PROJECT TITLE: Responsive building by social insects: how do ants reshape their nest architecture in response to the environment?

Project Science Theme: Evolution and Biodiversity Through Space and Time
Project keywords: Collective behaviour, networks, architecture, ants
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Project aims and methods:

Some species of social animals build impressive large-scale structures, from the elaborate nests of termites to man-made cities. These built environments serve as focal points for work and social interactions and provide effective routes for information and resources, but they can also facilitate the spread of disease and misinformation. Whilst humans have only just started to leverage the manifold impacts of architecture by designing 'responsive buildings' that adapt to the environment, social insects may have done so for millions of years. We recently found that ants reshape their nest to avoid epidemics when faced with a pathogen threat (https://doi.org/10.1101/2024.08.30.610481). However, it is still unclear how ants adjust their nest architecture to other environmental constraints, how such changes impact colony fitness, and how individuals fine-tune their digging behaviour to achieve particular features at the nest level.

This project aims to address these open questions using a range of cutting-edge techniques, such as video-recording inside the nest (in collaboration with the BBC Natural History Unit, Bristol), automated individual tracking, agent-based machine learning, digital 3D reconstruction of real-world nests, network analysis, and 3D-printing of experimental nests. The overall goal will be to uncover how ants maintain adaptive nest architectural features in changing environments.

Project CASE partner:

The BBC Natural History Unit will provide access to dedicated studio filming space, desk space, laptops and IT assets during placement, informal and potentially formal training.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via:
R.James@bath.ac.uk

Bristol NERC GW4+ DTP Prospectus:
https://www.bristol.ac.uk/study/postgraduate/research/great-western-four-doctoral-training-partnership-nerc/

How to apply to the University of Bristol:
http://www.bristol.ac.uk/study/postgraduate/apply/

The application deadline is Monday 13 January 2025 at 2359 GMT.