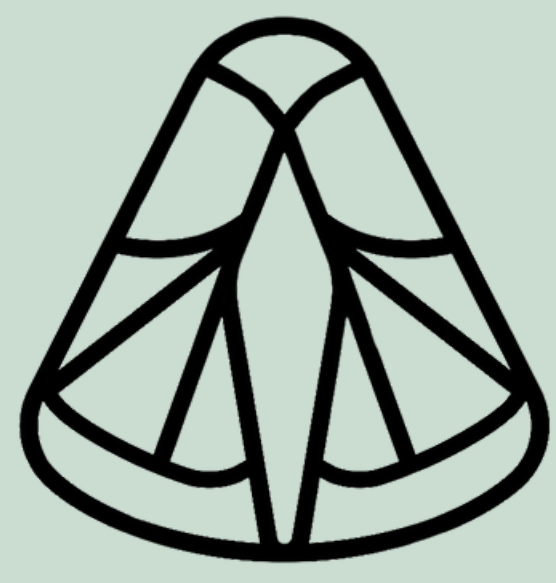


Can we use Footman moths *Eilema* spp. as indicators of changing air quality?

A case study of a post-industrial air environment, Hope Park, Liverpool



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1. Introduction

In the UK, it is well documented that many moth species have seen decreases in their populations and distribution (Fox, 2013), so the significant increase in a group of moths known as the Footman moths *Eilema* spp. (in the Lithosiini tribe) in both abundance and distribution goes hugely against the trend of most macro-moth species. One possible explanation for this is their larval food: lichens.

With the Footman moth distributions seemingly heading northwards (Randle et al., 2019) towards areas that were previously heavily polluted during the Industrial Revolution (Power and Worsley, 2018), this research aims to investigate whether these moths are being found in one such area: Liverpool. Using an area of Hope Park as a case study, lichen surveys and moth trapping surveys have been conducted to determine the presence or absence of Footman moths, with the lichen abundance data being used as a proxy for the changes in air quality. This research is still presently being undertaken.

3. Methodology

Pilot lichen surveys were undertaken in three public greenspaces in Liverpool: Calderstones Park, Princes Park and Sefton Park, to gain an understanding of what lichen species are found in some Liverpool greenspaces currently. These were undertaken in June 2024.

Moth trapping surveys were then conducted (following the Moth Recorders Handbook guidelines) using two Heath traps with 6W actinic tube bulbs (**Figure 1**) over two nights in August 2024 in Hope Park, with follow-up lichen surveys conducted in the same area to determine the abundance of each species of lichen to determine future possibilities of presence or absence of Footman moths.

4. Limitations

- Sub-optimal moth trapping conditions – nationwide decrease in moth abundance this year.
- Timings of moth trapping surveys – traps been left out longer than would normally be the case due to accessibility to the site.
- Equipment malfunction – battery going flat during a survey.
- Lichen identification skills – possible misidentifications.
- Location of lichens – many high up in tall trees, making it hard to see and identify them.

5. Results so far...

Moth Trapping Results

A total of two surveys have been conducted which has resulted in the following Footman moth records:

- Scarce Footman *Eilema complana* (**Figure 2**)

Lichen Survey Results

Below is a list of some of the lichens that have been identified across surveys:

- Common Greenshield Lichen *Flavoparmelia caperata* (**Figure 3**)
- Common Orange Lichen *Xanthoria parietina*
- Dotted Bush Lichen *Ramalina farinacea* (**Figure 4**)
- Abraded Camouflage Lichen *Melanelixia subaurifera*
- Net-marked Parmelia/Shield Lichen *Parmelia sulcata*
- Black Stone Flower *Parmotrema perlatum*
- *Punctelia* spp. (possibly *P. subrudecta* or *P. borrieri*)
- Fringed Rosette Lichen *Physcia tenella*
- Hooded Rosette Lichen *Physcia adscendens*
- *Physconia grisea*
- *Hypogymnia physodes/tubulosa*



Figure 3 - *F. caperata* in Sefton Park 19th June (Credit: Matthew Darbon)



Figure 1 - Heath Trap set up in Hope Park (Credit: Matthew Darbon, August 2024)



Figure 2 - Scarce Footman *E. complana* from Hope Park trapping 1st August (Credit: Matthew Darbon)



Figure 4 - *R. farinacea* in Calderstones Park 18th June (Credit: Matthew Darbon)

6. What will be done next?

- Data collection is still ongoing.
- To add to the current lichen data collected, an estimate of the abundance will be conducted using the DAFOR scale in Hope Park, as well as other greenspaces visited during pilot lichen survey.
- Previous air quality/pollution data for Liverpool will be looked into and any notable changes will be noted in the finished work.
- Submission of this Masters project is October 2024.

References

- Fox, R. (2013) The decline of moths in Great Britain: a review of possible causes. *Insect Conservation and Diversity*, 6(1), pp.5-19.
- Power, A., and Worsley, A. Chapter 2: Historical Urban Pollution. In: Charlesworth, S.M., and Booth, C.A. eds. *Urban Pollution: Science and Management*. pp.7-27.
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