COEVOL MULTI-SCALE COEVOLUTION

FUNCTIONNAL EVOLUTIONARY GENOMICS GROUP

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My past research has been focused on extracting information from genomes to better understand how they encode phenotypes. Extant living organisms are the result of an historical process that has unfolded over billions of years. Their genomes have accumulated footprints of past episodes of selection in response to interactions with their environment or with other species. I have developed computational methods based on probabilistic models to detect these footprints and interpret genomic data on a large scale.

In particular, I have used ancestral sequence reconstruction to study the lifestyles of organisms that lived billions of years ago, I have developed methods for reconstructing gene trees and species trees to better understand genome evolution, and I have developed and assessed methods to find examples of convergent genomic evolution.

My research in genomics these days mainly focuses on:

- using machine learning approaches to help in the fields of phylogenetic reconstruction and molecular evolution (collaboration with

  Johanna Trost

  ,

  Luca Nesterenko

  ,

  Philippe Veber

  and

  Laurent Jacob

)

- detecting directional selection at the sequence level, notably to study convergent genomic evolution (collaboration with

  Louis Duchemin

  and

  Philippe Veber

)

- exploiting information from horizontal gene transfers to date species phylogenies (e.g. see

  this manuscript ↗

  and the

  associated recommendation ↗

  by

  PCI Evol Biol ↗

)

I have recently broadened my interests in a variety of directions, which led me to study:

- how aphids, their predators, sugar beets and viruses interact, with the hope that a better understanding of this ecological network might help us avoid pesticides when growing sugar beets (collaboration with

  Baptiste Maucourt

  ,

  Eric Tannier

  and

  Léo Girardin ↗

)

- wheat yields, and how they depend on meteorological conditions (collaboration with

  Louis Duchemin

  and

  Philippe Veber

)

In terms of teaching, I have been involved in teaching Bayesian statistics, Computational Molecular Evolution, Genomics.

I also teach about the environmental footprint of our food systems as part of the
[course "Climat et transitions"](#) ↗
at Université Lyon 1.