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Letter to the Editor

Occupational allergic asthma induced by *Liposcelis decolor*

Dear Editor,

A 33-year-old non-smoker non-atopic male presented with wheezing, cough, chest tightness, eyes pruritus and nasal congestion for 4 years (2008–2012) from April to June. He worked as a carpenter and regularly handled cherry, oak and pine woods and, sometimes, iroko wood. Besides, his dog used to be with him in his office.

At the contiguous granary, barley grains were harvested during the same months (April to June). At that time, little insects usually spread from the granary to his office. Generally, symptoms got worse when he worked near the wall close to the granary. The symptoms disappeared on weekends. Since 2012, the grain was no more harvested and the patient remained asymptomatic without need of medication. No clinical symptoms associated with exposure to dust mites were present, nor upon pollen exposure.

An exhaustive allergic study was carried out and treatment with antihistamines, inhaled corticosteroids and leukotriene receptor antagonists were prescribed during those years, and symptoms improved. Pulmonary function testing showed moderate bronchial hyperreactivity (PC20 0.6 mg/ml), which persisted on 2013. Patient showed positive skin prick test (SPT) to grass, olive and artemisia pollen, birch profilin, *Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*, *Lepidoglyphus destructor* and *Tyrophagus putrescentiae* extracts (all by Laboratorio ALK-Abelló, Madrid, Spain). SPT were negative for composite, cherry, black poplar, pine, oak, beech and samba wood's extracts (Experimental Medicine Unit, Hospital General Universitario Gregorio Marañón, Madrid, Spain). Moreover, SPT to *A. siro* and other pollen, pets (Laboratorio ALK-Abelló, Madrid, Spain), and moulds (Laboratorio Stallergenes, Madrid, Spain) extracts were also negative.

Blood serum was collected and total and specific IgE were measured (ImmunoCAP®). Serum total IgE level was 578 KU/L, specific IgE to *L. destructor* was 0.55 KU/L, to *T. putrescentiae* 0.53 KU/L, to *Glycyphagus domesticus* 0.37 KU/L and *Sitophilus granarius* 1.37 KU/L. Specific IgE to other mites (including *D. pteronyssinus*), moulds, pets and mice, different cereal flours and samba wood were negative. Blood counts revealed a 300 eosinophils/μl (5.1%) with no other alterations.

Little insects were manually collected from office and identified as *Liposcelis decolor* by an entomologist (Iraola V). Extract and skin prick tests from *L. decolor* and *L. bostrychophila* were prepared (5 mg/ml of protein content, Laboratorios Leti, Madrid, Spain).

SPT showed a 12 mm and 34 mm diametral wheal and flare size for *L. decolor*, respectively and a 3–4 mm and 30 mm diametral wheal and flare size for *L. bostrychophila*, respectively (Fig. 1A).

As control, several patients were included in the study. SPT to *L. decolor* extract was negative in four atopic non-mite-sensitized patients and 3 mite-sensitized patients showed a 4 mm diametral wheal size.

The extract was characterized by SDS-PAGE and the allergenic profile of the patient performed by IgE-immunoblot techniques. The assay showed the recognition of a 30 kDa band in *L. decolor* extract, absent in the *L. bostrychophila* assay (Fig. 1B, C). Spectrophotometric studies by MALDI-TOF/TOF analysed and sequenced this recognized band (Table 1). All sequences obtained showed homology with diverse trypsin-like serine protease from arthropods and high homology with allergens from group 3 of mite and group 10 of cockroach.

Psocoptera or Corrodentia insects are commonly found on tree bark or under stones. They had also been found in stored grains, as the second arthropod group found in these places, preceded by mites.¹ There are few species, mainly *Liposcelis* spp. that appear in buildings and are commonly known to infest papers and books due to their ability to digest cellulose. They have been described as a major indoor allergen, which cutaneous sensitization oscillates from 7% to 20% in atopic patients.² Its implication in allergic asthma cases has been reported,³ but never associated to an occupational field.

In vitro procedures performed in *Psocoptera* spp. extracts have described multiple allergenic proteins in the 26 to 85 kDa molecular weight range,^{2–4} suggesting a 30 kDa protein as a potential allergen. *Psocoptera* spp cross reactivity to *D. farinae* and cockroach has been elsewhere described (62.5% and 38.5%, respectively).² Nevertheless, tropomyosin has been ruled out as the main agent for this cross-reactivity.⁴ In our patient, positive skin prick test were showed for *D. pteronyssinus* and *D. farinae* with a specific IgE <0.10 KU/L in both cases. It has been described that skin prick test has more sensitivity and specific IgE more specificity,⁵ so in this case we believe that the positive skin prick test for mites may be a false positive result as our patient did not show any clinical symptoms upon mite exposure, upon removal of the insects.

