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Teams in this unit investigate the mechanisms underlying the stability and the plasticity of genetic and epigenetic information in normal or pathological contexts such as cancer. Using complementarity approaches, we develop an integrated view of the functional organization of the genome at different scales: from the molecule to the cell to the organism.

Using several model organisms (*Drosophila*, *Xenopus*, mouse, yeast) and cell lines (human, rodents, insects ...) we study fundamental processes of chromosome biology: DNA replication, segregation and repair, regulation of gene expression during development, cell cycle and in response to environmental stress

Together, these models are helping to decipher how DNA replication and repair, gene transcription and silencing are modulated during development, cell division and in response to environmental stress

The main research themes of the unit include:

- The roles of factors involved in chromatin dynamics, genome stability and repair
- How functional domains of eukaryotic genomes are established and then maintained during development.
- How epigenetic plasticity plays a part in controlling the polarity of the embryo.
- How nuclear compartmentalisation and dynamics participate in regulating various functions of the genome.

Key publications

Year of publication 2018

Tanguy Lucas, Huy Tran, Carmina Angelica Perez Romero, Aurélien Guillou, Cécile Fradin, Mathieu Coppey, Aleksandra M Walczak, Nathalie Dostatni (2018 Oct 27)

3 minutes to precisely measure morphogen concentration.

PLoS genetics : e1007676 : [DOI : 10.1371/journal.pgen.1007676](https://doi.org/10.1371/journal.pgen.1007676)

Antoine Hocher, Myriam Ruault, Petra Kaferle, Marc Describes, Mickaël Garnier, Antonin Morillon, Angela Taddei (2018 Oct 26)

Expanding heterochromatin reveals discrete subtelomeric domains delimited by chromatin landscape transitions.

Genome research : [DOI : gr.236554.118](https://doi.org/gr.236554.118)

Huy Tran, Jonathan Desponds, Carmina Angelica Perez Romero, Mathieu Coppey, Cecile Fradin, Nathalie Dostatni, Aleksandra M Walczak (2018 Oct 12)

Precision in a rush: Trade-offs between reproducibility and steepness of the hunchback expression pattern.

PLoS computational biology : e1006513 : [DOI : 10.1371/journal.pcbi.1006513](https://doi.org/10.1371/journal.pcbi.1006513)

Marie Clémot, Anahi Molla-Herman, Juliette Mathieu, Jean-René Huynh, Nathalie Dostatni (2018 Aug 11)

The replicative histone chaperone CAF1 is essential for the maintenance of identity and genome integrity in adult stem cells.

Development (Cambridge, England) : [DOI : dev161190](https://doi.org/dev161190)

Anna M Lilja, Veronica Rodilla, Mathilde Huyghe, Edouard Hannezo, Camille Landragin, Olivier Renaud, Olivier Leroy, Steffen Rulands, Benjamin D Simons, Silvia Fre (2018 May 23)

Clonal analysis of Notch1-expressing cells reveals the existence of unipotent



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stem cells that retain long-term plasticity in the embryonic mammary gland.

Nature cell biology : [DOI : 10.1038/s41556-018-0108-1](https://doi.org/10.1038/s41556-018-0108-1)

Aaron Mendez-Bermudez, Liudmyla Lototska, Serge Bauwens, Marie-Josèphe Giraud-Panis, Olivier Croce, Karine Jamet, Agurtzane Irizar, Macarena Mowinckel, Stephane Koundrioukoff, Nicolas Nottet, Genevieve Almouzni, Mare-Paule Teulade-Fichou, Michael Schertzer, Mylène Perderiset, Arturo Londoño-Vallejo, Michelle Debatisse, Eric Gilson, Jing Ye (2018 May 3)

Genome-wide Control of Heterochromatin Replication by the Telomere Capping Protein TRF2

Molecular cell : 70 : 449-461.e5 : [DOI : 10.1016/j.molcel.2018.03.036](https://doi.org/10.1016/j.molcel.2018.03.036)