Department: Life Sciences

Job title: **Post-Doctoral Research Associate (PDRA) - Full time 30-month fixed contract**

Grade: **RU 6.26**

Salary: **£33,712 p.a. inclusive of London Weighting Allowance**

We are looking for a post-doctoral researcher in Biology, Physics, Biophysics, or related disciplines to join a Leverhulme Trust-funded project titled '**Retracing the evolution of cathedral termite mounds in Australia**'. The main aim of the project is to characterize the form of three-dimensional structure of nests built by Australian termites of the Nasutitermes genus. These nests exhibit a range of interesting morphological features and are phylogenetically important for understanding the evolution of nest building behaviour in termites.

Nest building by social insects is one of the most classical examples of self-organisation phenomena in living systems, and has contributed to the evolutionary success of ants and termites. Surprisingly, still very little is known about the mechanisms underlying the construction of these structures and about their morphological and functional properties. Our project aims at addressing these questions by using a variety of techniques, from micro-computed tomography imaging, 3D image analysis, mathematical and computational modelling and mechanical experiments on nest fragments.

The project is part of a collaboration between Dr Andrea Perna (nest morphology, Roehampton), Prof Nathan Lo (termite phylogeny, Sydney), Dr Stéphane Douady (biological and physical morphogenesis, Paris) and Dr Giulio Facchini (3D pattern formation, Brussels). The PDRA at Roehampton will be responsible for carrying out the data collection (CT-scans of nests collected in Australia), processing the CT-scans to create virtual 3D models, and analysing the 3D models to characterize the properties of nests belonging to related termite species. The PDRA will also collaborate with the PI and co-PI in publishing the project's findings and presenting them at international conferences.

The ideal candidate will be a person with a quantitative background and ideally some experience of 3D image analysis. Some computer programming skills are also essential.

Position can start as soon as possible, for additional information please contact:

Andrea Perna: andrea@perna.fr

Giulio Facchini: giulio.facchini@ulb.be

References:

Facchini et al. (2020) A growth model driven by curvature reproduces geometric features of arboreal termite nests. *Journal of the Royal Society Interface* 17:20200093

Perna and Theraulaz (2017) When social behaviour is moulded in clay: on growth and form of social insect nests. *Journal of Experimental Biology*. 220, 83-91.

Arab et al. (2017) Parallel evolution of mound building and grass feeding in Australian nasute termites. *Biology letters* 13, 20160665

Khuong et al. (2016) Stigmergic construction and topochemical information shape ant nest architecture. *PNAS* 113, 1303-1308

Perna et al. (2008) Topological efficiency in three-dimensional gallery network of termite nests. *Physica A* 387, 6235-6244