



Master project 2024-2025

Personal Information

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Group	MultiCellGenome Lab

Project

Computational genomics

Project Title:

Understanding the transition from unicellular to multicellular at the onset of animals

Keywords:

Origin of animals, phylogenomics, ancestor reconstruction, Single-Cell RNA Seq,

Summary:

Have you ever wondered how in evolution the transition from unicellular to multicellular organisms took place? In our laboratory we study this enigmatic and crucial evolutionary question from a diverse combination of approaches from genome wide analysis, cell and molecular biology as well as phylogenetics. More specifically, we aim to understand the origins of cell differentiation, the importance of phenotypic plasticity, reconstruct the genome of the unicellular ancestor or understand the evolutionary history of genome regulation at the onset of animals. With these objectives in mind, we are working with the closest unicellular relatives of animals belonging to the four known clades at the moment, choanoflagellates, filastereans, ichthyosporeans and corallochytreans. In the last years we have advance substantially in making them experimentally treatable expanding notably the possibilities to functionally test hypothesis. In this framework we have a range of Master projects that can be offered to students of the Bioinformatic Research Master from the University Pompeu Fabra. The Master Student would receive training and experience in latest advances in bioinformatics addressing questions such as: exploring the genetic content of the unicellular ancestor, analyzing single-cell RNA and ATAC-Seq data, analyzing the transposable elements content or the specific regulatory landscape of different genomes at the onset of animals

References:

Ruiz-Trillo I, Kin K, Casacuberta E. The Origin of Metazoan Multicellularity: A Potential Microbial Black Swan Event. *Annu Rev Microbiol.* 2023 doi: 10.1146/annurev-micro-032421-120023 Leger MM, Ros-Rocher N, Najle SR, Ruiz-Trillo I. Rel/NF-κB Transcription Factors Emerged at the Onset of Opisthokonts. *Genome Biol Evol.* 2022 doi: 10.1093/gbe/evab289.

Expected skills:

Basic skills on bioinformatics

Possibility of funding:

No

Possible continuity with PhD:

To be discussed

Comments:

More information and pictures and videos of those taxa can be found at: "<https://www.flickr.com/people/146564503@N06/>"
"<https://www.youtube.com/user/multicellgenomeLab>"