

### Post-doctorate at ESPCI Paris

**Research:** Biophysics and evolution

The ESPCI Biochemistry Laboratory develops tools combining DNA and microfluidic sequencing for the study of biological systems at a very high throughput. The aim of the project is to establish the relationships between genotype, phenotype and fitness in the bacterium *Escherichia coli* in order to understand the mechanisms behind evolutionary constraints. *E. coli* is an excellent experimental model for evolution (one generation every 20 minutes), genetic engineering, and biomedical given its major role in antibiotic resistance.

Depending on the candidate's profile, the project could be oriented towards the establishment of general laws between osmotic stress and growth (biophysical laws and application to the origin of eukaryotes), and / or the relationships between genotype, transcriptome, and growth (evolutionary role of pleiotropy in gene networks) obtained thanks to new cell culture and sequencing technologies.

The project will be carried out in collaboration with the teams of Olivier Tenaillon (Infection Antimicrobials Modeling Evolution unit, Bichat Hospital, Paris) and of Purification Popez-Garcia (Laboratory Ecology Systematic Evolution, Paris Saclay).

Selected publications of the team in relation with the project:

- Stochasticity of metabolism and growth at the single-cell level, DJ Kiviet, P Nghe, N Walker, S Boulineau, V Sunderlikova, SJ Tans, *Nature* 514 (7522), 376-379 (2014)
- Flux, toxicity, and expression costs generate complex genetic interactions in a metabolic pathway, H Kemble, C Eisenhauer, A Couce, A Chapron, M Magnan, G Gautier, P Nghe, O Tenaillon, *Science Advances* 6 (23), eabb2236 (2020)

For more : <https://nghe.net/>

**Teaching** (135 hours / year, equivalent to 1 afternoon per week): supervision of trinomial student projects in biology at the interface with physics - chemistry.

**Candidate profile:** PhD in biophysics or microbiology or molecular biology. A prior practice of microfluidics is not essential. Techniques used: microfluidics, microscopy monitoring, image analysis, biophysical modeling, molecular biology, bioinformatics. The candidate should be trained in interdisciplinary aspects.

**Position:** 1 year of post-doc with teaching ('ATER') starting in September 2020, possible extension for 1 year and another year as ae post-doctorate without teaching.

Research will be performed in Philippe Nghe team, located at Institut Pierre-Gilles de Gennes.

**Contact:**

Please write to [Philippe.nghe@espci.psl.eu](mailto:Philippe.nghe@espci.psl.eu) with CV, motivation and recommendation letters.