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UMR0879

Plant Reproduction and Development (RDP)

Management

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Research topics

- Biology and evolution of the development of plants and their reproductive systems
- Predictive biology: role of biochemical and mechanical signals in morphogenesis
- Societal issues: anthropocene, agriculture, architecture and urban planning

Key figures

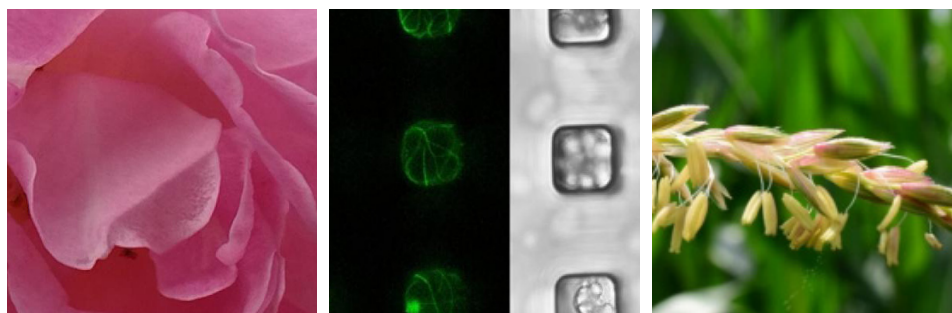
- 32 researchers and equivalent
- 34 PhD and post-docs
- 49 research support staff
- 8 research teams

Keywords

- Development and reproduction
- Plants
- Cell biology
- Biophysics

The Plant Reproduction and Development laboratory (RDP) is a joint research unit (UMR) run by INRAE, Université Claude Bernard Lyon 1, CNRS, INRIA and ENS de Lyon.

The RDP studies plant reproductive and vegetative development, focusing on the development and evolution of flowering organs, seed development, and on hormonal and mechanical signalling.



Photos ©INRAE

The main objectives are to:

- acquire a multi-scale (from genome to organism) quantitative understanding of plant development and evolution;
- achieve cellular integration of biochemical, mechanical and geometrical signals to understand how different plant and organ morphologies emerge.

The unit's work mainly involves:

- quantitative approaches to molecular genetics, genomics and cell biology;
- approaches using biophysics and bioinformatics;
- computer modelling approaches.



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RDP Teams

- Seed development
- Epigenetics, chromatin and development
- Evolution and development of the flower
- Mechanotransduction and development
- Floral morphogenesis
- Cell signalling and endomembranes
- Hormone signalling and development
- MOrophogenesis Simulation and In silico Analysis (MOSAIC)

Research

The RDP carries out basic research aiming to achieve a multi-scale (from the genome to the organism) quantitative understanding of the development and evolution of plant reproductive structures (from flower formation to seed development). It uses classic development biology approaches (molecular genetics, genomics, cell biology) and, integrates these with its internationally-recognized expertise in systems biology using multi-disciplinary approaches (including biophysics, bioinformatics and computational and mathematical modelling) to study the molecular and physical bases of plant morphogenesis.

Collaboration and expertise

Its main local academic partners are located on the Lyon ENS campus (physics, complex systems, geology, human and social sciences), and at the Université Claude Bernard Lyon 1. The RDP is also involved in citizen science projects with local stakeholders (farmer-bakers, applied botany resource centre, etc.).

Its national partners

The RDP is part of a dense network including INRAE, CNRS and INRIA centers and French universities, and is a member of several national research groups (imaging, cell biology, plant physics, etc.). The laboratory also collaborates with several private companies (plant biotechnology, seeds, food and cosmetics, microscopy, etc.).

At the international level

The RDP belongs to several international networks (International Research Partnerships with Cambridge, UK; IRN with Japan, etc.) and its scientific projects are carried out in collaboration with an extensive international network (mainly in Europe, Canada, the USA, Australia, China and Japan).

Scientific facilities

- Optical and mechanical imaging: atomic force microscope, micro-indenter (AFM), microfabrication, scanning electron microscopy, confocal microscopes with microfluidic systems;
- In-situ hybridization and immunolocalization;
- Growth chambers, greenhouses;
- Maize transformation platform, curated collection of petunia mutants;
- Digital tools: genomic database (rose and petunia), GNOMON (3D reconstruction platform, cellular segmentation, lineage analysis and modelling).

Teaching

The unit's lecturer-researchers and doctoral-assistants are involved in teaching at ENS de Lyon and the Université Claude Bernard Lyon I. They teach courses in plant physiology and development, but also in cell biology, genetics, genomics, mathematics and modelling for biology and systems biology. Many RDP researchers are involved on a less regular basis in these various courses and in events for the general public.



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