THE UNIVERSITY of EDINBURGH

Job Description

Internship Title: What can Honey bees tell us about heavy metal pollution? A lab and desk-based research project

Department/ School	School of Geosciences, University of Edinburgh
Reports To	James Watt – James.Watt@ed.ac.uk Barbara Smith - ac0738@coventry.ac.uk Alfy Gathorne-Hardy- a.gathorne-hardy@ed.ac.uk PhD Mentor – Daisy Martinez- daisy.martinez@ed.ac.uk

Job Purpose

In a recent project, we found that higher levels of air pollution were linked to reduced *ommatidium diameter*, the individual facets of bees' compound eyes. However, we are not clear on the mechanism behind this. This project would investigate the interactions of air pollution and honey bees through a lab and desk-based research: (i) lab based - use mass spectrometry to test if there are higher concentrations of heavy metal pollution in bees associated with heavier air pollution; and (ii) desk based – a rapid evidence assessment of recent research in this area.

Main Responsibilities

- Prepare and extract metals from bee samples using standard protocols **(20%)**
- Assist in the measurement of metals using Inductively Coupled Plasma Mass Spectrometry **(30%)**
- Carrying out a Rapid Evidence Assessment (REA) to identify the current state of knowledge concerning bee health and heavy metals **(40%)**
- Assist in the production of scientific figures and analysing data for publication **(10%)**

Knowledge Skills and Experience (required for the role)

Attribute	Essential	Desirable
Education, Qualifications & Training	- Motivation to learn new skills and approaches in a new field/discipline - Evidence of excellent organisational skills	- Working towards a BSc in a science related subject

Knowledge & Experience	- Experience carrying out literature searches and literature review	- Desire to further knowledge of metals influence on organism morphology - Interest in invertebrate ecology

Person Specification

Planning and Organising

- Ability to manage own time to balance workload across the main responsibilities
- Meet regularly with colleagues to check on work contributing to knowledge exchange
- Ability to work to deadlines to ensure deliverables are produced on time

Problem Solving

- Identification of relevant literature on metal translocation in bees during literature searches
- Adapting pre-existing methods to suit specific environmental samples during metals analysis

Decision Making

Key decisions will be made collaboratively with inputs from the supervisory team and PhD mentor. The post-holder will undertake day-to-day decision making on research planning and development, and subsequent analysis of results. They will need to exercise good judgement as to which decisions must be referred to the line manager and which should simply be implemented and documented.

Key Contacts:

- James Watt will be key to the metal analysis lab work
- Barbara Smith and Alfy Gathorne-Hardy will be key contacts for the REA
- Daisy Martinez will act as the PhD mentor.

Dimensions

Closing date for applications: Wednesday 14th May 2025 (Midnight)
Start date: From: Commencing late June 2025
Hours per week and preferred pattern/ restrictions (if applicable): **35 hours per week for 6 weeks**

Additional Information

Project Outline

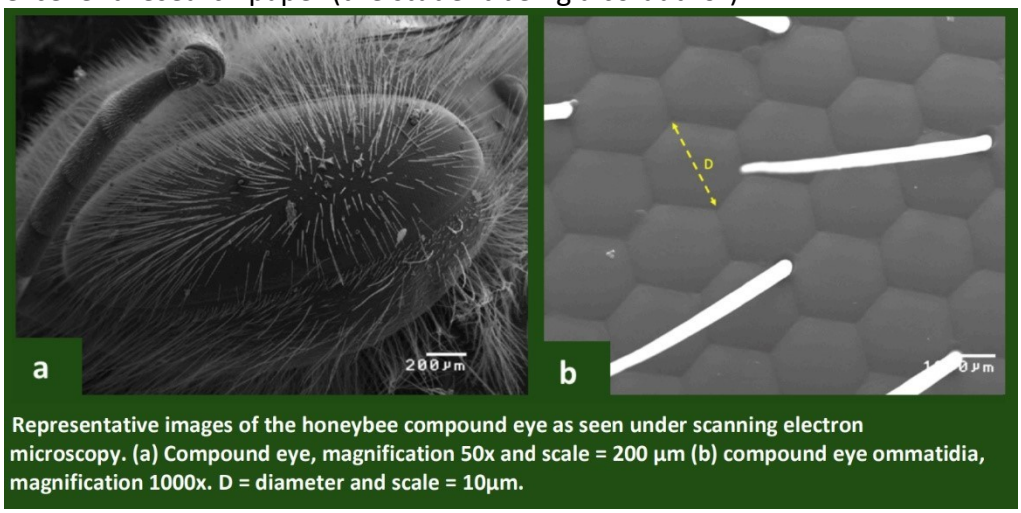
Dr Barbara Smith recently led a project looking at air pollution and honey bees, investigating different pollutants associated with bees in rural and urban, and high vs low polluted areas. We found depressingly high levels of micro-plastics on all the bees (car tyres (97%), polyethylene terephthalate/PET (89%), cellophane (67%), nylon (11%), polypropylene (6%), polydimethylsiloxane (3%) and polyvinyl chloride/PVC (3%)). We also found that in the more polluted sites, there were physiological differences in the bee eyes, that are likely to influence the bees' ability to find food and possibly to find their way back to their hive.

