

POST DOC POSITION IN MOLECULAR MICROBIOLOGY

- Recruitment grade: young researcher (i.e. with PhD)
- Location: Pau, France
- Duration: 10 months, starting 1 June 2022
- Deadline: 30 April 2022
- Gross Salary Range: 2960 euros / month

CONTEXT AND AIMS

Mercury (Hg) is a persistent pollutant in the environment, highly volatile and able to be converted into highly toxic methylmercury (MeHg). MeHg is a serious threat as it is a neurotoxic compound, which is bioaccumulated and bioamplified in food webs. Microorganisms play a central role in MeHg conversion, but little is known about the cellular and environmental mechanisms favoring MeHg production. Although *hgcA* and *hgcA* genes have been identified as necessary for Hg methylation in some bacteria, the methylation process cannot be fully explained. Our general project (GO-BEAM project: Go inside a bacterial cell methylating Mercury) focuses on the characterization of Hg methylation at the cellular level, from Hg recognition by the cell to Hg export, including methylation steps. We have developed our own Hg methylating sulfate-reducing bacteria model namely, *Pseudodesulfovibrio hydrargyri* strain BerOc1. We apply an interdisciplinary approach combining genetics, analytical chemistry based on mass spectrometry, and state-of-the art imaging and X-ray absorption spectroscopy to decipher the cascade of events leading to Hg methylation.

Very recently, in the Go-Beam project, we identified new genes as players in the trafficking of Hg at the cell level of *P. hydrargyri*, and some of them have important impact on Hg methylation/demethylation. The aim of this post-doc position is to clarify the role of these genes in Hg methylation/demethylation.

TASKS AND PROPOSED METHODOLOGY

The post-doctoral fellow will be in charge of the genetic characterization, construction of mutants, and evaluation of the impact of these genes on the Hg methylation/demethylation.

The work will focus on the characterization of the role of candidate genes in Hg methylation. It will be assessed through gene deletion and complementation in *P. hydrargyri* BerOc1 and through heterologous expression in the non-methylating strain G20 as follows:

- **Gene deletion:** Specific gene knockout in *P. hydrargyri* BerOc1 will be performed using one-step homologous double-crossover procedure. Genetic tools have been already optimized for *P. hydrargyri* BerOc1.
- **Over-expression of genes of interest:** The genes encoding *hgcAB* or the export systems will be overexpressed in wild type *P. hydrargyri* BerOc1 in order to evaluate the limits of mercury methylation and the effects on MeHg demethylation.

- **Heterologous expression** of genes of interest in G20: The genes encoding *hgcAB* or the export systems will be co-expressed in the non-methylating strain *D. alakansis* G20.

She/He will also perform physiological studies to understand the changes in growing, gene expression and mercury methylation and speciation. The gene deletion and over-expression in BerOc1 as well as the heterologous expression in G20 will be done in close collaboration with Alain Dolla and Nathalie Pradel from MIO laboratory in Marseille.

The Post-doc will also participate to teaching activities in biology at the undergraduate level (64 h per year).

FUNDING

This post doc position is funded by the project E2S-UPPA (Energy Environment Solutions) whose core scientific domain focuses on Environment and Energy to meet challenges related to the energy transition, geo-resources, aquatic habitats and the environmental effects of natural and anthropogenic changes (<https://e2s-uppa.eu/en/index.html>).

The post-doc is funded by the project GO-BEAM from E2S-UPPA. GO-BEAM was selected as 'Key Scientific Challenges E2S-UPPA' and is a collaborative and transdisciplinary project involving genetic microbiology, analytical chemistry, imaging and spectroscopy. The objective of the project is to improve the understanding of the Hg methylation/demethylation processes at the cell level. The Post-Doctorate will work on the GO-BEAM project and will tightly collaborate with a PhD student in analytical chemistry.

Scientific team: MP Isaure (PI of the GO-BEAM project), M Goñi-Urriza, M Monperrus, B Khalfaoui-Hassani, R Guyoneaud, C. Gassie, 1 PhD student, 1 post-doc.

SUPERVISION AND CONTACT

The post-doc will be supervised by Marie-Pierre Isaure and Marisol Goñi-Urriza (IPREM UMR 5254) and will work in close collaboration with the scientific team of the GO-BEAM project.

For additional information, please contact Marie-Pierre Isaure and Marisol Goñi-Urriza by e-mail.

Contact: marie-pierre.isaure@univ-pau.fr , marisol.goni@univ-pau.fr

YOUNG RESEARCHER SKILLS REQUIRED

The applicant will be a young doctor with a PhD in molecular microbiology/genetics applied to environmental science.

Due to the short duration of the position, the applicant should be readily operational, with skills in molecular microbiology, mutant construction, and lab work in anaerobic conditions. Preliminary experience in Hg measurements will be highly appreciated. She/he is rigorous, autonomous and has strong interest in working in a transdisciplinary team. Particularly, she/he will work with another PhD student involved in analytical chemistry. By applying isotopic tracer approaches and X-ray imaging on the wild type and mutants, the Hg methylation potentials and localization will be characterized in order to decipher the role of the genes on Hg pathways

The Post-doc will also participate to teaching activities and preliminary experience in teaching will be a plus.

SALARY

The salary of the successful candidate will be based on level chart for teaching and research personnel in the salary system of French universities. The salary will be 2960 euros/month (gross salary),

including allowance for 64 hours teaching per year.

APPLICATIONS AND DEADLINE

Application must include:

- a cover letter emphasizing the relevance of your research and motivation to this position (max 1 page),
- CV (max 2 pages)
- a publication list
- contact details of at least two relevant professionals who can provide a reference letter based on request
- PhD diploma, as well as report provided after the PhD defense (*'Rapport de soutenance de thèse'* or equivalent) and reports from the principal examiners of the PhD defense jury (*'Avis des rapporteurs'* or equivalent).

Applicants selected in a first step will be interviewed remotely.

Submit your application by e-mail to marie-pierre.isaure@univ-pau.fr and marisol.goni@univ-pau.fr, before **April, 30th 2022**. Interviews will be scheduled on **3 and 4 May 2022**.