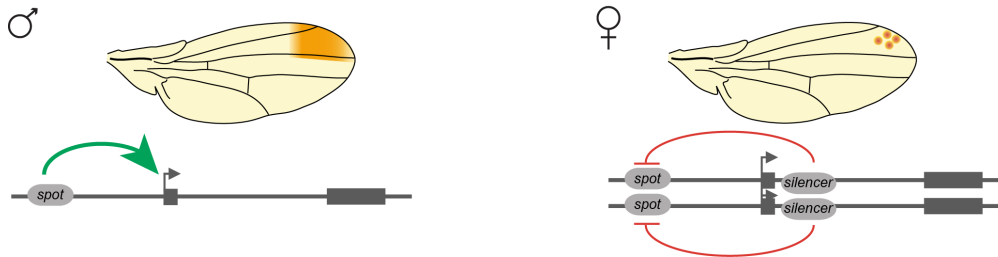


Imaging long-distance communication between homologous alleles to unravel the mechanisms of functional trans-interactions

The Prud'homme team is welcoming application for a post doc position to work on a collaborative imaging and modeling project with the lab of Thomas Gregor (Institut Pasteur, Princeton University).

Research background:

The expression of a gene is regulated by its flanking cis-regulatory sequences. However, proper gene expression relies also often on proximity-dependent interallelic gene regulation. How alleles sitting on homologous chromosomes find each other in the nucleus, and how their interactions influence gene expression are open questions. We study these general questions by focusing on the regulation of the *Drosophila* gene *yellow* [1]. *yellow* is located on the X chromosome, allowing the two alleles to interact in XX females but not on XY males. Thus, female-specific interallelic interactions shape the sex-specific expression of *yellow* [2].



Research objectives:

The proposed project aims at visualizing the interaction between homologous *yellow* alleles and the functional consequences of that interaction on gene expression. Super-resolution imaging in fixed cells will elucidate spatial conformations of the DNA polymer and associate these to gene regulatory states; in live cells the goal is to assess the temporal dynamics of gene expression and how it is linked to fluctuating distances between the two homologous polymer strands. For more information about these approaches see [3, 4].

Research environment:

This interdisciplinary project will be carried out in close collaboration between the Prud'homme lab at IBDM, in Marseille, and the Gregor lab at Institut Pasteur, in Paris. These two dynamic places are internationally-recognized for their interdisciplinary research environments, state-of-the-art imaging platforms, and offer excellent training opportunities.

Your profile:

The project is best suited for a self-driven and independent post-doc, seeking a highly interdisciplinary training; either with a background in physics and a strong interest for biological questions, or with a biology education with a strong background in imaging and computational analysis. Coding skills and statistical training are strongly recommended. The position can start in early 2022.

To apply for this position, please send a CV, a letter of motivation, and contacts for references to: benjamin.prudhomme@univ-amu.fr & thomas.gregor@pasteur.fr

More information about each group can be found here:

<https://www.prudhommelab.com/>

<https://research.pasteur.fr/en/team/physics-of-biological-functions/>

References:

- [1] Arnoult, L., et al. (2013). *Science* 339, 1423–1426. doi: 10.1126/science.1233749
- [2] Galouzis, C.C., and Prud'homme, B. (2021). *Science* 371, 396–400. doi.org/10.1101/2020.03.23.003103
- [3] Chen, H., et al. (2018). *Nature Genetics* 50, 1296–1303. doi: 10.1038/s41588-018-0175-z
- [4] Barinov, L., et al. (2020). arXiv:2012.15819 [q-bio].