Peak expiratory flow rate has been widely used in occupational asthma to obtain a verifiable confirmation of the relationship between exposure to the allergen and worsening of the lung function.

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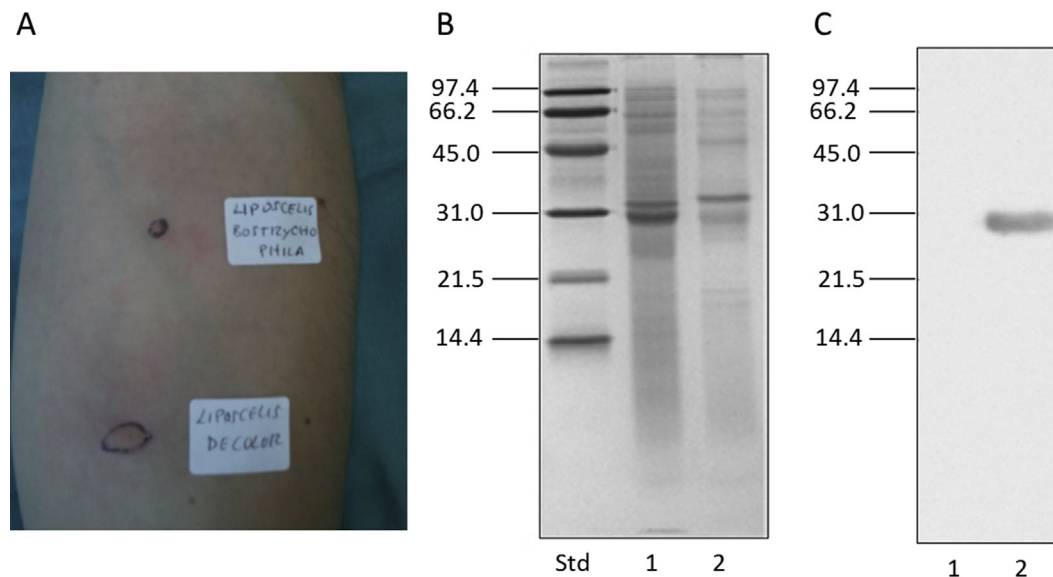


Fig. 1. **A.** Skin prick test showed a 3–4 mm and 30 mm diametral wheal and flare size for *L. bostrychophila*, respectively. Also, a 12 mm and 34 mm diametral wheal and flare size for *L. decolor*, respectively, were observed. **B.** SDS-PAGE showed a 31 kDa band in both *L. bostrychophila* and *L. decolor* extracts. **C.** Immunoblotting showed that our patient recognized this band in the *L. decolor* extract but not for the *L. bostrychophila*. Line 1. *L. bostrychophila*. Line 2. *L. decolor*.

Table 1
Protein sequences obtained from *L. decolor* extract.

MDDTVVCLDGR
GSAVGLVSEGGGLGCAR
GYPGVYTNVANNNPR
TACEDAYADLNELTSR
TASSFPFHADLGGELTSR
LAPNGALLDPQLEDF SAR
LANPQLLCAGHCLEDF SAR
ASVPGSHECGVLTAPQVVLGAHNVR

GYPGVYTNVANNNPR (in bold) sequence showed the best score for trypsin-like protease and high homology with allergens from group 3 of mite and group 10 of cockroach.

However, it could not be performed in our patient, nor the specific inhalation challenge (SIC), which is the gold standard in allergic occupational asthma.⁶

We describe an occupational asthma presumably due to sensitization to *L. decolor*, which ceased after the insect withdrawal. Symptoms were clearly related to the work exposure. Nothing was changed those following years except for the grains and insects, and the patient remained without asthma. Yet, it was clearly demonstrated the sensitization to the insect *L. decolor* (positive skin prick tests, specific IgE detection and the 30 kDa allergen found in the insect's extract). Bronchial hyperreactivity persisted in this patient one year later, as commonly found by other authors in spite of symptoms' resolution after the exposure discontinuation^{6–8} in occupational asthma patients.⁸

In conclusion, we report an occupational allergic asthma mediated by specific IgE to *L. decolor*. We demonstrated *in vivo* and *in vitro* sensitizations to *L. decolor* extract and firstly describe a 30 kDa protein, which correlated well with a trypsin-like protease, as a potential allergen on occupational diseases.

Conflict of interest

The authors have no conflict of interest to declare.

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