

Open position for a Post-doctoral researcher in Population Genomics:

Dynamics of adaptation and genome evolution in fungal populations

The GAIA team of the BIOGER Institute dedicated to fungal plant pathogens (UR BIOGER INRAE - University Paris-Saclay) is looking for a postdoc with experience in population genomics and/or evolutionary biology.

Research

Understanding **how adaptive traits arise, spread and persist within populations** over time is a key question in evolutionary biology. In pathogens, adaptation to antifungals constitutes a textbook example of evolutionary rescue that can easily be (re)produced in the lab and represents a valuable model to tackle this question. Besides, *in natura* this adaptation has serious consequences: it compromises crop health as well as it can worsen the environmental impact of the chemicals used. However, field evidence suggests that adaptive trajectories are **complex and difficult to predict**.

We are looking for a highly motivated post-doctoral scientist to understand the **dynamics of adaptation** to antifungals in the populations of the model ascomycete *Zymoseptoria tritici*, responsible for septoria leaf blotch disease on wheat. As a proof of concept, we propose to disentangle the respective impact of selection components first in a simplified environment and over a compressed timescale. Therefore, you will acquire whole genome resequencing data to quantify genomic changes having occurred during experimental evolution, from samples already available in the lab. Samples include populations and pure isolates that have undergone constant or fluctuating selection by distinct antifungals. You will use the variation in the frequency of polymorphisms over generations to visualize the dynamics of adaptation, understand the main drivers of adaptation and calculate the rate of adaptation, depending on the environment. You may interact with a biomathematician, who will focus on the dynamic aspects of selection using population genetics modelling approaches. Your results will provide a conceptual framework for understanding, in future work, how fungi may evolve in response to solo or joint selective pressures occurring in field agroecosystems.

Related references

- Ballu, A., et al. (2023). "Antifungal alternation can be beneficial for durability but at the cost of generalist resistance." *Communications Biology* **6**(1): 180.
- Feurtey, A., et al. (2023). "A thousand-genome panel retraces the global spread and adaptation of a major fungal crop pathogen." *Nature Communications* **14**(1): 1059.

Environment

INRAE is a French public research institution that focuses on issues related to agriculture, food and food security, environment and land management, with a particular emphasis on sustainable development. The BIOGER research unit works on major fungal crop pathogens using pluri-disciplinary strategies from functional genomics, evolution and population genetics to microbiology, epidemiology and modelling. The successful applicant will join the multidisciplinary GAIA team ("Guiding management and Anticipation of fungal pathogen Adaptation" - 5 scientists, 2 technicians and 2 PhD students) and will collaborate with the bioinformatics platform at INRAE BIOGER. The new AgroParisTech – Paris-Saclay University Campus of Palaiseau (91) is an acknowledged center for research in agronomy / agro-ecology located about 25 km south of Paris.

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Duration & starting date

The appointment will be for 18 months. The position is available from January 2025 (but may be postponed if necessary), and will remain open until a suitable candidate is found.

Salary

Funding is provided by the Plant Health Division of INRAE. Depending on work experience, a gross monthly salary of between 2650€ and 3090€ will be offered, including full social and health benefits.

Requirements/Qualifications

- PhD degree in population genomics, evolutionary biology or similar subject relevant for the project, obtained not earlier than 3 years before the start of this project;
- An excellent knowledge on statistics applied to life sciences and statistical tools, such as *R*;
- Knowledge in evolutionary biology, including theoretical aspects of adaptation. Interest in plant pathology and crop protection will be appreciated;
- A demonstrated capacity for team work and supervision of students and/or technical staff;
- A proven ability to communicate research results through scientific publications or oral presentations;
- Proficiency in English is compulsory, knowledge of French would be appreciated.

Application

If interested, please contact Anne-Sophie Walker (anne-sophie.walker@inrae.fr, tel.: 0033-18910-1318) and Sabine Fillinger (sabine.fillinger@inrae.fr, tel.: 0033-18910-1288). Provide a CV including references and a brief statement of research interests and qualifications. Any contact for additional information will be more than welcome.