

Postdoctoral Researcher (M/F) in Structural Biology.

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General information

Reference : UMR8261-CARTIS-002

Number of position : 1

Workplace : PARIS 05

Date of publication : 23 April 2025

Type of Contract : Researcher in FTC

Contract Period : 24 months

Expected date of employment : 2 June 2025

Proportion of work : Full Time

Remuneration : between 3081,33 € and 4291,70 € gross per month, according to the experience

Desired level of education : Doctorate

Experience required : Indifferent

Section(s) CN : 20 - Molecular and structural biology, biochemistry

Missions

Understanding the Mechanisms of Ribosomal and Transfer RNA Modifications in *Vibrio cholerae* and Their Roles in Antibiotic Tolerance

A 2-year postdoctoral position is available in the group "RNA Biogenesis, Architecture and Interactions," led by Carine Tisné at the Institut de Biologie Physico-Chimique (IBPC), located in the heart of Paris. The researcher will contribute to the ANR-funded project EpiRNA, investigating the molecular mechanisms of post-transcriptional modifications of ribosomal and transfer RNAs (rRNAs and tRNAs) in *Vibrio cholerae*, the bacterium responsible for cholera.

Our collaborator, Zeynep Baharoglu's team, has demonstrated that RNA modifications play a central role in the bacterial response to antibiotic stress, particularly from aminoglycosides (such as tobramycin and gentamicin). We are currently mapping the RNA modification landscape of *V. cholerae*, identifying both the positions of modifications and the enzymes responsible for them. Our findings indicate differences between *E. coli* and *V. cholerae* RNA modification patterns and have revealed previously uncharacterized modification sites.

It is therefore critical to further explore these modifications in *V. cholerae* and their connection to antibiotic stress responses. Preliminary data suggest that ribosome composition and interaction with binding partners are affected by the absence of certain rRNA modifications. In addition, specific tRNA modifications appear to influence the levels of other modifications, thereby modulating antibiotic tolerance.

We propose an interdisciplinary approach combining classical genetics and phenotypic characterization with structural studies (cryoEM) to:

- 1) Characterize a novel rRNA modification catalyzed by a newly identified bacterial methyltransferase and assess its impact on antibiotic resistance;
- 2) Understand how modulation of rRNA modifications in response to antibiotics affects ribosome assembly/stability, structure, and interaction partners;
- 3) Investigate how the presence or absence of specific tRNA modifications influences tRNA maturation pathways in *V. cholerae*, particularly under antibiotic stress.

The ultimate goal of the project is to advance our understanding of RNA-based regulation through biochemical reconstitution and structural characterization of RNA maturation complexes in *V. cholerae*.

This position may serve as a stepping stone toward applying for a permanent research position via the CNRS national competition.

Please contact : Carine TISNE, IBPC, UMR 8261; tisne@ibpc.fr

Publications related to RNA maturation in the Tisné's team:

- 1) V. Meynier, S. W. Hardwick, M. Catala, J. Roske, S. Oerum, D. Y. Chirgadze, P. Barraud, W. Yu, B. F. Luisi, C. Tisné. Structural basis for human mitochondrial tRNA maturation. **Nature Communications** 15 (2024), p. 4683. doi: 10.1038/s41467-024-49132-0.
- 2) Oerum S. et al (2021), A comprehensive review of m6A/m6Am RNA methyltransferase structures. **Nucleic Acids Res.** 49(13):7239-7255. doi: 10.1093/nar/gkab378.
- 3) Oerum S, Dendooven T, Catala M, Gilet L, Dégut C, Trinquier A, Bourguet M, Barraud P, Cianferani S, Luisi BF, Condon C, Tisné C. (2020), Structures of B. subtilis Maturation RNases Captured on 50S Ribosome with Pre-rRNAs. **Mol Cell.** 80(2):227-236. doi: 10.1016/j.molcel.2020.09.008.
- 4) Barraud P, Gato A, Heiss M, Catala M, Kellner S, Tisné C. (2019), Time-resolved NMR monitoring of tRNA maturation. **Nature Communications** 10(1):3373. doi: 10.1038/s41467-019-11356-w.

Activities

- Protein and RNA purification, in vitro transcription, preparation of RNA/protein complexes
- Structural biology (CryoEM)
- Enzymatic assays, ribosome purification for structural studies

Skills

- PhD in a relevant biological discipline (structural biology, biophysics, biochemistry)
- Strong background and research experience in structural biology, preferably in cryoEM (grid preparation, data collection, processing)
- Excellent written and oral communication skills, and proficiency in English are required. French is optional.
- General knowledge in molecular biology and biochemistry (enzymology, protein purification, etc.)
- The candidate must have strong interpersonal skills and be able to work independently, while also interacting effectively within an international research team
- Open-minded, curious, with strong analytical and synthesis skills
- Critical thinker, with scientific integrity
- Opportunity to co-supervise a Master's student

Work Context

The researcher will be employed by the CNRS (Centre National de la Recherche Scientifique), which is committed to the principle of equal employment opportunity. We want to promote the role of women in science and therefore explicitly encourage women to apply.

The researcher will join the "RNA Biogenesis, Architecture and Interactions" team, led by Dr Carine Tisné, within the Laboratory of Microbial Gene Expression. This laboratory is part of the Institut de Biologie Physico-Chimique (IBPC), located on the Curie campus in the 5th arrondissement of Paris. The project is supervised by Carine Tisné. All necessary equipment is already available in the lab or nearby (including electron microscopes).

The team's research focuses on understanding RNA maturation, at the molecular level: how RNAs acquire their structure and function during maturation, and how maturation enzymes specifically recognize target nucleotides and catalyze the maturation reactions.

Additional Information

The contract can start anytime between June 1st, 2025 and September 1st, 2025.

The application must be written in English. It should include a detailed CV, at least two letters of reference, and a cover letter describing your short- and long-term career goals.

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