Linking grass pollen biodiversity and human health: an environmental genomic approach

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#PollerGEN

Grass and Asthma

- 22% of the UK population are sensitised to grass pollen

- Grass pollen therapy is long and expensive

- Asthma (controllable) but leads to 50,000 hospital admissions/year; £800M pharmaceuticals; NHS £1 billion; society £6 billion

Grass (*Poaceae*)

In Europe and the UK, the single most important outdoor aeroallergen is grass pollen.

- Currently no atmospheric model has been used successfully for describing/predicting atmospheric concentrations of different species of grass pollen

- Presence and abundance of vegetation and pollen at the species level do not exist

Objectives

1. Develop a species level, spatio-temporal grass pollen assessment framework (abundance and deposition) throughout the UK (Figure 1)

2. Develop novel pollen bio-aerosol models (Figure 2)

3. Identify which species, or combinations of species are associated to public health outcomes such as hospital admissions for asthma exacerbations

Shotgun sequencing

Molecular Genetic Solutions

Illumina meta-barcoding

Real-time PCR

Figure 1. Pollen will be collected using Burkard multivial cyclone samplers

PollerGen

PollerGEN is an interdisciplinary, £1.2 million NERC project with the aim of revolutionising the way that pollen dispersion is measured and forecast, with synergies for understanding the ecology of aerial dispersed pollen.
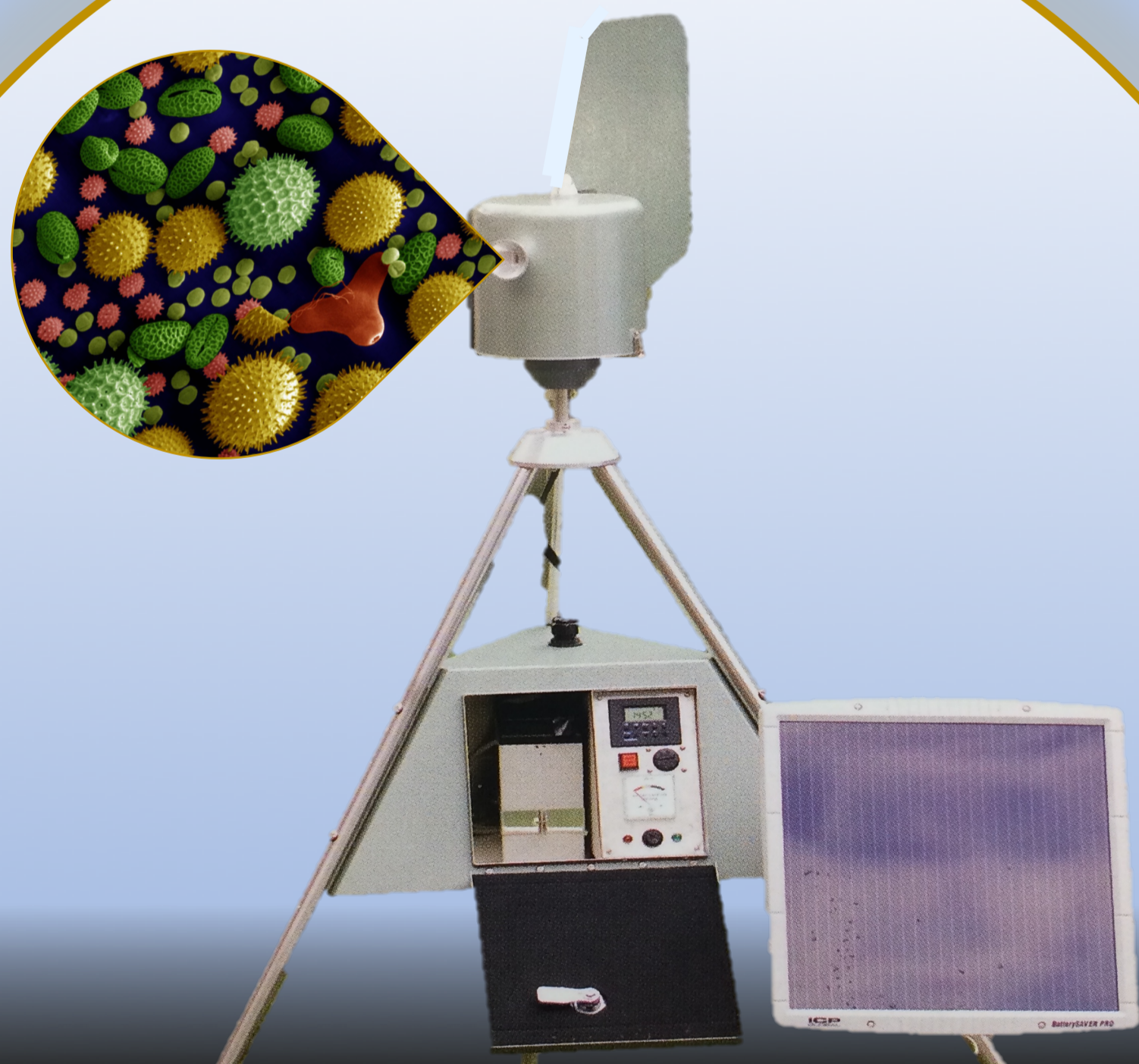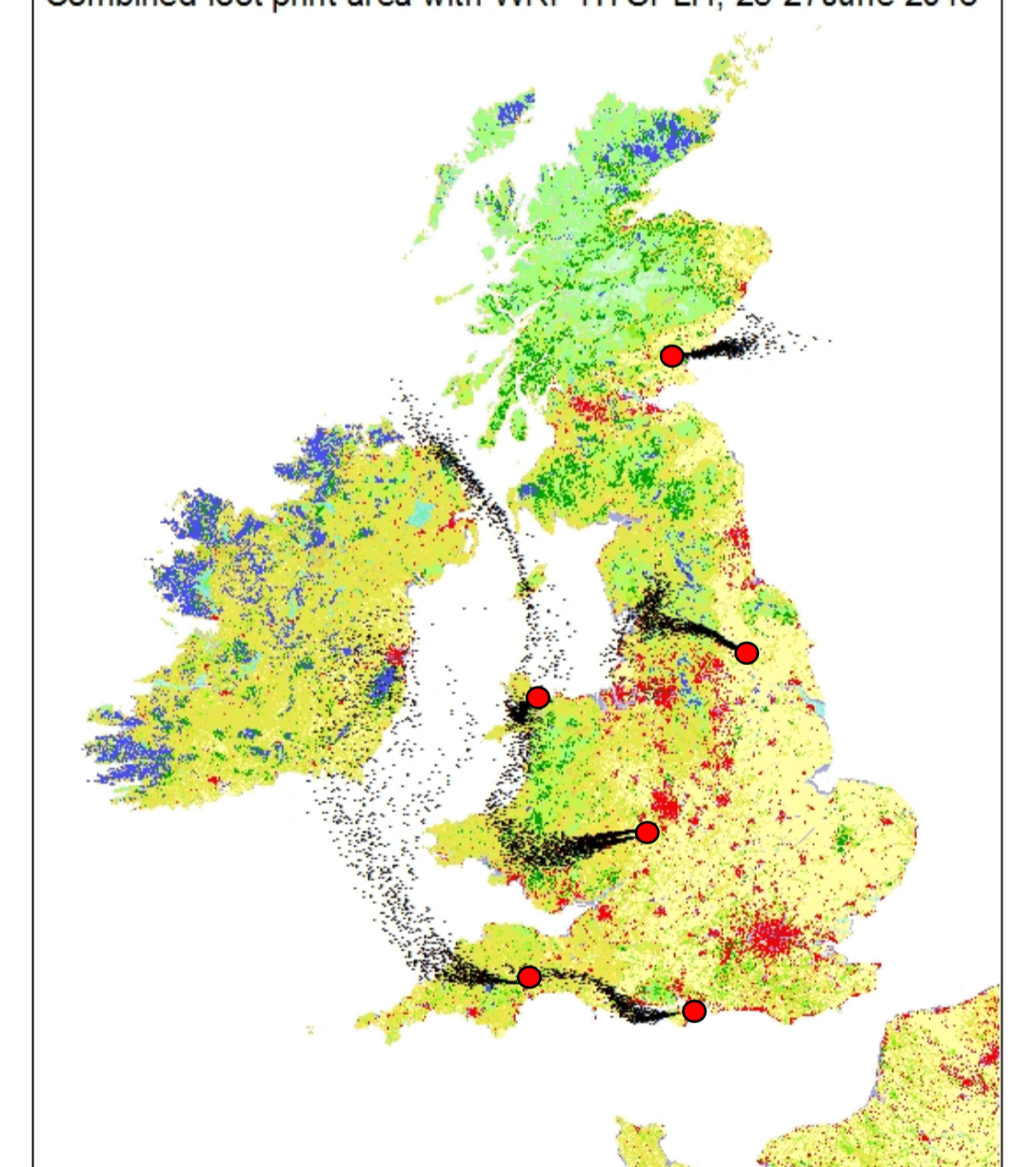
Combined foot print area with WRF-HYSPLIT, 25-27June 2016

Simulations with WRF-HYSPLIT, 25-27June 2016 12h back in time at the 6 stations used in the campaign in the NERC funded project: *"Using molecular genetics to understand grass species pollen deposition: enhancing bio-aerosol models and implications for human health."*

Figure 2. Pollen footprint modelling

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