



Horizon2020  
European Union Funding  
for Research & Innovation

## **PhD position in landscape epi / genomics**

### **Title: Genetic and epigenetic spatial population structure of local chicken breeds**

Genetic diversity is crucial for populations to adapt to various environments. These adaptive capacities are of major importance in the light of the ongoing climate change that will drastically affect the environmental conditions, influencing biotic (feed, diseases and pathogens distribution) and abiotic components (temperature, rainfall...). Livestock, in particular, are likely to suffer from these issues and numerous studies are ongoing to improve animal adaptation to harsher environmental conditions. In this context, local chicken breeds appeared to be a valuable option to consider, as they represent a large reservoir of genetic diversity valuable for adaptation, particularly in local breeds raised in harsh production environments over a long period of time and presenting characteristics that enable them to cope with these conditions. The study of their genetic diversity and its links with environmental conditions can give some clues for the future challenges that breeding should meet to cope with climate change and set the necessary agroecological transition.

In this context, we propose to study the spatial genetic and epigenetic structure of at least 16 European local chicken breeds and the determinants of their adaptation to various environments. The final goal is to improve the understanding about how the environment shapes both genetic and epigenetic diversity and how these interact with each other.

We will focus on both, 1) very localized breeds (i.e. found in a single restricted area) along a large environmental gradient in terms of climatic conditions raised in free-range conditions, and 2) more cosmopolitan breeds raised in contrasted conditions (raised free-range but bred in-house vs full free-range). This study is innovative since it will both consider the genetic and the epigenetic features of adaptation to understand the link between the environment, the genetic composition of the breed and the methylation profile. This last feature will be investigated with a recently developed approach, GBS-MeDIP, allowing for precise and high throughput epigenotyping. Genotyping will result from both already existing data and newly sampled and genotyped individuals. Links between all compartments will be investigated using classical landscape genetics tools and tailored multivariate approaches like redundancy analysis.

### **The PhD candidate will be responsible for:**

- data processing
- phenotype, genotype and epigenotype analysis
- conducting genetic and epigenetic diversity analyses
- communication of results in congress and through scientific publications in peer review journals

**Training and skills requirements**

The PhD candidate must hold a master's degree in genetics, population genetics, bioinformatics or any background relevant for this project. This thesis is targeted towards students who have a keen interest in investigating high-throughput genome/epigenome-wide data. The thesis project will require the use of scripts and bioinformatic (i.e. linux) and statistical programs (such as R), a minimum of interest for this type of analysis is essential.

Proficiency in English, including the ability to comprehend and produce scientific publications and effectively communicate orally in international conferences and with collaborators, is a prerequisite for this position. Fluency in French is not mandatory for the application; however, having a basic knowledge or a willingness to learn the language can be advantageous for day-to-day interactions

**Location:**

INRAE, Université Paris-Saclay, AgroParisTech  
GABI lab (Animal Genetics and Integrative Biology)  
GiBBS team (Genomics, Biodiversity, Bioinformatics and Statistics),  
Domaine de Vilvert, 78350 Jouy-en-Josas, FRANCE  
Link : [https://www6.jouy.inrae.fr/gabi\\_eng/Our-Research/Research-Teams/GiBBS](https://www6.jouy.inrae.fr/gabi_eng/Our-Research/Research-Teams/GiBBS)

**Contacts:**

Please send an application letter and a CV to the three following persons,  
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**If your application is retained to the next step, you will be contacted for interviews planned in June.**

**Starting date:** Between September and December 2023

**Duration:** 36 months

**Fundings:**

French National Association for Research and Technology  
Geronimo European H2020 project - <https://www.geronimo-h2020.eu/project>  
This thesis will be conducted in collaboration between INRAE (French National Institute for Research on Agriculture and Environment) and SYSAAF (French National Association for Aviculture and Aquaculture).