Postdoctoral position in biophysics

We are seeking a highly motivated postdoctoral researcher with background in **biophysics** to join an interdisciplinary and international project to explore the **evolutionary mechanics of adhesion complexes**.

Project

The project, at the interface between physics and molecular and evolutionary biology, will explore the **mechanical evolution of adhesion complexes** using inner-ear cadherin tip links as a model system[1]. The project is a collaboration between Marcos SOTOMAYOR (Ohio State University, OH, USA), Vincent LYNCH (University of Chicago, IL, USA) and Felix RICO (Aix-Marseille University, France). The US partners will sequence, synthesize, and study tip-link proteins from diverse extant species and will carry out evolutionary analyses both to reconstruct the sequences of ancestral, "resurrected" tip links, and to identify potentially stronger tip links from species in which positive selection is reported. The postdoc joining the French partner will use **high-speed atomic force microscopy** (HS-AFM[2]) to probe the mechanical response of cadherin tip links from different extant species and "resurrected" sequences. High-speed force spectroscopy[3,4] and molecular dynamics simulations[5] will be combined at similar loading rates to obtain an atomistic description of tip-link mechanics. Continuous exchange and meetings with the US partners is expected.

The project is funded by the **Human Frontier Science Program** (HFSP).

Candidate

The candidate with background in physics will integrate an interdisciplinary and international team and will be expected to travel annually to meet with the US partners. The project requires experience in force measurements using AFM or other nanotool. Good programming skills are essential. Experience in molecular biology and biochemistry will be a plus.

Hosting group and working environment

The force microscopy group is an interdisciplinary and international group affiliated to the LAI U1067 Aix-Marseille Université / INSERM / CNRS. The lab is located in the Luminy campus within the Calanques National Park in Marseille, France. The campus provides an exceptional research environment, including renowned centers in immunology, developmental biology, theoretical physics and mathematics. The lab is part of the Turing Centre for Living Systems (CENTURI), an interdisciplinary institute to decipher the complexity of biological systems.

Application procedure

Applications must be submitted to Felix Rico (felix.rico@inserm.fr) before September 19, 2020, and must include:

- CV with a list of publications and the names and contact details of 2 referees
- A short letter describing the motivation to join our group and your contribution to the research project

Selected applicants will be notified whether their application has been selected for further assessment and interview either by personal visit or video conference.

Terms of salary and employment:

A 1-year contract renewable up to the length of the HFSP project. The terms of employment are set according to the prefixed table of wages and depend on professional experience. Successful candidates will receive a gross salary around 2800 euros per month.

References

1. Sotomayor, M., Weihofen, W. A., Gaudet, R. & Corey, D. P. Structure of a force-conveying cadherin bond essential for inner-ear mechanotransduction. *Nature* (2012).
2. Ando, T. *et al.* A high-speed atomic force microscope for studying biological macromolecules. *Proceedings of the National Academy of Sciences* **98**, 12468–12472 (2001).
3. Rico, F., Gonzalez, L., Casuso, I., Puig-Vidal, M. & Scheuring, S. High-Speed Force Spectroscopy Unfolds Titin at the Velocity of Molecular Dynamics Simulations. *Science* **342**, 741–743 (2013).
4. Rico, F., Russek, A., González, L., Grubmüller, H. & Scheuring, S. Heterogeneous and rate-dependent streptavidin–biotin unbinding revealed by high-speed force spectroscopy and atomistic simulations. *PNAS* **116**, 6594–6601 (2019).
5. Sotomayor, M. & Schulten, K. Single-molecule experiments in vitro and in silico. *Science* **316**, 1144–1148 (2007).