PhD program 2020 call for proposals: LabEx co-direction fellowships

Role of rDNA genomic instability on replicative senescence in a natural population

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Research teams and team leaders

Team 1: Biophysics of cell growth

Team leader 1: Gilles Charvin

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Team 1 members: 7

3 relevant publications:

[1] Proteostasis collapse, a hallmark of aging, hinders the chaperone-Start network and arrests cells in G1 Moreno DF, Jenkins K, Morlot S, **Charvin G**, Csikasz-Nagy A, Aldea M
eLife, e48240, 2019

[2] Excessive rDNA transcription drives the disruption in nuclear homeostasis during entry into senescence in budding yeast
Morlot S, Jia S, Léger I, Matifas A, Gadal O, **Charvin G**
Cell Rep, 28(2):408-422, 2019

[3] Nonlinear feedback drives homeostatic plasticity in H2O2 stress response.
Goulev Y, Morlot S, Matifas A, Huang B, Molin M, Toledano MB, **Charvin G**
eLife, *6*, e23971, 2017

Number of PhDs in progress: 3

(Starting dates: 10/2016 ; 10/2016; 10/2018)

Team 2: Variation intra-spécifique et évolution des génomes

Team leader 2: Joseph Schacherer

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Team 2 members: 14

3 relevant publications:

[1] Extensive impact of low-frequency variants on the phenotypic landscape at population-scale
Fournier T, Abou Saada O, Hou J, Peter J, Caudal E, **Schacherer J**
elife, 8 e49258, 2019

[2] Genome evolution across 1,011 *Saccharomyces cerevisiae* isolates.
Peter J, De Chiara M, Friedrich A, Yue JX, Pflieger D, Bergström A, Sigwalt A, Barre B, Freel K, Llored A, Cruaud C, Labadie K, Aury JM, Istace B, Lebrigand K, Barbry P, Engelen S, Lemainque A, Wincker P, Liti G, **Schacherer J**
Nature, 2018, 7701:339-344, 2018

[3] Fitness trade-offs lead to suppressor tolerance in yeast.
Hou J, **Schacherer J**
Mol Biol Evol, 34(1):110-118, 2017

Number of PhDs in progress: 4

(Starting dates: 10/207 ; 10/2017; 10/2019; 10/2019)

Phd supervisors

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Phd subject

Title: Role of rDNA genomic instability on replicative senescence in a natural population

Description:

Aging is a ubiquitous feature of living organisms, yet its fundamental origin still remains to be deciphered. Over the last twenty years, budding yeast has emerged as a powerful model to identify and characterize the molecular

mechanisms that drive age-associated physiological declines. Previous work, including recent contributions from the host lab, has identified and characterized the instability of ribosomal DNA (rDNA) as the main driver of entry into replicative senescence. However, previous studies were all based on lab strains derived from very specific selection processes. Therefore, the effects associated with large genetic variations observed in natural isolates have been largely ignored. Yet, such analyses are likely to provide unprecedented advances about how genome stability controls longevity, knowing that the organization of the rDNA locus greatly differs among the variants. This project combines the experience of the Charvin lab in replicative aging studies with the unique expertise of the Schacherer lab with the analysis of structure-function relationships in intra-species genetic variants.

Key words: Replicative aging, intra-species genetic variations, microfluidics, single cell imaging