

## Unité Mixte de Recherche

# Génétique Quantitative et Évolution - Le Moulon

### Director:

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## Scientific goals

The main scientific focus of the UMR<sup>5</sup>, so-called « Le Moulon », is the genetics and evolution of complex traits (quantitative traits), with three complementary objectives:

- *Bringing knowledge in fundamental multifactorial genetics, within the following subjects: modeling of quantitative variation, evolution of quantitative traits, searches for genes underlying quantitative effects and the dynamics of genetic resources.*
- *Guiding selection methodologies by including genomic knowledge. Exploiting and enhancing genetic resources. Target traits are typically growth, development or adaptation traits.*
- *Decrypting the genetic, molecular and epigenetic mechanisms controlling both qualitative and quantitative traits, unveiling their importance in evolutionary history of species and associated adaptations.*

The main species studied are maize and wheat. Some projects involve other species, either as models (*Arabidopsis thaliana*, *Saccharomyces cerevisiae*, *Escherichia coli*), or to address specific questions (*Brassica*, basal Eudicots).

## Context

The UMR is linked to INRA, to Université Paris-Sud, to CNRS and to AgroParisTech. It gathers about fifteen full time researchers (INRA and CNRS), a dozen faculty members (Université Paris-Sud and AgroParisTech) and a permanent staff of nearly thirty engineers and technicians; the lab hosts about thirty trainees or postdoctoral and doctoral scientists.

Le Moulon is one of the three constitutive laboratories of the institute « Diversité, Écologie et Évolution du Vivant » (IDEEV) associated with Université Paris-Sud and CNRS.

We participate in several organizations *d'excellence*<sup>6</sup>. The UMR is a member of two LabEx networks "Biodiversity, Agroecosystems Society, Climate" (BASC) and "Saclay Plant Sciences" (SPS). Le Moulon coordinates the project « AMAIZING » that rallies twenty four public and private partners: this project is funded by the ANR (National Funding Agency).

<sup>1</sup> DR : Directeur de Recherche = Research PI

<sup>2</sup> INRA: Institut National de Recherche Agronomique

<sup>3</sup> AgroParisTech: Graduate Institute in Life and Environmental Science and Engineering

<sup>4</sup> CNRS: Centre National de la Recherche Scientifique

<sup>5</sup> UMR: Unité Mixte de Recherche = Research Unit

<sup>6</sup> Laboratoire d'excellence (Labex) and Initiative d'excellence (Idex) = two national networks programs.

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## Research Teams

- *Biologie et Adaptation des Systèmes en Évolution (BASE)* - C. DILLMANN, UNIVERSITÉ PARIS-SUD  
Modeling of quantitative variation and its evolution by integrating genetic, molecular, genomic, metabolic and environmental levels.
- *Recombinaison des Allèles en Méiose : Déterminisme, Applications, Modélisation (RAMDAM)* – O. MARTIN, INRA  
Study of the formation of meiotic crossovers by theoretical and experimental approaches. Integrative biology and modeling.
- *Structure et Évolution des Chromosomes Fongiques (SECF)* – C. FAIRHEAD, UNIVERSITÉ PARIS-SUD  
Modes of reproduction of hemiascomycetes yeasts, role in the evolution history of *Candida glabrata*. Population genomics, comparative and functional genomics, and adaptation of yeast to their environment.
- *Dynamique du Génome et Adaptation des Plantes cultivées (DyGAP)* – M. TENAILLON, CNRS  
Characterisation of nucleotidic, structural and epigenetic variations implicated in the evolution of genomes, the regulation of their expression and the adaptation of populations.
- *Génétique, Épigénétique et Évolution de la Morphogenèse Florale (GE2MorF)* – C. DAMERVAL, CNRS  
Mechanisms driving morphological diversity of petals and perianth symmetry. Role of perianth diversity for adaptation and species diversification.
- *Diversité, Évolution et Adaptation des Populations (DEAP)* – J. ENJALBERT, INRA  
Genetic bases of local adaptation; dynamic biodiversity management and uses for innovative and sustainable farming, participatory plant breeding.
- *Génétique Quantitative et Méthodologie de la Sélection (GQMS)* – A. CHARCOSSET, INRA  
Study of the genetic bases of complex traits and mechanisms of response to selection, optimization of genetic resource management and of selection methodology.

## Facilities

- *Atelier Cartographie, Expression et Polymorphisme* - M. FALQUE, INRA  
Common projects in molecular biology, technological watch, methodological developments for specific projects.
- *Atelier de Bioinformatique et d'Informatique* - O. MARTIN, INRA  
Analysis of genomes and sequences (J. JOETS, INRA) - Development of programs and databases for genetics and genomics (D. STEINBACH, INRA) - Computing services (O. LANGELLA, CNRS).
- *Plate-forme de protéomique PAPPSO* - M. ZIVY, CNRS  
Identification and quantification of proteins, analysis of post-translational modifications, methodological developments, bioinformatics for proteomics.
- *Installation Expérimentale* – P. BRABANT, AgroParisTech  
Field experiments for the genetic research of the laboratory, agronomic experiments for the INRA networks working on maize and wheat, hosting of educational experiments for the University Paris-Sud and AgroParisTech.