However, we are not clear what is driving this difference – a gap this project would aim to fill.

For the first three weeks this project would use various chemical extractants and acid digestions to understand how much heavy metal is sorbed to the outside of bees and up taken internally. Using bees previously collected and stored from the ThrivingHive project, metal concentrations in samples would be quantified using inductively coupled plasma mass spectrometry (ICP-MS). This part of the project will be supervised by Dr James Watt.

The second part of the project will be a desk-based study, a Rapid Evidence Assessment exploring the literature on heavy metals and bee health. This part of the project will be supervised by Dr Barbara Smith and Dr Alfy Gathorne-Hardy.

This project would, we believe, be the first of its kind, and could be used to generate an excellent research paper (the student being a co-author).



Representative images of the honeybee compound eye as seen under scanning electron microscopy. (a) Compound eye, magnification 50x and scale = 200 µm (b) compound eye ommatidia, magnification 1000x. D = diameter and scale = 10µm.

Budget

A maximum of £500 towards research costs

Location

Crew Building, Kings Buildings, Alexander Crum Brown Road, Edinburgh EH9 3FF

Health & Safety Requirements for the role

None

Key Job hazard information specific to the role

This role may result in potential exposure to certain hazards as listed below. These will be risk assessed by the school or department, which may require you to participate in, for example, health surveillance or follow other health and safety requirements.
Working with corrosive acids and oxidising materials

Programme Information

The Research Experience Programme (REPs), funded by NERC, offers paid research opportunities for undergraduate students. The programme is designed to address both

demographic and diversity challenges in the environmental sciences, as well as thematic skills gaps, such as quantitative skills.
This is a valuable opportunity to gain hands on research experience, boost your employability, and explore potential pathways into further study or careers in environmental science.

For full details on how to apply and the selection process, please visit our REP webpage

Application Support

The University's Careers service provides a wide range of resources to support your application, including guidance on CVs, cover letters, and interview preparation.
Students undertaking a REP placement will also have the opportunity participate in the **Edinburgh Award** - a structured programme that helps you reflect on and gain recognition from the University for the skills and attributes developed during your internship.
For more information, you can book an appointment with a Careers Consultant via MyCareerHub.

Eligibility Criteria

To be eligible for a REP placement, applicants must meet **all** of the following criteria:

• Be currently studying towards their first undergraduate degree studies (including integrated Master's degrees) in a UK Higher Education institution, in any science discipline
Note: *Final year students are eligible if they still hold student status at the* ***start of the placement,*** *even if the student graduates during the course of the placement.*

• Be eligible for subsequent NERC PhD funding as defined here:
- A UK citizen who has been living in the UK for at least the past 3 years OR
- An EU citizen with pre-settled or settled status under the EU Settlement Scheme OR
- A non-EU citizen who has obtained the right to remain in the UK - known as 'indefinite leave to remain' (ILR) OR
- An International/EU student currently studying in the UK under a Tier 4 or Student Route Visa with validity until at least September 2025.

REPs **do not** meet the requirements for visa sponsorship. As such, students who are not currently residing in the UK or who do not hold a valid UK visa are not eligible to apply.

You cannot take part if you are a visiting student, or have previously taken part in REP programme.

Privacy Statement

In addition to the University's HR Privacy Information Notice, please read the Student and Graduate Privacy Statement: Internships and work experience programmes to understand how your personal information will be collected, used, and stored as part of the application process. .

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