

PhD position

Conservation physiology in wild bees

Bees & Environment unit, INRA Avignon, France

Most of studies on wild bee decline have focused on species richness and distribution patterns through large (national to continental) scales. However, those patterns (species range contractions and diversity erosion) depict the outcome of extinction processes. Conservation biologists urgently need to identify alternative ecological parameters and measurements that are liable to reveal population trends before they actually end up in local or regional extinctions. The “physiological conservation” approach [1] offers such a promising framework to help uncover decline processes already at work within species distribution ranges, and to gather information on bee health for assessing the potential sustainability of bee populations in habitats designed or not for their protection or conservation [2]. As an integrative scientific discipline, physiological conservation aims at combining physiological and ecological concepts to solve conservation problems.

The thesis will aim at investigating the insights provided by physiological conservation in the context of wild bee decline. Specific objectives include (i) the establishment of standard macrophysiological variations in bee species and communities, (ii) the identification of potential deviations from those standards along gradients of landscapes differing in composition and structure and (iii) application of the approach to design bee supportive habitats. Ultimately, this integrated approach will contribute to provide tools for uncovering the true habitat quality and guiding management and restoration efforts of bee habitats.

The PhD candidate will join the “Bees and Environment” research unit (INRA Avignon), which develop a wide range of research programs that are targeted to the study of honeybee and wild bee populations, in the context of sustainable farming and food security.

He/she will be part of the BiodivERsA project Nutrib2 (Nutrition as critical link between Biodiversity and Bee health) and will join a European consortium composed of scientists from different countries (GER, BEL, FR, POL, UK) with complementary expertise in bee taxonomy, nutritional & chemical ecology, community ecology, physiology, behaviour, epidemiology, biostatistics and modelling.

1. Cooke SJ, Sack L, Franklin CE, Farrell AP, Beardall J, Wikelski M, Chown SL: What is conservation physiology? Perspectives on an increasingly integrated and essential science. *Conservation Physiology* 2013, 1:1-23.
2. Alaux C, Allier F, Decourtye A, Odoux JF, Tamic T, Chabirand M, Delestra E, Decugis F, Le Conte Y, Henry M: A 'Landscape physiology' approach for assessing bee health highlights the benefits of floral landscape enrichment and semi-natural habitats. *Sci Rep* 2017, 7:40568.

Funding

The PhD student will be funded for 3 years.

We aim for a start date in February/March 2020.

Candidate profile

The ecophysiological approach requires the combined analysis of environmental data, physiological measurements and population surveys. The successful candidate should be familiarised with data analysis in spatial ecology at either landscape or biogeographical level. Experience in insect physiology

(e.g. biochemistry) is also recommended. The candidate should have interests in both field and laboratory approaches.

- Master's degree in Biology/Ecology/Physiology and ideally expertise in insect physiology and/or ecology
- Experience in biochemical analysis
- Experience in field sampling
- Strong background in statistical analysis
- Good communication and writing skills (English)
- The successful candidate will have excellent team-working

Supervisors

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How to apply

The application should include a detailed CV, a one-page cover letter (research interest) and contact details of 2 scientific references in **a single pdf file**. The document should be sent by email to Cedric Alaux before November 17, 2019. Selected candidates will then be interviewed.