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INRAE

Post-doctoral Research position in (epi)genetic regulatory networks controlling cell plasticity and animal responses to environmental changes

The PEGASE research unit (INRAE-Institut Agro), in close collaboration with the IGDR research unit (CNRS-Rennes University) has an exciting postdoctoral fellowship at Rennes, France, to study **(epi)genetic regulatory networks controlling cell plasticity and animal responses to environmental changes.** The successful candidate will lead projects as part of local projects at Rennes on cell and phenotype plasticity and the GEroNIMO consortium, funded by the European Horizon 2020 (https://www.geronimo-h2020.eu/). GEroNIMO, part of the EuroFAANG effort (https://eurofaang.eu/), works on chicken and pig, the most used sources of animal protein worldwide, to provide breeders with new knowledge and tools to promote innovative genome- and epigenome enabled selection methods which must evolve toward a more sustainable model.
Join our team (https://eng-pegase.rennes.hub.inrae.fr) that focuses on scientific issues related to the regulation of gene expression and its involvement in complex trait variations (particularly those related to lipid metabolism) and in the adaptation of laying hens to environmental variations. Great opportunities to publish! (https://www.researchgate.net/profile/Sandrine-Lagarrigue).

The role

The post-doc project will be to investigate hepatic gene regulatory networks that control cell plasticity and animal responses to environmental changes. These environmental changes focus on three main areas: *(i)* functional longevity (studying advanced ages), *(ii)* housing systems (cage vs. floor), and iii) diet (with vs. without co-products). These various conditions were defined according to the new challenges in the laying hen sector due to societal constraints (abandoning cages) and climate change leading to reducing the amount of resources used to produce the same amount of eggs (extending the laying carrier, changing the diet).
An originality of the project is the integration of multiple "omics" data (mRNA & lncRNA, miRNA, circRNA and methylome) from the liver, a key tissue in energy homeostasis, of 200 to 500 laying hens well balanced across the modalities of the different studied factors.
The first part of the project will focus on decoding different types of regulatory networks involving non-coding RNAs (miRNA and lncRNA), which are critical components of tissue and phenotype plasticity. The aim is to understand basic regulatory networks such as 'lncRNA-mRNA' and 'miRNA-mRNA,' as well as more complex networks based on sponge mechanisms like 'lncRNA/circRNA-miRNA-mRNA,' to decipher their roles in the phenotypic responses of animals to changing environments. In addition, epigenome analyses will be performed in collaboration with our INRAE colleagues in Toulouse.
In the second part, post-doctoral researcher will use hepatic 'single nuclei RNA-Seq' data and signal deconvolution approaches to re-exploit liver RNA-seq data. This will allow access to a new phenotype, the cellular proportions of the liver, including immune populations. This aspect of the study will enable to analyse the impact of the three factors of interest on immune function, enhancing the understanding of phenotypic responses of birds to these factors.

Work environment: close collaboration with the 'Avian Genetics & Genomics' team from PEGASE research unit (INRAE-Institut Agro). and the 'Gene Expression & Oncology' (GEO) Team from IGDR research unit (CNRS-Rennes University). You will also work with partners in Paris, Toulouse, and abroad, all involved in the GEroNIMO project.

Position Responsibilities:

1- Lead analysis on the impact of environmental changes on liver transcriptomes to identify regulatory networks affecting phenotypic responses. Such an analysis will be performed on three environmental changes: ages related to functional longevity (70 vs. 90 weeks), early rearing systems (cage vs. floor), and feeds (control vs. suboptimal).

2- Lead analyses of liver 'single nuclei RNA-Seq' and signal deconvolution approaches to determine, from bulk RNA-seq, the cellular proportions including immune cell populations used as new phenotypes in 1 and 2.
3- Participate in data management and submission (FAIR principles).

Professional experience:

- **Must have spent at least 18 months abroad between May 1, 2020, and the project start date (requirement from funders).**
- Motivated PhD in genomics and/or bioinformatics
- Extensive experience in high-throughput omics data analysis and excellent coding abilities in R
- Proficient in UNIX command line and high-performance computing with at least 2 years of experience with Next Generation Sequencing data analysis
- Use of containerized workflows e.g.: Nextflow and version control tools, e.g.: Git, would be a plus.
- Proficient in both spoken and written English. French is not required but helpful for daily life in Rennes

The Offer – Working conditions

- **Contract duration**: Full-time position for a fixed term of 2 years.
- **Salary**: Net salary of 2,400 euros per month. The salary is funded by the Brittany Region (75%) and the European Horizon 2020 (25%) as part of the GEroNIMO project entitled: «Genome and epigenome enabled breeding in monogastrics » (https://www.geronimo-h2020.eu/).
- **Target start date:** December 2024 at the latest

Application Procedure:

All applications must include:

1. A cover letter addressed to Dr Lagarrigue and Dr Blum
2. A complete CV including contact details.
3. A document detailing research interests
4. Contact details of two/ three referees.

All applications must be addressed to Dr Sandrine Lagarrigue (sandrine.lagarrigue@institut-agro.fr) and Dr Yuna Blum (yuna.blum@univ-rennes1.fr)

Selection Process:

- Pre-selection: The pre-selection process will be based on qualifications and expertise reflected on the candidate CV. It will be merit-based.
- Interview: Preselected candidates will be interviewed by Hiring Managers of the position and a selection panel if required.
- Offer Letter: Once the successful candidate is identified, a Job Offer, specifying the start day, salary, working conditions, among other important details will be sent.

Deadline: Please submit you application as soon as possible at the latest september, 27 for a recruitment in November or December 2024.