Two-year Postdoc position

Developmental genetic basis of an evolutionary innovation

Where:
- **The Khila lab** at the Institute of Functional Genomics (IGFL), École Normale Supérieure de Lyon, UMR CNRS 5242, Lyon, France

- **The Francesconi lab** at the Laboratoire de Biologie et Modelisation de la Cellule (LBMC), École Normale Supérieure de Lyon, UMR CNRS 5242, Lyon, France
  [http://www.ens-lyon.fr/LBMC](http://www.ens-lyon.fr/LBMC)

Salary: 2500-3000/month Euros (based on experience after PhD)
Starting date: January 2022
Deadline for applications: October 30th, 2021 or till the position is filled

Project title: Understanding the origin of evolutionary innovations using water strider propelling fan as a model

Keywords: EvoDevo, developmental genetics, RNAi, Single cell-sequencing

Background: Evolutionary innovations are qualitatively new and beneficial phenotypes that allow the bearing lineages to access previously unexploited ecological opportunities. Studying these traits offers a unique opportunity to understand how novelty arises and evolves. Although many iconic examples have been documented, it is still difficult to study the origin of evolutionary innovations for various reasons. For example, systems bearing striking evolutionary innovations may be intractable for experimentation, or the innovation itself may be too complex for manipulation.

Model system: The Khila lab has established the propelling fan of the water strider *Rhagovelia* (Figure 1A) as a model to study the origin of evolutionary innovations. The propelling fan in *Rhagovelia* is composed of ~20 plume-like structures that can be deployed or retracted as the animal rows on the water (Santos et al., 2017) (Figure 1B). The fan allows the water strider to sustain permanent movement on fast flowing streams – a previously unexploited ecological opportunity that is not accessible to fan-less species. This innovation may have contributed to the burst of speciation of the genus *Rhagovelia*, which alone accounts for almost half of the species count in the family (over 400 species). We investigate the origin of this evolutionary innovation through a comparative study of the cellular and developmental genetic mechanisms underlying fan development in species with one pair, two pairs or no fans (Figure 1).

![Figure 1](http://igfl.ens-lyon.fr/images/figure1.png)

**Figure 1**: *Rhagovelia* possess a pair of plumy fans in the mid-legs (A, B) while *Tetrapirpius* possess two pairs of bushy fans in the mid-legs (C) and hind-legs (D).
**Project:** The postdoctoral fellow will lead the effort to generate single cell sequencing data from the legs *Rhagovelia* and sister species legs, see (Santos et al., 2017). This tissue includes multiple cell types, identifiable based on molecular markers, including a cluster of fan cells (Santos et al. 2017). She or he will analyse the single cell data in collaboration with Francesconi team and build a putative gene regulatory network to be experimentally validated through experiments of gene expression and RNAi knockdown.

**Requirement:** PhD degree.

**Required skills:** Excellent communication skills in English (written and spoken), motivation, creativity, curiosity, critical thinking, good work ethics, teamwork, and good inter-personal relationship with colleagues. Acquired skills in large-scale data analysis and computational biology. A track record of peer-reviewed publications.

**Desired skills:** Knowledge in evolutionary developmental biology, previous experience in single cell RNA-seq experimental and data analysis steps would be a plus.

**How to apply:** By email to abderrahman.khila@ens-lyon.fr or mirko.francesconi@ens-lyon.fr with a motivation letter explaining why you are interested by this position and how you think you are a good fit, your CV and names and e-mail addresses of two or three referees who can write letters of reference on your behalf.

**Lab publication on the Rhagovelia fan:**