Postdoc at the LBBE in Lyon – Modeling the joint evolution of enzyme kinetic features and metabolic networks

The postdoc is funded until the end of 2024, so the starting date should be as soon as possible. The net salary is 1864 € per month, including health insurance.

Context. Metabolic reactions form networks that are essential to transforming nutrients into energy and useful building blocks. As essential are enzymes that catalyze these reactions. Yet, despite their contribution to competition at the most basic level, enzymes are extremely diverse and sometimes only moderately efficient. No less puzzling is the presence of a large amount of redundancy in metabolic networks – meaning that some enzymes are possibly useless. This project aims at understanding this conundrum by studying the joint evolution of enzyme features and the structure of the metabolic network. This involves (i) building and analyzing mechanistic population genetics models to get an idea of what enzymes should look like, and (ii) comparing these predictions to published data.

Mission. The successful candidate will build mathematical or computational models to address the question above, that include:

- enzymes whose expression and kinetic features change by mutation (possibly using existing code written during the PhD of Florian Labourel)
- gene duplications and deletions that may change the structure of the metabolic network.

The ideal candidate should:

- have experience in building / analyzing mathematical or computational models, preferably in evolution
- be familiar with population genetics concepts or be keen to learn them
- enjoy dealing with mechanistic aspects / have an appetite for reading and discovering how things work.

Not ticking all these boxes might be fine, please get in touch if this is the case. Not having worked on enzymes, or even at this level of biological organization, is also fine.
The description above gives the general direction that the postdoc may take initially but other short projects may be started, either led by the postdoc or just involving her / his contribution.

Supervision. Etienne Rajon is the main supervisor of the project. He has produced models of evolution at several levels of organization (networks are often involved) and recently started working on enzymes. He is heading the Evolution, Behaviour and Adaptation Group, so be prepared to learn about mate choice in wasps, sociality in marmots or personality in birds.
Sabine Peres – a specialist of metabolic network architectures – is also involved, mostly in the data analysis part of the project.

Working and living environment. The whole group meets on a weekly basis, and the successful candidate may attend the meetings of other groups in the department.
The LBBE is a thematically diverse structure (perfect for the open-minded) with "departments" ranging from genomics to evolutionary ecology. We have external and internal seminars, thematic days, etc. And this is just to learn from each other, because we consider that this is part of (what is interesting in) our jobs.

Lyon is a vibrant, human-sized city. It is renowned for its gastronomy, hosts many festivals and events, an iconic lightshow, many museums, etc. Exceptional natural sites and other large French cities can be reached by train or short car travels.

To apply, please send an email to Etienne Rajon (etienne.rajon@univ-lyon1.fr) including:

- a CV
- a short description of your research interests and ideas about the project
- the names, affiliations, and emails of two referees

We encourage formal inquiries and discussions first.
Due to the ASAP starting date, we will start the evaluation shortly and continue until the position is filled.