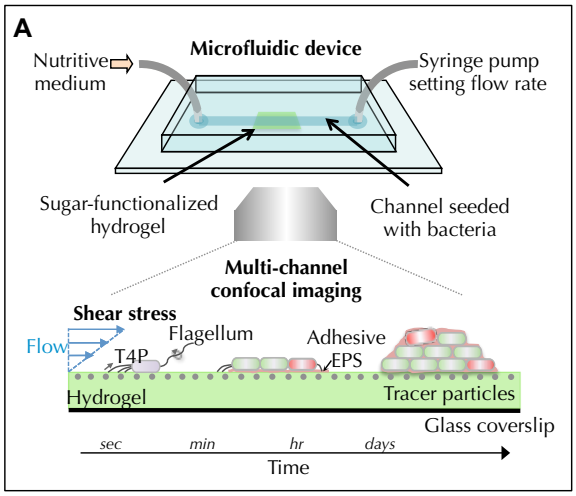
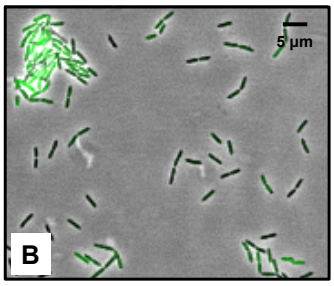
# Postdoctoral position starting in 2018

## Deciphering the role of lectins in *Pseudomonas aeruginosa* virulence

**Project :** Bacterial lectins are sugar-binding proteins that mediate adhesion to host surfaces, and are also important for biofilm formation. In the widespread pathogen *Pseudomonas aeruginosa,* soluble lectins LecA and LecB are known to be key pathogenicity factors [1,2], yet their exact role in surface colonization and their implication in virulence pathways are unclear. The goal of the proposed project is to use an integrative cross-disciplinary approach involving surface functionalization, microscopy, time-resolved force measurements and microbiology tools in order to unravel the role of *P. aeruginosa* lectins in early biofilm formation and pathogenicity, thus identifying new targets for antimicrobial strategies.

The hired postdoc will image bacterial adhesion and spatio-temporal dynamics of biofilm formation *in vitro* in microfluidic flow cells [3,4]. The onset of virulence will simultaneously be monitored with adequate fluorescent reporters. Image analysis and tracking algorithms will be used to dissect bacterial response *in situ*. To decipher the role of lectins, we will i/ perform adhesion assays on sugar-functionalized surfaces designed to specifically bind LecA or LecB, ii/ use high-affinity glycoconjugates that can block lectins, and iii/ investigate the behavior of mutant strains impaired in lectin production.




A. Principle of the experimental approach: bacteria adhere on a test surface (typically a sugar-functionalized, deformable hydrogel) under constant flow and are observed *in situ*;
B. Example of an intracellular GFP reporter upregulated upon surface adhesion.

[1] Heggelund JE, Varrot A, Imberty A, Krengel U. Histo-blood group antigens as mediators of infections. *Curr Opin Struct Biol*, 4:190-200, doi: 10.1016/j.sbi.2017.04.001 (2017). [2] Zheng S, Eierhoff T, Aigal S, Brandel A, Thuenauer R, de Bentzmann S, Imberty A, Römer W. The Pseudomonas aeruginosa lectin LecA triggers host cell signalling by glycosphingolipid-dependent phosphorylation of the adaptor protein CrkII. Biochim Biophys Acta. Jul;1864(7):1236-1245. doi: 10.1016/j.bbamcr.2017.04.005 (2017). [3] Lecuyer S, Rusconi R, Shen Y, Forsyth A, Vlamakis H, Kolter R, et al. Shear stress increases the residence time of adhesion of Pseudomonas aeruginosa. Biophysical journal. Jan 19;100(2):341–50 (2011). [4] Shen Y, Siryaporn A, Lecuyer S, Gitai Z, Stone HA. Flow directs surface-attached bacteria to twitch upstream. Biophysical journal. Jul 3;103(1):146–51 (2012).

**Profile :** Applicants should hold a PhD, preferably in soft matter physics or bioengineering. The selected candidate will work at the interface between soft matter physics (microfluidics, microscopy, image analysis), chemistry (substrate preparation, surface functionalization, glycobiology), and microbiology (bacterial culture, biofilm formation assays). Previous experience in any of these domains would be an asset, but most importantly a strong adaptability and the desire to interact with different communities are required.

**Practical details :** Most of the project will take place at the Laboratoire Interdisciplinaire de Physique (LIPhy), on Grenoble main academic campus which hosts 60,000 students, a few minutes from Grenoble city center and at the foot of the French Alps. Part of the work will be done in close collaboration with lectin specialists at nearby CERMAV, in the group of Annabelle Varrot. Both institutes perform high-level, internationally competitive research. The postdoctoral grant is co-financed by the « Laboratory of Excellence » TEC21 and the Institut Carnot POLYNAT; salary expectations are based on CNRS grids (monthly net income ~1800 € minimum, with full health coverage and social benefits).

**Duration : 12 months**
**Expected starting date : August to October 2018**

**To apply, please send a CV and a cover letter to: sigolene.lecuyer@univ-grenoble-alpes.fr**