

Progress Report Executive Summary

Report for project year: ☒ Five Month ☐ Ten Month

☒ First year ☐ Final ☐ Second year

Project Title: Establishing a link between pollen allergens and the rising incidence of asthma

Principal Investigator: Richard C. Flagan 2/12/2002
Date

The objectives of this study are: (1) identification of the mechanisms by which pollen allergens of highly allergenic grasses, trees and weeds (as well as fungal allergens from mould spores) disperse in respirable atmospheric particles; (2) development of methods for quantifying respirable allergen release as a function of meteorological and climatic conditions; and (3) quantification of the amounts of allergen present in the respirable aerosol, both outdoors and indoors. Laboratory measurements of respirable particle release under controlled environment conditions from a range of wind-pollinated *trees*: oak, walnut, sycamore, birch, alder, ash, olive, pine and Japanese cedar; *grasses*: ryegrass and Bermuda grass; and *weeds*: ragweed and plantain reveal that the pollen rupture and respirable particle release previously observed for grasses also occur in trees and weeds, although the time and environmental conditions that trigger that release differ from one species to another. Particles as small as 30 nm diameter have been released from birch; most of the plants release submicron particles. Ambient samples are being collected using a Burkard volumetric spore trap that also enables daily pollen and spore counts, high volume PM10 and PM2.5 samplers, and a micro-orifice uniform deposit impactor (MOUDI) sampler. Laboratory and ambient samples are being analyzed to determine ambient respirable allergen concentrations by immunoblotting and ELISA assays. Pollen cytoplasmic debris, in the size range 0.5 to 2 μm , that was released from ryegrass flowers tested positively for both Phl p 1 and Phl p 5. The pollen cytoplasmic debris from birch flowers is loaded with allergens, but the orbicules released from the flowers under dry conditions are not allergenic. Immunocytochemistry analysis is being used to determine the distribution of allergen among the various organelles, or other cytoplasmic debris, which have the highest allergen loads.