

POST-DOCTORAL POSITION AVAILABLE

A 2-year post-doctoral position funded by the Labex *Who Am I?* (<http://www.labex-whoami.org/en/>) is open at the “Robustness and evolvability of life “ team at the Cochin Institute (INSERM U1016 - CNRS UMR8104 - Université de Paris) in Paris.

PROJECT: In changing stressful environments, the available genetic variability can limit adaptation. So the question is how organisms find the balance between *adaptability*—the ability to adapt to new conditions—and *adaptedness*—the ability to remain adapted to current conditions. The trade-off between population adaptability and adaptedness can be broken by limiting the increase of mutation rates to short periods of time and by within-population heterogeneity of mutation rates. Presence of subpopulations of cells exhibiting transiently high mutation rates does not affect the average mutation frequency, and therefore it does not reduce the population mean fitness in a stable environment. However, it can contribute to the population adaptability in fluctuating environments because these subpopulations represent a reservoir of increased genetic variability.

The existence of the subpopulations of transient mutators in bacterial population has been theorized 30 years ago, but bulk population measurements that were used to study mutagenesis precluded experimental demonstration of their existence. We developed a first method allowing visualization of emerging mutations in individual living *Escherichia coli* cells. This method allows monitoring of genome-wide mutations in living cells independently of their effect on fitness. Hence, replication errors giving raise to lethal, deleterious and even neutral mutations can be visualized for the first time. By using this assay, we propose to investigate population-wide heterogeneity in mutation rates at single cell level and to identify molecular mechanisms responsible for the emergence of mutator subpopulations.

CANDIDATE PROFILE: We are looking for an experienced, motivated, independent and dynamic postdoc candidate. Candidate should have solid experience with the fluorescence microscopy and image analysis, as well as microbiology and molecular biology skills. The candidate is expected to contribute both experimentally and intellectually to the performance and development of the project. The candidate should be proficient in English both in writing and speaking.

APPLICATION: Please, send applications including CV with names and contact information of 2 referees, a complete list of publications and a statement of research interest directly to: ivan.matic@inserm.fr.

STARTING DATE: The position is available immediately, but duration of the settlement of all administrative paperwork is expected to be two/three months. Post-doc should start working before the end of 2021, latest. Salary will be commensurate to previous experience and in line with the University of Paris regulations.

LABORATORY PUBLICATIONS RELATED TO THE TOPIC:

Elez, M., Murray, A., Bi, L.B., Zhang, X.E., Matic, I. and Radman M. (2010) Seeing mutations in living cells. *Curr. Biol.* 20:1432-1437.

Elez, M., Radman, M., and Matic, I. (2012) Stoichiometry of MutS and MutL at Unrepaired Mismatches *In Vivo* Suggests a Mechanism of Repair. *Nucleic Acids Res.* 40:3929-3938.

Woo, A.C., Faure, L., Dapa, T., and Matic, I. (2018) Heterogeneity of the spontaneous DNA replication errors in single isogenic *Escherichia coli* cells. *Science Advances.* 4: eaat1608

Matic, I (2019) Mutation rates heterogeneity increases odds of survival in unpredictable environments. *Mol Cell* 75:421-425.

Tenaillon, O., and Matic, I. (2020) The impact of neutral mutations on genome evolvability. *Curr Biol.* 30:R527-R534