antigenic cross-reactivities between *P. persimilis* and the *D. farinae* were not related to the major allergens of *D. farinae*. Finally, we examined the reactivity of *P. persimilis* extract to house dust mite sensitive patients' sera by direct RAST. Five out of the twenty allergic sera to *D. farinae* were positive to *P. persimilis*. However, the degree of cross-allergenicity between *D. farinae* and *P. persimilis* was very

weak, the average PRU value of the positive sera (five subjects) against *P. persimilis* extract being 1.4, while the average value against *D. farinae* extract being 42.8 PRU/ml (Table 1). These data suggest that *P. persimilis* might scarcely provoke allergic symptoms in the subjects sensitized to house dust mites.

We thank Dr. Hiroshi Nakao, The Hokkaido Central Agricultural Experimental Station, Japan for helpful scientific discussions. We are very grateful to Dr. Makoto Tsukui, Tomen Corporation, for providing *P. persimilis*.

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Table 1 Specific IgE to *Df* and *Pp* allergens

Sera No.	RAST (PRU/ml)	
	<i>Df</i>	<i>Pp</i>
1	52.5	<0.35
2	20.2	<0.35
3	17.0	1.1
4	4.9	<0.35
5	11.5	0.50
6	12.9	<0.35
7	11.3	<0.35
8	6.5	<0.35
9	58.8	<0.35
10	25.9	<0.35
11	125.6	4.0
12	80.2	<0.35
13	13.6	<0.35
14	70.3	<0.35
15	144.8	0.41
16	5.4	<0.35
17	120.9	1.1
18	7.7	<0.35
19	25.1	<0.35
20	41.7	<0.35

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コナヒョウヒダニとチリカブリダニとの抗原性の関連について

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我々は、ハウスダスト中のダニであるコナヒョウヒダニと捕食性のダニであるチリカブリダニとの抗原性の関連を調べた。イムノプロット法による解析によると、これら異なった亜目に属するダニの間には、弱い共通抗原性が認められた。しかし、この反応性は、コナヒョウヒダニの主要アレルゲンである *Der fI* と *Der fII* には関連していなかった。これらの結果は、ヒョウヒダニに感作されたヒトにおいて、チリカブリダニによるアレルギー症状の誘発は、極めて稀であることを示唆している。