# Job Title

PROJECT - Virome@tlas

2 years Postdoctoral fellowship - Virome biogeography at global scale

# Job Contract

- Status: Contract
- Job category: A
- Speciality/field: biogeography, viral metagenomics, large-scale approaches
- Contract: CDD
- Desired number of hours: 100%
- Contract duration: 24 months
- Desired start date: from October 2025 (negotiable)

# Job Missions

**Context:**

University of Lyon 1, in collaboration with 11 partners, is coordinating the SHAPE-Med@Lyon project (www.shape-med-lyon.fr). The **Virome@tlas project** - was recently granted a prize by the SHAPEMed@Lyon consortium as part of the call for structuring projects 2023 - **develops a digital platform dedicated to virosphere monitoring**. This collaborative project is led by the PRABI-AMSB platform (UCBL1, FR BioEEnvis - http://amsb.prabi.fr), the *Environnement Ville et Société* laboratory (Lyon2 - https://umr5600.cnrs.fr), the *Centre International de Recherche en Infectiologie* (HCL, GENEPII platform - https://teamhcl.chu-lyon.fr/genepii) and the *Infections Virales et Pathologies Comparées* laboratory (INRAE - https://ipvc.lyon-grenoble.hub.inrae.fr) in partnership with the *Biométrie et Biologie Evolutive* laboratory and the Institut Français de Bioinformatique (NNCR cloud). The Virome@tlas project is recruiting a **postdoctoral fellow to work on the biogeographical exploration and monitoring of the virosphere at global scales**. This work will be carried out within an interdisciplinary "One Health" framework involving scientists with strong expertise in the fields of bioinformatics, metagenomics, molecular evolution, virology, geography, hydrology and geomatics.

**Main missions:**

The primary mission of the postdoctoral fellow is to build **a comprehensive framework for exploring the interactions between viruses, hosts, and the environment at a global scale**. This analysis will be inferred from the large amount of data deposited in the Peta-bytes archives and will be used as a framework to improve our understanding of the viral transmission between human, animal and their diffusion in the environment. This open platform will be valuable for the scientific community to easily identify host organisms (animal, human) or environmental biosamples (freshwater, soil, wastewater) harboring new virome signatures. This comprehensive and up-scaled systems-level approach will improve our preparedness and surveillance systems to help prevent the potential next epidemic **by identifying global biogeographical rules and patterns involved in the virosphere evolution and adaptation, particularly in the context of global environmental change and climate warming.**

**Main activities:**

Most viruses responsible for human infectious diseases appear to be zoonotic (Wolfe et al., 2007; Woolhouse et al., 2012). The main activity of the recruited Post Doctoral fellow will be to explore at larges scales (e.g. biomes, ecosystem, watershed, virus/host taxonomy ...) the complex molecular, ecological and biogeographical factors responsible for future zoonotic spillover (Olival et al., 2017) - i.e. the transmission of animal viruses to human individuals - or their spillback - i.e. the transmission of human viruses to animals or in the

environment. It strongly relies on the building of a comprehensive catalogue, or atlas of virus/host associations, occurring in human and animal populations, as well as an in-depth annotation of their geospatial and temporal distribution. To do so, the candidate will benefit from the technical support and expertise of two highly qualified research engineers in bioinformatics and geomatics with the aim of integrating and annotating the quality of biogeographic and sequencing data and metadata stored within the virome@tlas datalake. A large fraction of the virus's host range spectrum remains understudied, thus neglecting an integrated and interconnected vision of global health. As a result, only a limited number of virus/host associations are described in public databases, and the majority of them are biased toward human viruses and or viruses causing diseases. In addition, the influence of biophysical environment and their contemporary changes (e.g., deforestation, urbanization, increasing aridity) on these virus-host associations remains unknown. To tackle this problem, the postdoctoral fellow will develop new computational methods using network theory and/or state of the art data science approaches (text mining, machine learning, AI) to comprehensively highlight **yet undiscovered virus/host/environment relationships** and annotate **potentially putative new spillover/spillback events** from the mining of millions of SRA biosamples and their associated billion of SRA-STAT taxonomic assignments already stored in our Virome@tlas data-lake. The candidates will also promote the development of new use cases in collaboration with the Virome@tlas consortium, ShapeMed@Lyon and the FR BioEEnviS partners to promote One Health and global-scale approaches.

## Job profile

Expected skills:

- Python programming (Dash, FLASK, geospatial python package), linux,relational databases/NOSQL
- Multivariate analysis (PCA, PLS, UMAP, tSNE, DBSCAN) and exploratory spatial data analysis
- Network and data sciences
- Nucleic sequence homology search, taxonomic assignment
- Viral metagenomics: de novo assembly, annotation of viral genomes
- Molecular phylogenies
- Machine learning

Knowledges:

- Virology
- Environmental metagenomics
- Biogeography
- Geomatics
- Bioinformatics

Know how:

- Responsive to OneHealth concept
- Ability to work in project mode with a multidisciplinary team of engineers and researchers
- Responsiveness, autonomy, initiative, rigor.
- Organizational skills.
- Team spirit and sense of collaboration.
- Ability to work as part of team, using modern digital tools.

## Job location

<u>Laboratory :</u>

City: Lyon, France

Laboratory/Service : Pôle Auvergne-Rhône-Alpes de Bioinformatique- Analyse et Modélisation des Systèmes Biologiques (PRABI-AMSB) / FR BioEEnviS

## Other:

Diploma required: PhD in systems molecular ecology or bioinformatics or environmental virology or biogeography/geomatics

Software/Programming: NoteBook Jupyter, R, IDE visual studio code, linux

Expected experience: PhD or Post Doctorate

## Application procedure :

Deadline for submission : Septembre 2025

Submit your CV, a cover letter, and two academic references to: :

Last name & First name: NAVRATIL Vincent

Position: Responsable scientifique PRABI-AMSB

Mail : vincent.navratil@univ-lyon1.fr


Last name & First name: NAVRATIL Oldrich

Position: Enseignant chercheur

Mail : oldrich.navratil@univ-lyon2.fr