

## **Postdoc “Yeast systems and synthetic biology”, Institut Pasteur and Inria, Paris**

We are looking for a highly motivated quantitative biologist with a strong interest for interdisciplinary research to join our team. We combine quantitative systems biology with applied mathematics and control theory for cell engineering. Our long-term goal is to develop integrated, model-driven hardware/software/lifeware platforms for the rational engineering of microbial cell populations.

**Keywords:** genetic engineering, quantitative biology, bioproduction, cell physiology, optogenetics, smart lab.

### **The Project**

There are nowadays, over 400 recombinant peptides and proteins on the market, and many others are undergoing clinical trials. Host cells are required to produce large amounts of the heterologous protein. To match this demand, cellular resources need to be reallocated. This may imbalance various physiological equilibria and cause deleterious effects on the recombinant product and on the host cell. The cell production rate and the cell growth rate might both be impacted. In the majority of the applications, this problem is addressed -at least partly- by dissociating growth from production: a first phase focuses on biomass production and a second phase focuses on product synthesis.

Our objective is to develop strategies that are more considerate for the host cell. We aim at demanding only the maximum that the cell can stand over long durations. Regulation and automated feedback are at the core of these strategies. We will envision both external and internal feedback approaches. For the former, one has to sense and quantify the level of (synthesis / folding / secretion) stress of the cell and dynamically adapt the induction level accordingly. For the latter, one has to engineer regulation circuits in which stress levels mitigate protein synthesis rates.

The candidate will employ methods like modular cloning, optogenetics, automated bioreactors enabled for real-time control, and quantitative modeling to understand single cell physiology and develop host-aware approaches for cell engineering.

### **Qualifications**

Candidates should have a PhD in biology with expertise in systems biology and/or synthetic biology. He or she should be capable of using modern genetic engineering methods and produce and analyze quantitative data. Experience with yeast engineering would be a significant asset.

We are primarily searching for a creative mind willing to develop his or her research in line with the lab directions. Funding for a relatively long stay is available (up to 4.5 years). We also expect that he or she will have a leading role in the team and take an active part in student supervision. So team spirit is essential and seniority would be appreciated.

### **Work environment**

Our group, InBio, is a joint initiative between Inria and Institut Pasteur. Inria is a French national institute dedicated to research in computer science, control and applied mathematics, and promoting scientific excellence and technology transfer. The Institut Pasteur is a world-renowned non-profit private foundation dedicated to biomedical research and the fight against infectious diseases. It offers access to top-notch experimental platforms and strong support for innovation.

InBio is an interdisciplinary research group, combining experimental and computational biology in the same lab. We combine systems and synthetic biology approaches with control and active

learning methods and stochastic and statistical modeling frameworks. Current applications include (i) the real-time control of gene expression using optogenetic and chemical stimulations in various systems (e.g. gene expression in yeast and bacteria, toggle switch in bacteria), (ii) the optimization of protein production through the preservation of host cell physiology or through engineered cell specialization, and (iii) the characterization of collective antibiotic resistance in ESBL-producing bacteria. We also develop platforms to automate experiments.

The group consists of scientists with diverse backgrounds (mathematics, physics, computer science, and biology) and nationalities (French, German, Spanish, Montenegrin, and Indian). The spoken language is English. We are located on the vibrant campus of Institut Pasteur in the heart of Paris. Team's website: <http://bit.ly/InBioPasteur>

Applications are accepted immediately and candidates will be considered until the position is filled. The successful applicant will be hired on a two-year contract with possible extensions and a competitive salary.

**Contact:** Gregory Batt, [gregory.batt@inria.fr](mailto:gregory.batt@inria.fr), [pasteur.fr](mailto:gregory.batt@pasteur.fr)

Applications should include a CV, a brief text describing your current research and career goals and how you could contribute to our research program, and contact information of references.