

A 2-years, [EPSRC](#)-funded project (starting date: 1st of April 2004)

The Environmental Control of House Dust Mites: Validation of a Combined Hygrothermal Population Model

House dust mite project that aims to reduce asthma

Inhaled allergens derived from house dust mite (HDM) faeces play a major role in allergic disease, especially in asthma. The number of people affected is rising throughout Europe (and indeed worldwide), now impairing the health and quality of life of a substantial proportion of children, as well as many adults, and placing a significant burden on health services.

It is known that temperature and humidity play an important role in house-dust mite physiology. Room conditions are important because dust mites have a unique mechanism for taking up water, which involves secreting a salt solution from the upper part of their front legs to their mouth. This mechanism enables mites to take up water from the room air. If the room conditions become dry this salt solution crystallises, the mechanism stops and hence the mites dehydrate and eventually die. Consequently, there is considerable interest in reducing mite populations in dwellings by controlling the internal environment.

This EPSRC-funded project builds upon the completed EPSRC-funded project *A Hygrothermal Model for Predicting House Dust Mite Response to Environmental Conditions in Dwellings*. The original EPSRC-funded project successfully developed a sophisticated hygrothermal population model of house dust mites in beds. This new 2-year follow-up project, also funded by EPSRC, improves the model and tests it in homes around the UK.

The new project represents the next step in developing the model for use in devising anti-mite strategies for a range of UK house types. It includes laboratory monitoring of mite population growth in a range of conditions, which will generate data essential to the effectiveness of the model. To validate the model, the project also involves a field study comprising 60 houses across the country. The fieldwork involves monitoring temperature and humidity in bedrooms and beds, as well as mite populations found in the beds.

This project allies two leading research groups in the built environment (the Bartlett, University College London, and the Martin Centre, University of Cambridge) with two leading entomological centres (Insect Research and Development Ltd, Cambridge, and the Royal Agricultural College, Cirencester). It involves scientists at UCL, the University of Cambridge and London South Bank University, as well as industrial partners Insect Research & Development Ltd and Acaris Healthcare Solutions plc. The industrial partners are providing equipment, facilities and analysis for both the laboratory experiments and the field study. They also help steer the project and disseminate the results into real applications.

Human health is affected not by house dust mites themselves but by the allergens they produce in their faeces, which are the perfect size to be inhaled into people's lungs. To predict the allergens' effect on human health, a submodel needs to be developed that simulates the rate at which allergens are produced for a given mite

population. The experiments to provide the data required to develop the submodel are being carried out as part of a separate EPSRC-funded project.

The proposed models is going to be useful for building designers and engineers to create healthy homes and for health care workers to point out (or avoid) mite risk areas, mite risk houses and mite risk behaviour. By helping to determine the most effective and affordable means of preventing mite infestation, the project is going to benefit the health and quality of life of those people affected by mite-induced asthma and allergy, as well as of those who might otherwise be affected in future. Any lowering of the prevalence of asthma will also have enormous impact on public health expenditure.

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