OXFORD INTERDISCIPLINARY BIOSCIENCE
Doctoral Training Partnership

Industrial CASE Studentship Advertisement – 2020-21

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Project Title: Development of monitoring technology to establish the nutritional state and health of domesticated honeybee colonies

Brief description of project:

Digital technology is driving innovation in all spheres of livestock production with the potential to dramatically improve animal welfare and food production. Monitoring technologies that involve the use of sensors combined with sophisticated data analysis software enable farmers to manage livestock, reduce stress, and react to health problems in a timely way. Such methods are now being used to improve honeybee colony management. Beekeepers have historically managed bees by opening colonies to identify signs of disease, queen supercedure or loss, and nutritional status of the colonies. Opening colonies, however, is very disruptive and can damage or harm the brood when external temperatures are <15oC. Within the past 10 years, several companies have developed electronic monitoring devices to detect changes in the state of the colony. These devices use a combination of sensors combined with sophisticated software to predict when colonies are preparing to swarm or when queens die. These methods, however, have not been adapted to predict the nutritional status of the colony.

Predicting nutritional state of the honeybee colonies is important, because one of the main reasons that colonies 'collapse' is due to starvation. The use of sensors to detect changes in nutritional state would be an important advance for beekeepers, because such sensors would make it possible to anticipate changes in pollen or nectar availability that could be readily ameliorated through food supplementation. Through years of BBSRC-funded research, our lab has identified how nutrition influences colony growth and have methods for measuring the impact of nutrition on brood production within colonies. Through this studentship, we will collaborate with experts at two companies developing sensor technologies for bee colonies (Canetis and BeeHero) to find new ways to predict the nutritional state of domesticated bee colonies.

This studentship will be carried out at the University of Oxford's new honeybee laboratory at John Kreb's Field Station in Wytham. The student will also work in with BeeHero at their sites in California with commercial beekeepers and may also visit the BeeHero headquarters in Tel Aviv and the Canetis headquarters in Italy to work with software and hardware engineers.

Attributes of suitable applicants:

Please note any skills or qualifications you are seeking in a prospective applicant, e.g. academic background, driving licence, specific research skills or interests.

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This project will require candidates to routinely work with whole bee colonies in a laboratory and in a field setting. Candidates allergic to bee stings would be required to undergo desensitization therapy prior to their work. Candidates will also have to be willing and able to travel for extended periods. The ideal candidate will have a background in one or more of the following: (1) beekeeping; (2) computer science; (2) engineering; or (4) statistics. Ideal candidates for this PhD studentship will have a 1st or 2.1 BSc in biology, statistics, or engineering, but candidates from any STEM degree will be considered. Willingness to work together with a team of scientists is essential.

Funding notes:

This project is funded for four years by the Biotechnology and Biological Sciences Research Council BBSRC. BBSRC eligibility criteria apply (https://www.ukri.org/files/legacy/publications/rcuk-training-grant-guide-pdf/ Annexe 1). EU nationals who do not meet BBSRC residence criteria are encouraged to contact the programme administrator to check their eligibility for BBSRC funding before submitting a formal application. Successful students will receive a stipend of no less than the standard RCUK stipend rate, currently set at £15,009 per year, which will usually be supplemented by the industrial partner.

This project is supported through the Oxford Interdisciplinary Bioscience Doctoral Training Partnership (DTP) studentship programme. The student recruited to this project will join a cohort of students enrolled in the DTP's interdisciplinary training programme, and will be able to take full advantage of the training and networking opportunities available through the DTP. For further, details please visit www.biodtp.ox.ac.uk.